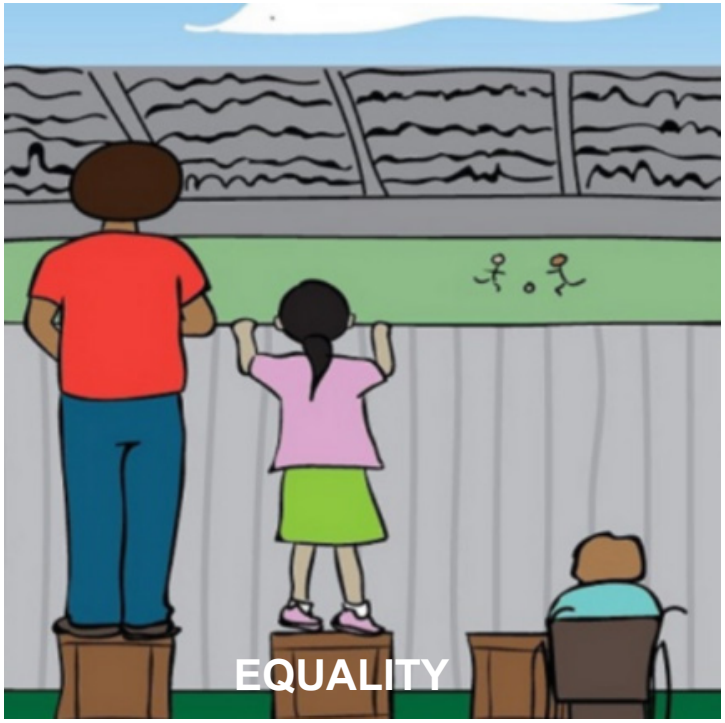
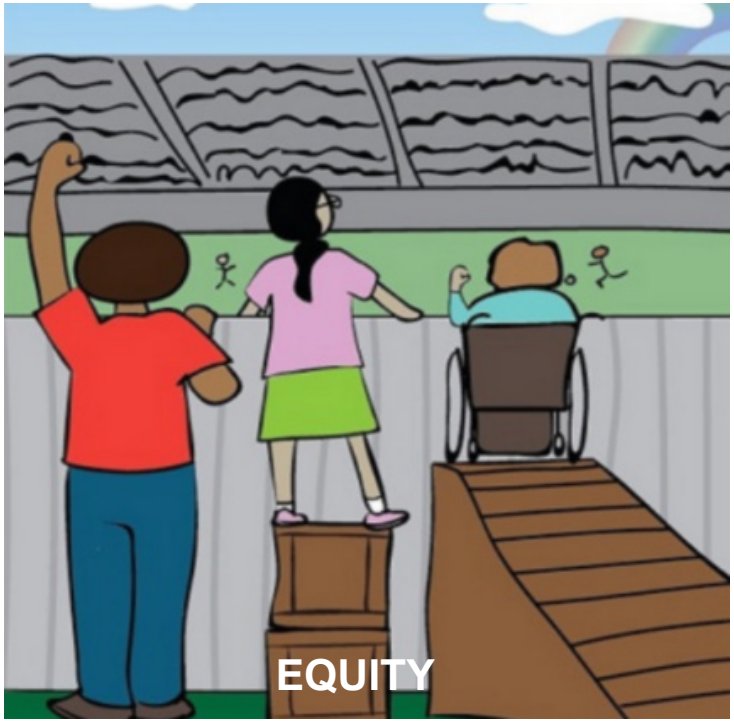
KCE REPORT 334S

Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

HEALTH SYSTEM PERFORMANCE ASSESSMENT: HOW EQUITABLE IS THE BELGIAN HEALTH SYSTEM?

SUPPLEMENT





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HEALTH SERVICES RESEARCH

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SUPPLEMENT

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COLOPHON

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1. APPENDIX ON INEQUITY IN HEALTHCARE USE

1.1. Reading manual

The reading manual provides information and background on how to read and interpret the detailed results on inequity for each of the indicators.

First, more information is given on the sample selection and sample descriptive statistics. Second, we define the population subgroups that are used to analyse trends over time in use and inequity in use. Third, we provide more information on the regression analysis, the output and the two-stage decision process that we apply for the indicators on contacts with healthcare providers, i.e. doctor consultations (GP and specialist combined), GP consultations, specialist consultations, contact with the emergency department (ED), inpatient admissions and day-care treatments. Fourth, we provide more detail on the scenarios that we use to make a distinction between sources of inequalities that lead to fair differences in care use and sources that lead to unfair differences. Fifth, more explanation is given on the concepts and measures that we use to summarize inequity, i.e. absolute versus relative disparity, the Gini index and the concentration index. Finally, we detail the structure in which we present the results for each indicator.

1.1.1. Sample and descriptive statistics

Each indicator is analysed using data from the EU-SILC/IMA-AIM coupled data (see Scientific report sections 1.3.1 and 2.3). The sample consists of all individuals in the EU-SILC waves 2008, 2012 and 2016, with four main exclusions (see also Table 1):

1. Individuals for which no national insurance number could be retrieved are excluded as no coupling is possible between EU-SILC and IMA-AIM data. It concerns 311, 135 and 28 individuals in 2008, 2012 and 2016, respectively.
2. Individuals that are not registered in the IMA-AIM data are excluded. These are mainly residents with EU citizenship, so likely working or having worked for an international organisation and not insured through the Belgian public health insurance. It concerns 393, 383 and 352 individuals in 2008, 2012 and 2016, respectively.
3. Individuals below 18 years. Important variables on health status are only recorded for respondents aged 16 or older. We have applied an age limit at 18 years, an age at which one is considered to be responsible for one's decisions and behaviour. It concerns 3 052, 2 896 and 2 891 individuals in 2008, 2012 and 2016, respectively.
4. Individuals with missing values on important covariates used in the regression model, such as self-reported health status, activity status, educational attainment. It concerns 496, 185 and 225 individuals in 2008, 2012 and 2016, respectively.

Table 1 – Impact of sample exclusions on sample size

	2008		2012		2016	
	Observations	Weighted observations	Observations	Weighted observations	Observations	Weighted observations
Total sample EU-SILC	15 108	10 549 076	13 951	10 903 470	13 773	11 269 856
Excluding individuals with missing national insurance number	14 797	10 348 151	13 816	10 821 258	13 745	11 250 044
Excluding individuals with missing link with IMA data	14 404	10 094 117	13 433	10 529 084	13 393	10 958 481
Excluding individuals below 18 years old	11 352	8 064 853	10 537	8 381 505	10 502	8 779 257
Excluding individuals with missing covariates for health status, activity status or educational attainment	10 856	7 705 916	10 352	8 250 623	10 277	8 619 050

Table 2 to Table 4 provide descriptive statistics (weighted mean, minimum and maximum) for all explanatory variables used in the regression model (see section 1.1.3). Where necessary, a definition of the variable is provided. Some important trends that can be discerned are (1) the ageing of the population (average age increases) (Table 2); (2) a deterioration of health status, i.e. higher fraction of individuals with (very) bad self-assessed health, higher fraction of individuals in invalidity or disability, higher fraction of individuals taking prescribed medication that is used to define the specific disorders (Table 2); (3) an increase in population share over time of the subpopulation at risk of poverty and the lower middle class (Table 3); (4) a decrease in population share over time of the subpopulation at work (Table 3); (5) a strong increase in the fraction of individuals entitled to increased reimbursement (Table 4).

Table 2 – Descriptive statistics of variables related to health status and morbidity

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Self-assessed health (EU-SILC data)									
Very good	26.6%	0	1	30.0%	0	1	29.0%	0	1
Good	47.7%	0	1	43.9%	0	1	44.1%	0	1
Fair	17.8%	0	1	17.0%	0	1	17.4%	0	1
Bad	6.6%	0	1	7.5%	0	1	7.4%	0	1

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**
Very bad	1.3%	0	1	1.6%	0	1	2.1%	0	1
Self-reported presence of chronic disorder(s) and/or limitations to daily activities (EU-SILC data)									
No chronic disorder, no limitations	70.1%	0	1	70.7%	0	1	69.0%	0	1
No chronic disorder, limitations	5.3%	0	1	4.2%	0	1	4.9%	0	1
Chronic disorder, no limitations	7.4%	0	1	7.0%	0	1	5.5%	0	1
Chronic disorder, limitations	17.2%	0	1	18.1%	0	1	20.6%	0	1
Entitled to lump sum chronic illness (IMA-AIM data)									
Yes	5.0%	0	1	6.2%	0	1	6.7%	0	1
Invalidity, disability and incapacity to work (IMA-AIM data on the receipt of allowance for at least one day). Individuals receive an allowance for incapacity to work in case of absence from work due to a medical condition for a period less than 1 year, an allowance for invalidity in case of absence from work due to a medical condition for a period exceeding 1 year, an allowance for disability in case the person is seriously physically or mentally impaired as evaluated according to an appropriate measure.									
Invalid or disabled (for at least 1 day).	3.6%	0	1	4.2%	0	1	5.0%	0	1
Incapacity to work (for at least 1 day).	4.9%	0	1	4.9%	0	1	4.8%	0	1
Morbidity based on prescribed medicine use (**IMA-AIM data** to define presence of disorder using the anatomical therapeutic chemical (ATC) classification of the medication and the daily defined dose (DDD), nomenclature codes, age and doctor consulted. Diseases with less than 1% prevalence are combined)[1]									
Cardiovascular disorder	25.2%	0	1	27.2%	0	1	27.6%	0	1
Thrombosis	6.5%	0	1	13.4%	0	1	14.4%	0	1
Chronic obstructive pulmonary disease	2.9%	0	1	3.3%	0	1	3.7%	0	1
Asthma	1.6%	0	1	2.2%	0	1	2.4%	0	1
Diabetes	5.0%	0	1	6.2%	0	1	6.8%	0	1
Epilepsy	1.3%	0	1	1.4%	0	1	1.8%	0	1
Thyroid disorder	4.1%	0	1	5.2%	0	1	5.7%	0	1

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**
Other neurological disorder (Parkinson, Alzheimer, psychosis)	1.6%	0	1	1.7%	0	1	2.0%	0	1
Other disorders (multiple sclerosis, HIV, hepatitis, Parkinson, psoriasis, Crohn, haemophilia, kidney, cystic fibrosis, transplantation, pancreas)	1.0%	0	1	1.3%	0	1	1.2%	0	1
Age and sex (EU-SILC data)									
Age	48.1	18	98	48.76	18	100	49.65	18	100
Male	48.7%	0	1	48.7%	0	1	48.1%	0	1
Male aged 18-34 years	13.6%	0	1	13.3%	0	1	12.9%	0	1
Female aged 18-34 years	13.2%	0	1	13.1%	0	1	13.0%	0	1
Male aged 35-49 years	13.8%	0	1	13.5%	0	1	12.2%	0	1
Female aged 35-49 years	13.8%	0	1	13.2%	0	1	12.4%	0	1
Male aged 50-64 years	12.4%	0	1	12.3%	0	1	12.6%	0	1
Female aged 50-64 years	12.6%	0	1	12.8%	0	1	13.0%	0	1
Male aged 65-79 years	7.1%	0	1	7.4%	0	1	7.9%	0	1
Female aged 65-79 years	8.4%	0	1	8.4%	0	1	9.5%	0	1
Male aged 80 years or more	1.9%	0	1	2.2%	0	1	2.6%	0	1
Female aged 80 years or more	3.3%	0	1	3.7%	0	1	4.0%	0	1

Table 3 – Descriptive statistics of variables related to sociodemographic characteristics and socioeconomic position

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**
Household composition (EU-SILC data)									
Single without children	19.3%	0	1	19.4%	0	1	18.7%	0	1
Single with children	3.8%	0	1	4.4%	0	1	3.9%	0	1
Couple without children	31.8%	0	1	31.2%	0	1	30.9%	0	1
Couple with children	27.6%	0	1	28.7%	0	1	28.6%	0	1
Other	17.5%	0	1	16.3%	0	1	17.8%	0	1
Place of residence (EU-SILC and IMA-AIM data)									
Wallonia	31.4%	0	1	31.7%	0	1	31.7%	0	1
Brussels	9.1%	0	1	9.5%	0	1	9.8%	0	1
Flanders	59.5%	0	1	58.8%	0	1	58.5%	0	1
Urbanization - dense	32.1%	0	1	34.3%	0	1	33.0%	0	1
Urbanization - medium	49.9%	0	1	47.9%	0	1	49.6%	0	1
Urbanization - thin	18.0%	0	1	17.8%	0	1	17.4%	0	1
Country of birth (EU-SILC data)									
Belgium	89.4%	0	1	85.6%	0	1	84.6%	0	1
Other	10.6%	0	1	14.4%	0	1	15.4%	0	1
Equivalized household disposable income (EU-SILC data)									
Income[a]	20 265	-15 062	638 000	21 961	-2 548	330 000	24 156	-1 025	279 463

[a] In rare occasions the household disposable income can be negative (e.g. income from self-employment can be negative when making a loss). It concerns 2 households in 2008, 6 households in 2012 and 1 household in 2016. The income is used as such when defining income groups or ranking households by income e.g. for the

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**
Income (natural logarithm, minimum income set at € 500)	9.79	6.21	13.37	9.88	6.21	12.71	9.99	6.21	12.54
Income (squared natural logarithm, minimum income set at € 500)	96.14	38.62	178.65	97.88	38.62	161.46	99.92	38.62	157.27
Middle class status (EU-SILC data)									
Household at risk of poverty (<60% of median income)	13.2%	0	1	14.3%	0	1	14.8%	0	1
Lower middle class ([60%-80%) of median income)	17.5%	0	1	18.8%	0	1	19.1%	0	1
Core middle class ([80%-120%) of median income)	33.6%	0	1	32.8%	0	1	32.4%	0	1
Upper middle class ([120%-200%) of median income)	30.6%	0	1	29.5%	0	1	28.8%	0	1
Top middle class (>=200% of median income)	5.1%	0	1	4.6%	0	1	4.9%	0	1
Severe material deprivation (**EU-SILC data,** based on the affordability of 9 items: (1) to pay rent or utility bills; (2) to keep the home adequately warm; (3) to face unexpected expenses; (4) to eat meat, fish or a protein equivalent every second day; (5) a week's holiday away from home; (6) a car; (7) a washing machine; (8) a colour TV; (9) a telephone)									
Severe material deprivation index (between 0 and 1 / 0 = all items affordable / 1/9 = 1 out of 9 items not affordable / … / 1 = all items not affordable)	0.08	0	0.89	0.09	0	1	0.08	0	0.89
Moderate material deprivation (inability to afford at least 2 out of the 9 items)	19.2%	0	1	21.0%	0	1	20.7%	0	1
Severe material deprivation (inability to afford at least 4 out of the 9 items)	4.7%	0	1	5.7%	0	1	5.1%	0	1
Activity status (EU-SILC data)									
Full-time employee	34.0%	0	1	32.8%	0	1	30.7%	0	1

concentration index (see section 1.1.5.2). The household income is set at € 500 when taking the logarithm of household income in the regression analysis (see section 1.1.3). These households are excluded when computing the redistributive effect (see section 1).

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Part-time employee	11.8%	0	1	12.7%	0	1	11.9%	0	1
Self-employed	6.4%	0	1	5.2%	0	1	5.5%	0	1
Unemployed	5.8%	0	1	6.2%	0	1	5.6%	0	1
Inactive	11.2%	0	1	12.1%	0	1	11.8%	0	1
Student	6.5%	0	1	6.8%	0	1	7.6%	0	1
Retired	24.4%	0	1	24.3%	0	1	26.9%	0	1
Education (highest degree achieved) (EU-SILC data)									
Primary or no degree	13.8%	0	1	14.3%	0	1	10.9%	0	1
Lower secondary	19.8%	0	1	17.2%	0	1	17.9%	0	1
Upper secondary	35.6%	0	1	35.4%	0	1	36.1%	0	1
Tertiary	30.9%	0	1	33.1%	0	1	35.2%	0	1

Table 4 – Descriptive statistics of variables related to the healthcare system

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Member of community health centre (IMA-AIM data)									
Yes	1.8%	0	1	2.6%	0	1	3.3%	0	1
Beneficiary of increased reimbursement – social MAB (IMA-AIM data)									
Yes	13.6%	0	1	17.3%	0	1	18.5%	0	1
Healthcare supply (density per 10 000 population, distance in km) (RIZIV-INAMI data)									
Density of GPs in municipality	11.75	0.00	24.78	11.29	3.69	31.68	11.67	4.58	31.08

	2008 (N=10 856)			2012 (N=10 352)			2016 (N=10 277)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Density of GPs in neighbouring municipalities	11.52	4.67	18.75	11.36	5.66	18.04	11.61	5.29	16.95
Density of specialists in municipality	12.95	0.00	67.11	12.61	0.00	65.40	13.01	0.00	75.12
Density of specialists in neighbouring municipalities	13.82	1.22	46.52	13.70	2.09	38.21	14.26	3.15	48.29
Density of doctors (GPs, specialists) in municipality	24.70	0.00	91.89	23.90	5.52	97.08	24.68	5.50	100.65
Density of doctors (GPs, specialists) in neighbouring municipalities	25.34	9.61	62.99	25.05	9.01	52.00	25.87	10.32	63.41
Density of dentists in municipality	7.53	0.00	22.22	7.38	1.32	23.14	7.73	1.49	25.06
Density of dentists in neighbouring municipalities	7.19	3.15	16.72	7.21	3.72	15.78	7.65	3.64	18.57
Density of psychiatrists in municipality	1.81	0.00	10.43	1.73	0.00	10.55	1.68	0.00	12.63
Density of psychiatrists in neighbouring municipalities	2.05	0.00	5.91	1.99	0.00	5.50	1.98	0.00	7.13
Distance to nearest ED	5.42	0.00	29.58	5.67	0.15	29.58	6.07	0.15	28.47

1.1.2. Choice and definition of population subgroups

We measure inequality and inequity in healthcare use at the individual level. However, it is also interesting to look into more detail at specific population subgroups as this may contribute to evidence-informed policymaking. In our analysis, we systematically single out a range of subgroups.

Socioeconomic population groups

Two subgroup classifications represent the socioeconomic position, income and education. Income and education were chosen because there is a natural order from a low income level or educational attainment to a high income level or educational attainment.

Income groups are defined as follows:

- At risk of poverty (less than 60% of median equivalized[b] household income)
- Lower middle class (60% to 80% of median equivalized household income)
- Core middle class (80% to 120% of median equivalized household income)
- Upper middle class (120% to 200% of median equivalized household income)
- Top middle class (200% or more of median equivalized household income)

Education groups are defined based on the highest degree obtained, classified in four broad categories:

- Primary education or no degree
- Lower secondary education
- Upper secondary education and post-secondary education
- Tertiary education

A more detailed classification is not desirable as there have been methodological changes in the survey question to determine the educational level of the respondents. Because of these changes, the question is different in 2008, 2012 and 2016, which may impact the relative shares of educational attainment. A more in-depth analysis of this issue is made in Van Dam & Bastaits (2018).[2] With this in mind and considering the descriptive statistics for education over the years (see Table 3), we take the stance that the evolution of educational attainment in the selected years is plausible and can be used to deduct policy relevant conclusions.

Population groups based on health status

We define population subgroups based on self-assessed health status. Five categories can be distinguished, again with a natural order (from very bad health to very good health):

- Very bad health status
- Bad health status
- Fair health status
- Good health status
- Very good health status

[b] The modified OECD equivalence scale is used (1 for the first adult, 0.5 for individuals aged 14 or more, 0.3 for individuals aged 13 or less). This scale is the default choice for the analysis of the EU-SILC by Eurostat.

Vulnerable population subgroups

We define a range of population subgroups identified as vulnerable, i.e. groups at increased risk of poverty and social exclusion. Most of these groups have been determined based on the annual reports on social protection in Belgium by the Federal Public Service Social Security.[3] In addition, we add the group of self-employed individuals as the insurance coverage of this group has changed in 2008 to include both major and minor risks[4], and the group of households with children at risk of poverty. There is partial overlap with some categories listed above, nonetheless for completeness and comparability, we choose to keep these population subgroups both as vulnerable group and as a category of income, education or self-assessed health. Also, some overlap exists between vulnerable groups which might belong to multiple categories linked to vulnerability.

- Population subgroups at risk based on needs
  - Individuals with (very) bad self-assessed health status (combination of categories very bad and bad self-assessed health)
  - Individuals who report a chronic disorder and limitation to daily activities
  - Individuals aged 80 years or more
  - Individuals who receive invalidity or disability allowance
- Population subgroups in a financially vulnerable situation
  - Unemployed individuals (aged 18-65)
  - Single (aged 18-65)
  - Adult in single parent household
  - Adult in household with children, at risk of poverty (less than 60% of median equivalized household income)
  - Individuals with low educational attainment (combination of categories primary education or no degree, and lower secondary education)
- Population subgroups of interest related to the health system
  - Self-employed individuals (aged 18-65)
  - Individuals with increased reimbursement status

1.1.3. Regression analysis

The methodology we apply to evaluate inequity in healthcare use, is based on the fairness gap as proposed by Fleurbaey and Schokkaert (2009, 2011),[5, 6] which is a generalization of the evaluation of horizontal inequity in healthcare as studied amongst other by the OECD.[7, 8] The methodology is explained in the Scientific report section 2.4.2 and more specifically in Box 5. The first step is to estimate the relation between healthcare use – as captured by one of the proposed indicators (see Scientific report section 2.2) – and a range of variables that potentially affect healthcare use, such as health status (self-reported health, age, sex, etc.); socioeconomic and sociodemographic features (education, activity status, income, material deprivation, increased reimbursement status, household composition etc.); (place of) residence; and supply side factors (density of doctors, distance to hospital). This relation is empirically estimated by a parametric regression model.

1.1.3.1. Two-stage decision process for contacts with healthcare providers

For the indicators on contacts with healthcare providers in the past year, i.e. doctor consultations (GP and specialist combined), GP consultations, specialist consultations, contact with the emergency department (ED), inpatient admissions and day-care treatments, we estimate two relations: (1) the probability of use, i.e. the probability to have at least one such contact in the past year, and (2) the intensity of use, i.e. the number of contacts in the past year given at least one contact.

Why a two-stage decision process?

There are two important arguments in favour of such two-stage process, one substantive and one technical.

The substantive argument is that the decision to seek care is made by the patient, while the intensity of care is determined by the provider, as emphasized in the theory on principal-agent relationship between doctor and patient. The principal-agent relationship makes a distinction between the patient initiated decision to seek care, such as the first contact with a general practitioner (GP) or specialist, and decisions that are influenced by the physician, such as repeat visits, prescriptions, and referrals.[9] One drawback of the model is that the healthcare contacts are registered per calendar year. In a year multiple spells of illness can occur that each may provoke the principal-agent decision process. Moreover, the participation decision and the repeat contacts do not necessarily occur in the same calendar year. Nonetheless, it has been shown that the two-part model is well suited to model healthcare contacts that occur less frequently, such as e.g. specialist consultations or hospital care.[9]

The technical argument is that contacts with healthcare providers, such as physician consultations, visits to the ED or inpatient admissions, are known to have a skewed distribution with an important share or even the majority of individuals having no or few contacts and only a small proportion reporting frequent use.[9] A standard (integer) count model, such as the Poisson model or the negative binomial model, that estimates and predicts the number of contacts is not suited to deal with such skewed distribution as it can only partly account for the large number of no contacts. Therefore, a better alternative is to predict the probability of having a contact or not in a first step, so that one can account for the important share of individuals without contacts, and, in a second, separate step estimate the number of contacts conditional on having at least one contact.

How is it implemented?

In the two-stage process, the decision to seek care and the intensity of care are estimated separately and with different regression models. This is a strength of the two-part model as the socioeconomic and sociodemographic characteristics may be associated differently with the participation decision and the intensity of care. By differentiating between both processes, this can be revealed. Therefore it can e.g. be possible that individuals with financial difficulties have a lower probability to consult a GP relative to individuals without financial difficulties, but once the step to consult a GP is taken, the intensity of care is higher among individuals with financial difficulties.

The first stage, i.e. the decision to seek care, is binary in nature, either one has a contact with a provider or not. This stage is estimated using a probit regression model, a model specifically for binary outcome variables. The second stage, i.e. the intensity of care, relates to the number of contacts and is modelled using a count model applied to the subsample of individuals with at least one contact. It is therefore a conditional count model, conditional on seeking care. In this way the group of individuals without any contact do not interfere in the estimation of the count model. A truncated negative binomial regression model is used when possible, but in case the model fails to converge, a generalized negative binomial regression model is used.

1.1.3.2. Estimating the regression model

The indicators evaluated in this report are *either binary* in nature meaning that you can have two outcomes, e.g. participation or not in breast cancer screening in the past two years, regular contact or not with a dentist over a period of three years, use or not of antidepressant medication in the past year, consultation or not of a GP in the past year etc., *or count variables*, e.g. the number of contacts, treatments or admissions in the past year. In the first case, we apply a probit regression model. In the second case, we apply a truncated or generalized negative binomial count regression model on the observations with positive healthcare use (see section 1.1.3.1). In both cases, we account for the survey sampling design to compute standard errors.

Multiple models are estimated and presented for each indicator. In a first step, we start with a model with observations of all years pooled together and with a large range of explanatory variables, *the full pooled model*. The explanatory or independent variables include information on, amongst others, age and sex; self-reported health status; information on chronic disorders derived from prescribed medication use; health status derived from administrative information on invalidity, incapacity and disability; socioeconomic information on activity status, educational attainment, income and material deprivation; increased reimbursement status; household composition; place of residence; country of birth; supply of healthcare providers in the municipality and neighbouring municipalities. An overview of the explanatory variables is given in section 1.1.1. The pooled regression model includes time dummies and time-specific effects for self-employment status and increased reimbursement status, as the eligibility criteria and benefits of the latter have changed over time.

In a second step, the number of variables is reduced using a backward-model-selection process applied to the full, pooled model. A backward-selection process starts from the full model and removes the least significant variable whose p-value is above a pre-set threshold, re-estimates the model without the removed variables and repeats the removal procedure. The process is complete when the p-value for all remaining variables is below the pre-set threshold. We performed the stepwise backward-selection procedure with p=0.15 as threshold on the pooled sample. Self-assessed health, time dummies and increased reimbursement status are always kept in the model irrespective of the significance level. Variables with multiple categories, e.g. educational attainment (primary or no degree, lower secondary, upper secondary and tertiary) are assessed as one variable in the selection procedures (as opposed to the alternative approach of assessing each category separately). This results in a *reduced pooled model*.

In a third step, the reduced model is estimated for each year separately. The *year-specific reduced models* are used to calculate the fairness gap and to correct healthcare use for healthcare needs (see Scientific report section 2.4.2 for the methodology of the fairness gap).

1.1.3.3. Output of the regression model

The regression output are average marginal effects. This means that marginal effects are computed for each observation separately and averaged over the population. For binary explanatory variables – e.g. is Brussels your region of residence (yes or no)? – a marginal effect indicates the impact on the value of the indicator of belonging to the specific category (e.g. living in Brussels). For continuous explanatory variables, e.g. income, a marginal effect indicates the impact of having one additional unit of the explanatory variable on the value of the indicator (e.g. € 1 additional income).

In case of binary indicators, the marginal effect is expressed in terms of percentage points of e.g. the vaccination rate, the probability of having a contact with a provider, the usage rate of medication etc. In case of count variables, the marginal effect is expressed in terms of contacts/consultations/admissions. All effects should be interpreted as associations and not as causal effects.

1.1.4. Inequity: fair and unfair sources of inequality

The horizontal equity principle posits that an equitable health system should provide equal treatment of people with the same health needs, irrespective of other characteristics such as income, race, place of residence, etc. Hence, differences in healthcare use are considered fair if they are related to healthcare needs, and unfair if they result from access difficulties related to e.g. capacity to pay, health literacy or any kind of discrimination. Our empirical strategy, based on the fairness gap, aims to evaluate the horizontal equity principle (see Scientific report section 2.4.2).

Although the horizontal equity principle is conceptually clear, its application is less straightforward. As discussed in section 1.1.4.1, different perspectives can be taken on the measurement of healthcare needs, potentially leading to different results. Second, once healthcare needs are defined, the division between fair and unfair sources of inequalities becomes clear. Both sources are treated differently in the computation of the fairness gap (see Scientific report, Box 5). In the computation, the observed values are used for variables considered to be fair, while reference values are used

to neutralize variables deemed to lead to unfair differences. The reference values are discussed in section 1.1.4.2.

1.1.4.1. Different perspectives on healthcare needs

The measurement of healthcare needs remains a difficult issue. Certain characteristics – at least in the imperfect way that we can measure them – combine elements of needs and access difficulties (e.g. financial resources, discrimination, health literacy, reduced own contributions etc.). As explained in the Scientific report section 2.4.3, it is therefore advisable to perform a sensitivity analysis on the definition of healthcare needs. We propose four different scenarios to define healthcare needs and Table 5 list the variables used a proxy for healthcare in the different scenarios:

1. **Inequality scenario.** No adjustments to healthcare needs are made. This scenario is relevant for certain types of preventive care (e.g. preventive dental care), where one could argue that differences in health needs are irrelevant, as prevention is important and valuable irrespective of needs in order to preserve one's health status.
2. **Baseline inequity scenario.** Healthcare needs are interpreted in a narrow sense, i.e. the observed differences in health status and co-morbidities. This scenario is in line with the traditional approach in the literature.[7, 8, 10-13]
3. **Net effect needs-access scenario.** Healthcare needs are interpreted more broadly. The effect of socioeconomic status and insurance status on healthcare use is seen as a trade-off between the effect of healthcare needs (i.e. a higher use for individuals with higher healthcare needs) and the effect of access barriers (i.e. a lower care use of individuals facing access barriers). For example, severe material deprivation is associated with higher healthcare needs (see Scientific report section 2.4.1), which might lead to higher care use; individuals with severe material deprivation are at the same time confronted with more stringent (financial) barriers to access healthcare, which might lead to lower use of healthcare. In the net effect scenario, socioeconomic status is considered as a proxy for needs in case the needs-effects dominates the access-effect. In that case, the higher use by these individuals will be considered fair.
4. **Baseline-residual scenario.** In addition to the baseline definition of healthcare needs, the variability left unexplained by the regression model is considered a fair source of inequalities. The unexplained variation can be interpreted as the combined effect of individual preferences, availability/absence of information, unmeasured barriers in access, unmeasured factors such as lifestyle, unmeasured aspects of health needs, social background, luck, etc. Given that unmeasured preferences are treated as a fair source of differences, this scenario is more in line with equality of access.

Table 5 – Variables used a proxy for healthcare needs

Scenario	Correction for and interpretation of healthcare needs
Inequality	None
Baseline inequity scenario	Age, sex, self-assessed health, self-reported presence of chronic disorder(s) and/or limitations to daily activities, health profile from administrative sources (invalidity, incapacity, disability, entitlement to lump sum chronic illness), presence of chronic conditions based on prescribed medicine use
Net effect needs-access inequity scenario	Baseline definition + all socioeconomic and sociodemographic information that is positively associated with healthcare use. This potentially includes equivalized household income, activity status, educational attainment, material deprivation, increased reimbursement status, household composition, country of birth.
Baseline-residual inequity scenario	Baseline definition + variability left unexplained (residual)

An additional issue is that – given the available information – we are not able to determine whether or not the use of care was appropriate or optimal or that, on the other hand, under- or overconsumption took place. As our main focus is on an equitable distribution of healthcare use, we will disregard such efficiency considerations. Therefore, variables related to the place of residence (such as region and urbanization) and registration in a community health centre are considered as mere control variables and are treated in the same way as fair differences; i.e. they do not lead to inequity. Place of residence variables capture a wide range of effects, going from regional differences in societal preferences, differences in care organization that lead to efficiency differences, regional practice variation, population ageing, supply availability, etc. Care in community health centres is organized and financed in a different way, with a multidisciplinary approach (jointly providing GP care, nursing care, psychological care, physiotherapy, dietary advice) and without out-of-pocket payments for the patient at the point of consumption. Moreover, these centres are not uniformly available throughout the country.[14] Variables that are more directly related to healthcare supply, such as the density of or distance to healthcare providers, are considered to capture access barriers and are hence treated as unfair differences in healthcare use.

1.1.4.2. Reference values

In order to determine the fairness gap, a needs-adjusted norm value is computed (see Scientific report, section 2.4.2). In order to neutralize disparities in healthcare use that are considered to be unfair, a reference profile is applied. Traditionally, average values were chosen as reference values under the premise that "*the system gets it right on average*", but Fleurbaey and Schokkaert (2009) argue that it might be more plausible to select reference values that represent the best or optimal situation.[5] However, it is not always clear what the optimal situation is with regard to healthcare use as it would require an evaluation of the appropriateness of healthcare use. Moreover for each type of healthcare, the best situation could be represented by a different set of reference values. In our evaluation, we opt for one reference set for all indicators that reflect a person having all the opportunities (time, resources, cognitive ability, availability of care etc.) to make an appropriate decision with respect to healthcare use.

Table 6 lists the applied reference values. Hence the needs-adjusted norm use for a person with a certain health profile (e.g. health status, age and sex), can be interpreted as the healthcare use of a person with that particular health profile and all the reference characteristics with respect to the variables leading to unfair differences (e.g. not at risk of poverty, with a degree of tertiary education, working full time etc.).

Table 6 – Set of reference values

Variable	Reference value if variable is classified as illegitimate
Household equivalent income	200% of median household equivalent income, considered as the frontier between upper middle class and top middle class
At risk of poverty	Not at risk
Index of material deprivation	No material deprivation
Education	Tertiary education
Occupation	Full time employee
Region of residence	Flanders
Beneficiary of increased reimbursement	No beneficiary
Member of medical house	No member
Healthcare supply	Median density of doctors, median distance to ED in the survey year
Partner	Has partner
Household type	Couple without children

1.1.5. Measurement of inequity

There are many different ways to summarize inequalities and inequities. The choice of appropriate disparity measures is important as different measures have distinct underlying value judgements and might therefore lead to different results. An overview of different statistical measures can be found amongst others in Harper and Lynch (2006, 2007) and Spinakis et al. (2011).[15-17]

We do not present only one specific measure, but provide different viewpoints on what constitutes an improvement with regard to disparities. Therefore, we present results from both absolute and relative measures of disparity (see section 1.1.5.1). Second, we summarize disparities in three ways: (1) the Gini index to evaluate inequity in the fairness gap over time; (2) the concentration index to evaluate systematic inequity in the fairness gap over time related to a specific characteristic, such as income, educational attainment and self-assessed health; (3) the deviation in the average fairness gap between the population and various subgroups (see section 1.1.2 for more information on the subgroups). Section 1.1.5.2 provides more information on the Gini index and the concentration index.

1.1.5.1. Absolute, relative and reversed relative disparity

Disparities can be measured in relative or absolute terms. Relative and absolute disparity measures have different underlying value judgements. They may yield different or even opposing patterns of the evolution of (in)equity or (in)equality over time and taken together, they provide a more accurate and complete description. Disparity measures often have an absolute and relative version.

Absolute disparity is about differences in events between population groups. The magnitude of the disparity is expressed in the same measurement unit as the indicator (e.g. number of consultations, prevalence, vaccination rate, cases etc.). An equal absolute change (addition or subtraction) leaves (in)equality or (in)equity calculated by an absolute disparity measure unchanged, i.e. the disparity score remains the same.

Relative disparity is about the ratio of an event occurring in one group relative to a reference. This reference can be another population group, the population mean, or any other norm. Relative measures are invariant to an equiproportional change, i.e. the same percentage increase or decrease. They are more frequently used to address (in)equalities or (in)equities than absolute measures.

The majority of indicators that we evaluate are binary in nature, meaning that you can have two outcomes (e.g. participation or not in breast cancer screening in the past two years, regular contact or not with a dentist over a period of three years, use or not of antidepressant medication in the past year etc.). This provides a further complication to the analysis as the indicator can be expressed in terms of attainments (i.e. participation, contact, use etc.) or reverse, as shortfalls (non-participation, absence of contact, non-use etc.). While absolute inequity is the same in either definition, it has been shown that the definition as shortfall or attainment might lead to different conclusions with respect to equity when using a relative disparity measure (for an example, see Box 1).

Given that absolute disparities are invariant to the definition of the indicator, this is our preferred perspective. Nonetheless, for binary indicators, both relative perspectives are presented in the assessment of the indicator in addition to the absolute disparity, i.e. the original definition of the indicator as either an attainment or shortfall in the KCE HSPA report of 2019 and the reverse perspective.[18] We define this as relative disparity and reversed relative disparity, respectively. For indicators that are not binary in nature, no reverse situation can be defined.

Box 1 – Example for absolute, relative and reversed relative disparity for influenza vaccination

Consider a population with an influenza vaccination rate of 50%. A subdivision can be made between two population subgroups of equal size. The influenza vaccination rate equals 60% and 40% in group A and B, respectively. The rate difference, an absolute disparity measure, would calculate the gap between both groups, i.e. 20 percentage points ($= 60\% - 40\%$). The rate ratio, a relative disparity measure, would evaluate the ratio between both 1.5 ($= 60\%/40\%$).

Imagine that different policy options are suggested to improve the take-up of the vaccine, each leading to an overall increase from 50% to 60% for the population, but with a different impact in each population subgroup. As will be explained, the policy options are evaluated differently with respect to the evolution in disparities. The presented policy options are merely illustrative and entail by no means a recommendation. The aim is to show that different disparity measures provide different and complementary information and that their combined information may contribute to the evaluation of (in)equities.

A *first policy option* would increase vaccination take-up by 20%, i.e. to 72% and 48% respectively in group A and B. This policy respects relative disparities as the rate ratio is unchanged at 1.5 ($= 72\%/48\%$). However, as a result of this policy, absolute inequalities have increased with the rate difference increasing to 24 percentage points ($= 72\% - 48\%$).

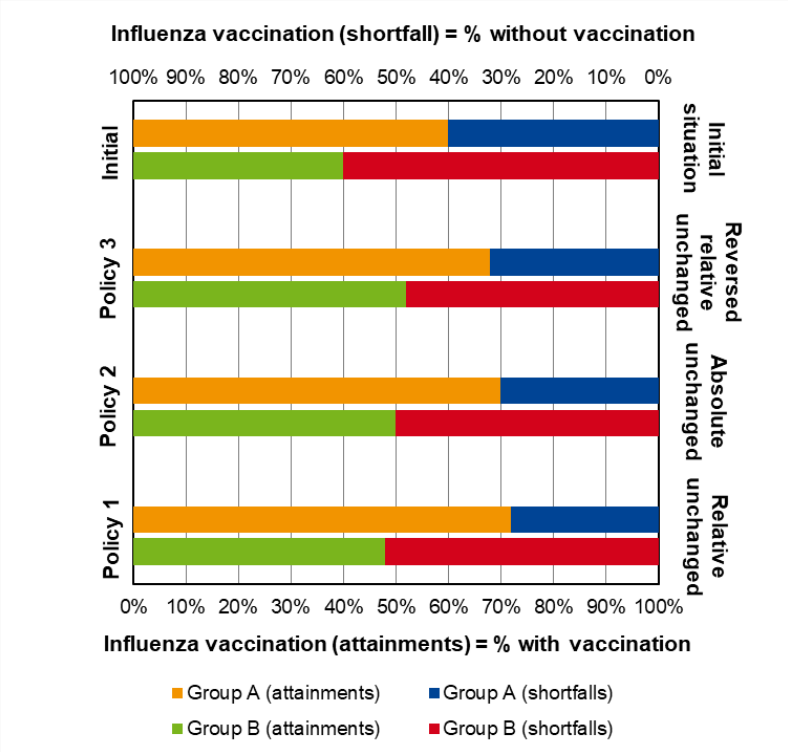
A *second policy option* would lead to an equal absolute increase of 10 percentage points in each group and would bring the vaccination rate at 70% and 50% respectively for group A and B. This policy keeps absolute disparities unchanged, the rate difference still amounts to 20 percentage points ($= 70\% - 50\%$). However, relative disparities have decreased as the rate ratio has lowered to 1.4 ($= 70\%/50\%$).

Reverse relative disparity

Some policymakers propose that policy goals should be set in terms of non-take-up of influenza vaccination (shortfalls) rather than take-up. Non-take-up in group A amounts to 40% and in group B to 60%. The reversed rate ratio amounts to 0.67 ($= 40\%/60\%$). The absolute disparity remains unchanged (in absolute terms) at 20 percentage points ($= 60\% - 40\%$).

A *third policy option* aims to reduce non-take-up by 20%, to 32% and 48% for group A and B, respectively. This policy keeps the reversed relative disparity unchanged at 0.67 ($= 32\%/48\%$). However, both the absolute disparities (16 percentage points = $48\% - 32\%$)) and the relative disparities (in terms of attainments) (1.31 $= 68\%/52\%$) have decreased.

Figure 1 – Illustration of absolute, relative and reversed relative changes



1.1.5.2. Gini coefficient and concentration index

A wide range of disparity measures exist. In this report we have opted for the well-known (and related) Gini index and concentration index. Both have an absolute and a relative version.

Gini coefficient

The Gini coefficient is a commonly used measure of disparity in policy research, particularly when measuring income inequalities. The observed disparity is summarized in one single score, which makes it easy to grasp the evolution over time. Higher values of the Gini coefficient indicate a higher level of disparity.

In case the values of the evaluated indicator are positive, the *relative version of the Gini coefficient* is bounded between 0 and 1, with a value of 0 indicating perfect equality/equity and a value of 1 perfect inequality/inequity. The relative version of the Gini coefficient is invariant to an equal proportional change for everyone. The relative Gini coefficient is often represented by the area between a Lorenz curve and the perfect-equality diagonal. The Lorenz curve represents the concentration of the indicator among the population when individuals are ranked from low to high according to the indicator value.

Remember that the fairness gap is equal to the difference between the actual value of the indicator (HC_i) and the needs-expected value ($\widehat{HC}_i$) (see Scientific report Box 5): $FG_i = HC_i - \widehat{HC}_i$. Because the value of the relative Gini is sensitive to the mean, we augment the fairness gap by an equal amount for each individual so that the average fairness gap equals the average of the observed indicator value. Despite this increase, the values of the adjusted fairness gap can still be negative, implying that the relative Gini coefficient is no longer restricted to the range 0 to 1. We, however, apply the normalisation proposed by Raffinetti et al. (2015) to ensure that the range of the relative Gini coefficient is bounded between 0 and 1 in case of negative values.[19]

Mathematically, the relative Gini coefficient (G) equals:

$$G = \frac{1}{2n^2\mu}\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|$$

Where n is the number of individuals (or groups) which are compared, μ is the population average of the evaluated indicator, y_i is the indicator value for individual (group) i and y_j is the indicator value for individual (group) j. Hence, contrary to other disparity measures, such as the rate difference and rate range, the Gini coefficient (as well as the concentration index discussed below) takes advantage of the information on all individuals or households; all inter-individual (or inter-group) comparisons are made, their absolute value summed together and divided by the product of the squared observations and the mean.

The correction proposed by Raffinetti et al. (2015) replaces the population average μ by a higher value $\mu^* = \frac{1}{N}(T^+ + T^-)$ with T^+ equal to the sum of all positive indicator values and T^- the absolute sum of all negative indicator values.[19]

The *absolute Gini coefficient* equals the relative Gini coefficient multiplied by the average value. The value of the absolute Gini is invariant to an equal absolute change (addition or subtraction) for everyone. The absolute Gini (A) equals:

$$A = \mu G = \frac{1}{2n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|$$

Concentration index

The concentration index is a standard disparity measure to assess systematic socioeconomic inequities in the economics literature. It is related to Gini coefficient and summarizes the observed inequity in one single score, which makes it easy to grasp the evolution over time. The concentration index measures the extent to which the healthcare indicator, e.g. having a contact with a GP or specialist in the past year, is concentrated among individuals when those individuals are ranked by socioeconomic status, i.e.

from a low income to a high income or from a low educational attainment to a high educational attainment. The concentration index does not single out one specific income or education subgroup, but uses the entire distribution of income and education levels to summarize the disparity in a single score. Besides socioeconomic status, other ranking variables such as self-assessed can be used, as long as there is a natural ranking in the variable.

The standard (relative) concentration index is often represented by the area between a concentration curve and the perfect-equality diagonal; its value is bounded between -1 and 1. The concentration curve plots the cumulative distribution of the evaluated indicator as a function of the population ranked by the ranking variable, e.g. some feature of socioeconomic status. The concentration curve can be above and/or below the diagonal, leading to negative and positive values for the concentration index, respectively. Positive values for the concentration index indicate higher concentrations of the evaluated indicator in the upper middle or top of the distribution, while negative values imply a higher concentration of the evaluated indicator in the bottom/lower middle of the distribution. A zero value of the concentration index indicates the absence of systematic inequity by socioeconomic status.

In the analysis, we use the generalized or absolute version of the concentration index. In this way, the evaluation of socioeconomic inequity in healthcare use for binary indicators is unaffected by the definition of the indicators in term of attainments or shortfalls (see section 1.1.5.1).

Tukey's honest significant difference test

The significance of changes in the Gini coefficient and the concentration index over time are assessed using Tukey's honest significant difference test. This test allows for a pairwise comparison of two means, and provides a correction for the number of tests that are performed. Given that we compare the values of 2008, 2012 and 2016, three pairwise comparisons are made (2008-2012, 2012-2016, 2008-2016).

Weakness of summary scores

The ease of one summary score to capture disparities is, however, not only a major strength but can also be a drawback. An improvement in the summary score can be the result of either an improvement in the indicator value (e.g. influenza vaccination coverage, breast cancer screening, regular contact with a dentist or other healthcare provider) among worse performing population subgroups, a deterioration among better performing population groups, or a combination of both. Different underlying effects might entail a different policy approach. Therefore every (in)equity measurement should be complemented with a review of the evolution of the evaluated indicator for different population subgroups.

1.1.6. Structure of the result for the indicators

The presentation of the results for each indicator follow the same structure.

1.1.6.1. Summary

First we specify how the indicator is calculated. Second, the key points that emerge from the analysis are summarized in a box.

1.1.6.2. Evolution over time of the indicator in the population and in population subgroups

First, the evolution of the indicator in the EU-SILC/IMA-AIM survey sample is presented. For binary indicators, we also present the reversed value of the indicator, because the assessment of inequity can be different depending on the definition of the binary indicator as attainment or shortfall (see section 1.1.5.1).

Second, the indicators on healthcare use that are assessed in this report are selected from the KCE HSPA report of 2019.[18] In the HSPA report, they were analysed and evaluated at the population level using the IMA-AIM data on the entire Belgian population. In this report, we use coupled EU-SILC/IMA-AIM survey data and the selected indicators need to be replicated on this sample. To have confidence in the representativeness of the survey sample and generalizability of the results, we performed a validation by checking

whether the population (macro) values calculated on the entire IMA-AIM database could be reproduced using the much smaller EU-SILC/IMA-AIM sample. The population values were obtained from the KCE HSPA report or the IMA-AIM atlas.[18, 20] For some indicators no population data were available and no validation check could be performed.

Third, the evolution of the indicator in various population subgroups (see section 1.1.2) is presented. This is the evolution of the indicator prior to correction for healthcare needs. As discussed in section 1.1.5.2, it is important to review the evolution of the indicator over time in different subgroups, as a deterioration in inequity over time can be the result of various underlying effects. It can be driven by a deterioration of the indicator value among worse performing population subgroups, an improvement among better performing population groups, or a combination of both. Different underlying effects might demand different policy measures.

1.1.6.3. Regression output

As discussed in section 1.1.3, binary indicators, e.g. the probability to consult a GP in the past year, are assessed using a probit model, while count variables, e.g. the number of GP consultations in the past year are assessed using a truncated or generalized negative binomial count model. For each indicator, the average marginal effects of 5 models are presented: the full pooled model, the reduced pooled model, and the year-specific reduced models for 2008, 2012 and 2016. The output provides information on the associations between the indicator and the different explanatory variables.

1.1.6.4. Overview inequity and evolution in the different scenarios

In this section, we analyse the fairness gap calculated according to the methodology discussed in the Scientific report section 2.4 and using different definitions for healthcare needs (see section 1.1.4.1). The inequity in the fairness gap of the indicator at the population level is summarized using the relative and absolute Gini coefficient (see section 1.1.5.2).

First, a figure visualizes the absolute Gini coefficient for the inequality scenario, the baseline inequity scenario and net effect needs-access inequity scenario (see section 1.1.4.1). For the latter two scenarios, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in healthcare use
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in healthcare use.

For all indicators, there is an important gap between both approaches, with a much lower Gini coefficient when using the alternative approach. This implies that an important part of healthcare use is in fact left unexplained by the explanatory variables at our disposal.

Second, a table summarizes the evolution of inequity in the fairness gap as summarized by the absolute Gini coefficient, the relative Gini coefficient and the relative Gini coefficient for the reversed indicator (in case of a binary indicator). The significance of the differences over time is assessed using Tukey's Honest Significant Difference (HSD) test (see section 1.1.5.2). An arrow indicates an upward, downward or stable trend over time.

1.1.6.5. *Overview inequity over time for different population subgroups*

In this section, two figures present the deviation in the average fairness gap between the population and various subgroups in the different years and for the different scenarios (see section 1.1.2 for more information on the subgroups and section 1.1.4.1 for the different scenarios). The results not only permit an evaluation in terms of the population average, it is also possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

A third figure in this section shows the absolute concentration index of the fairness gap to assess systematic inequity related to self-assessed health, educational attainment and income for the different inequity scenarios. Instead of comparing population (subgroup) averages, the concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher concentrations of the evaluated indicator (after correcting for healthcare needs!) among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher concentrations of the evaluated indicator (after correcting for healthcare needs!) among individuals with better self-assessed health, a higher education degree and higher income. A zero or insignificant value of the concentration index indicates the absence of systematic inequity by socioeconomic status.

1.2. Doctor consultations (GP and specialist consultations combined)

1.2.1. *Summary*

We analyse inequity in doctor consultations over the past 12 months. In what follows, the term doctor consultation refers to a consultation of either a GP or a specialist. Two types of utilisation are examined consecutively, the probability of a consultation and the number of consultations given at least one consultation. Individuals who are registered in a community health centre are excluded from the analysis as no registration in IMA-AIM is made for a GP consultation.

GP consultations and visits are identified by the combination of

- the nomenclature code (variable ss00020 in IMA-AIM GZSS database): 101010, 101032, 101076, 102410, 102432, 102454, 102476, 101091, 101113, 103110, 103132, 103213, 103235, 103412, 103434, 104296, 104311, 104333, 104591, 104613, 104635, 104215, 104230, 104252, 104510, 104532, 104554
- the qualification of the healthcare provider (variable ss00065B in IMA-AIM GZSS database) equal to 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9

Specialist consultations are identified by the combination of

- the nomenclature code (variable ss00020 in IMA-AIM GZSS database): 103213, 103530, 101275, 104694, 103611, 103832, 102933, 104532, 104871, 103935, 103773, 104414, 104230, 104576, 104834, 104134, 104554, 109410, 102734, 102874, 102211, 102955, 102174, 109336 , 102896, 102196, 102911, 102712, 102815, 102675, 103810, 102535, 101054, 102034, 103110, 102970, 102292, 102830, 102336, 103471, 103014, 104370, 102616, 104451, 103670, 104856, 102756, 103751, 103552, 103950, 104753, 102992, 102594, 103132, 104156, 103073, 103736, 103714, 104672, 103456, 102270, 101290, 103633, 103235, 109395, 102351, 102653, 103434, 102152, 109432, 102314, 102012, 109675, 109454, 102550, 109351, 102071, 102373, 103913, 104812, 104252, 103412, 109373, 102115, 104392, 104716, 104112, 103353,

102572, 102255, 104215, 103051, 104510, 104731, 103316, 103795, 103331, 102093, 102130, 104274, 103515, 103655, 102631, 104436, 102690

- the qualification of the healthcare provider (variable ss00065B in IMA-AIM GZSS database) not equal to 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9

Key points inequity in doctor consultations in the past year

- Doctors (GP and specialist combined) are fairly accessible. About 90% of the population has consulted a doctor in the past year; above 95% among higher care groups. The average annual number of consultations (among those consulting a doctor) has increased from 8.5 in 2008 to 9.3 in 2016 among the survey sample (18+).

Probability to consult a doctor

- Affected by both healthcare needs and socioeconomic status. **Main associations (regression):**
  - Health status: higher probabilities for individuals incapacitated from work; for a large range of disorders as defined by prescribed medication use; and females (in the age category 18-64). Weak association with self-reported health status.
  - Lower probabilities for individuals with material deprivation; the inactive and unemployed; and the self-employed, especially (but not exclusively) in 2008 around the time of the change in insurance coverage for this group.
  - Higher probabilities for individuals who benefit from increased reimbursement.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Small (but increasing) systematic socioeconomic inequity by income level with above-average probabilities among individuals in core/upper middle class; below-average probabilities among individuals at risk of poverty and in lower middle class; and below-average (but rapidly increasing) probabilities in top middle class.
  - No systematic inequities by educational attainment.
  - Among the groups of interest, probabilities below the population mean are found for individuals at risk of poverty, the unemployed, individuals with severe material deprivation, singles between 18 and 65 and the self-employed. For the latter three groups, the situation is relatively improving. For households with children at risk of poverty, the situation is relatively deteriorating.
  - Compared to other individuals in a difficult financial situation, i.e. individuals at risk of poverty, the unemployed and individuals with severe material deprivation, those who benefit from increased reimbursement have a higher probability, in line with the needs corrected population average, suggesting an improved accessibility for this group, that does not extend to other financially vulnerable groups.

Conditional number of doctor consultations

- Strong association with healthcare needs and to a limited extent with socioeconomic status. **Main associations (regression):**
  - Health status: more consultations for worse self-reported health (fair, bad or very bad self-assessed health, presence of chronic disorder, limitations to daily activities); for individuals incapacitated from work; for individuals eligible for the lump sum chronic illness; for individuals with invalidity/disability; in higher age groups; for females (in the age category 18-64); and for individuals who take medication for asthma, cardiovascular disease, thrombosis and epilepsy.
  - Fewer consultations are found for the unemployed, self-employed and students (relative to full-time employees); individuals with lower income; individuals living in Wallonia.

- More consultations are found for individuals who benefit from increased reimbursement.

- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Conditional number of doctor consultations below the population mean for the unemployed; for individuals with severe material deprivation in 2008; for single parents in 2008; for individuals at risk of poverty; and individuals with higher care needs (especially in 2008 and 2012), i.e. bad or very bad self-assessed health, presence of chronic disorder and limitations to daily activities, invalidity/disability and high age.
  - Systematic inequities (borderline significant in the baseline horizontal inequity scenario, more pronounced in the net effect needs-access scenario) in favour of individuals with better self-assessed health and higher income. The effects are potentially driven by unexplained variance, as they are smaller in the baseline-residual scenario.
  - No systematic socioeconomic inequities by educational attainment.

1.2.2. Probability of a doctor consultation in the past year

1.2.2.1. Evolution over time for the population and population subgroups

Table 7 shows the evolution over time of the probability to have one or more doctor consultations in the past year. There was no information in the KCE HSPA report of 2019 on the population value of this indicator, hence only the probability in the EU-SILC/IMA-AIM sample is reported.[18] About 90% of the population has seen a GP or specialist at least once in the past year. This high fraction is nearly constant over time and increased with a few percentage points between 2008 and 2016, going from 88.7% in 2008 to 90.5% in 2016. The probability is similar when restricting the sample to the adult population (aged 18 or more), which is used in the regression and inequity analysis.

The reversed value is given as well, i.e. the probability of not consulting a doctor in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 7 – Evolution (2008-2016) of the probability to have at least one doctor consultation in the past year

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	88.7%	89.4%	90.5%
	Reverse	11.3%	10.6%	9.5%
Survey (18+)	Indicator	89.5%	89.9%	91.2%
	Reverse	10.5%	10.1%	8.8%

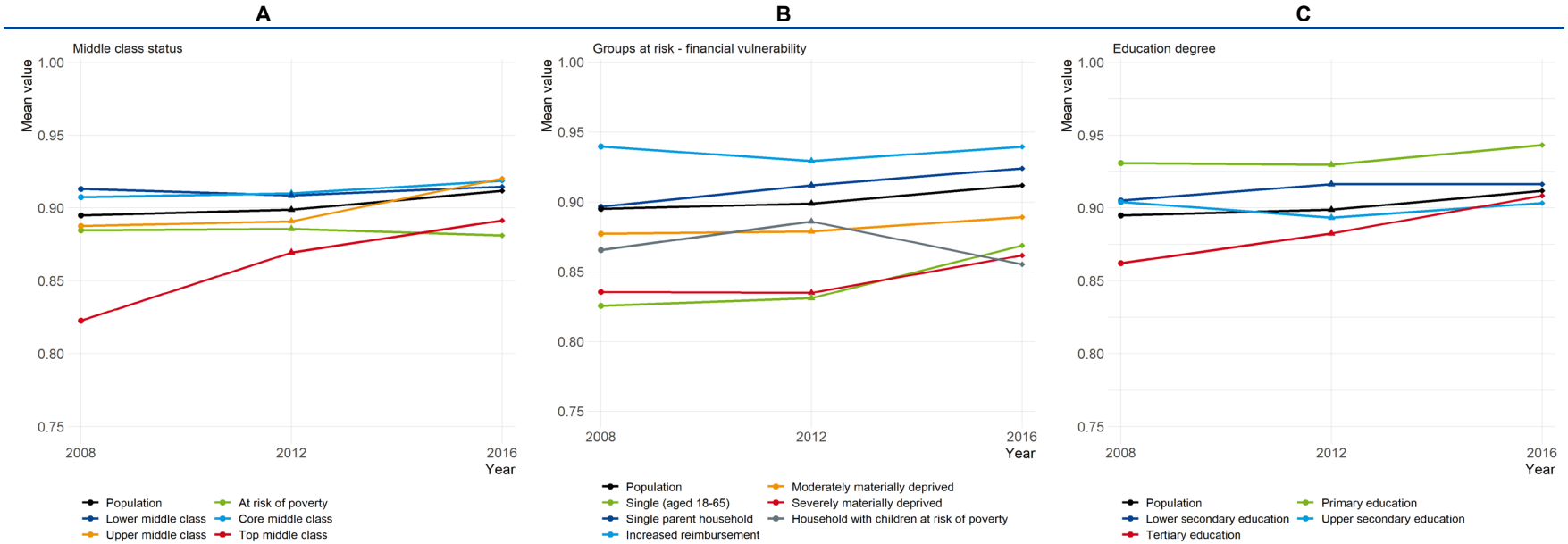
Figure 2 shows the evolution of the probability to have at least one doctor consultation in the past year for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.2.2.2.

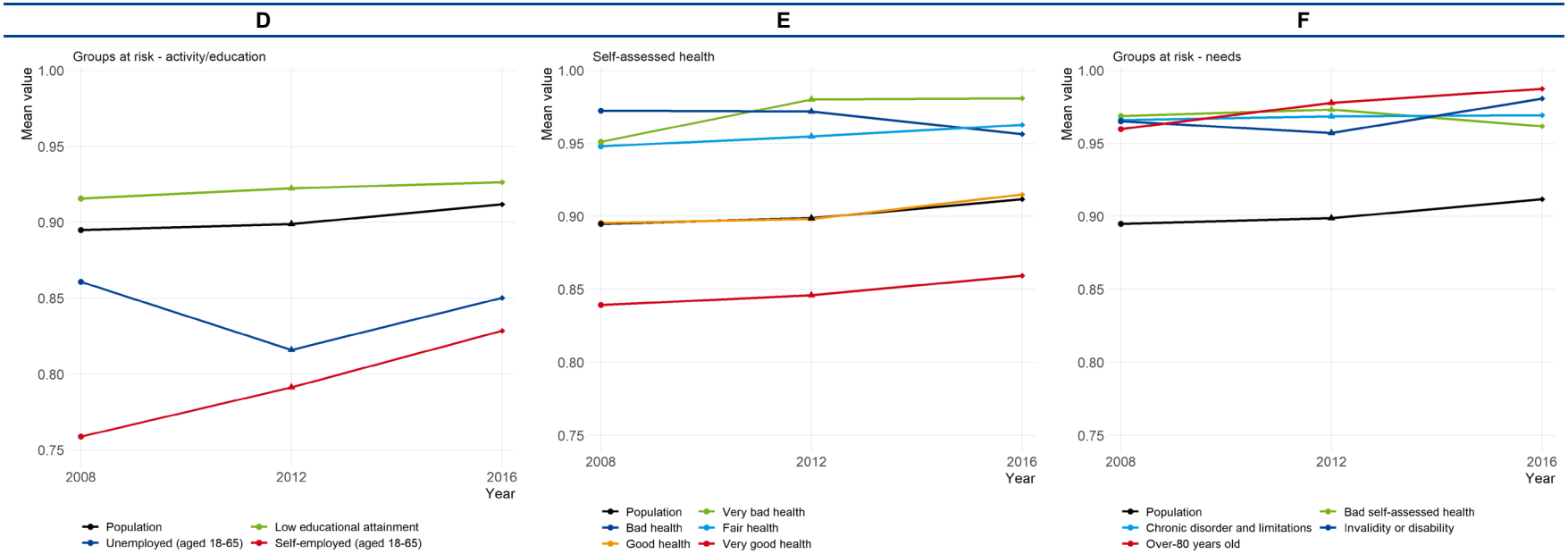
Figure 2 indicates that for most population subgroup, there is a stable or slightly upward trend over time. There is an important increase in probability to go to a doctor for the upper and top middle class, the self-employed, individuals with tertiary education and single persons aged below 65. There is a slight decrease among individuals with bad self-assessed health and households with children which are at risk of poverty. There is little variation in probability by income level or educational attainment. However, individuals with severe material deprivation (i.e. unable to afford at least 4 out of 9 items) have a substantially lower probability to go to the doctor. Individuals with higher care needs, i.e. those in bad health, with chronic disorders and limitation, invalidity or disability have the highest probability to consult a doctor. Moreover individuals who benefit from increased reimbursement are more likely to go to a doctor.

In addition, we have the following findings:

- Panel A: There is little variation in the probability to consult a doctor by income level (range 2016: 0.88 – 0.94). Individuals at risk of poverty and in the top middle class have somewhat lower probability. While the latter group shows a strong positive trend, the probability to go to a doctor has slightly decreased among individuals at risk of poverty.
- Panel B: among financially vulnerable individuals, we find that single adults between 18 and 65 and individuals with severe material deprivation have a probability substantially below the population average, but with a positive trend. Individuals with moderate material deprivation and households with children which are below the poverty line have a probability below the population average. For the latter group, there is a downward trend between 2012 and 2016. Adults in single parent household have a probability that is slightly above the population average. Individuals with increased reimbursement status have a probability to consult a GP clearly above the population average.
- Panel C: There is little variation in the probability to consult a doctor by educational attainment (range 2016: 0.90 – 0.94). There is somewhat higher usage among individuals with lower educational attainment. Panel D: There is a catch-up in doctor usage over time among the self-employed, although their probability to go to a doctor remains below the population average. The unemployed have a probability to consult a doctor that is below the population mean.
- Panel E and F: There is quite some variation in the probability to consult a doctor by self-assessed health status (range 2016: 0.86 – 0.98). Individuals in (very) good health have a lower probability than individuals in fair or (very) bad health. Over 95% of those reporting to have fair or (very) bad health have consulted a doctor in the past year. Similarly, a probability above 95% is found for individuals over 80 years old, individuals with disability or in invalidity, and individuals reporting chronic disorders in combination with limitation to daily activities.

Figure 2 – Evolution (2008-2016) of the probability to have at least one doctor consultation for different subgroups and populations groups at risk





1.2.2.2. Regression output

Table 8 reports the average marginal effects of a probit regression of the indicator of having at least one consultation to a doctor in the past year (value = 1) or no consultation (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 8):

- **Healthcare needs** are clearly associated with the probability to consult a doctor. Males in the age category 18-65 have a lower probability and needs captured by bad self-assessed health, presence of chronic disorders and limitations to daily activities, medication use for various disorders and incapacity to work are associated with higher probability.
  - Age and sex: in the age group 18 to 65, males have a 7 to 11 percentage point lower probability to consult a doctor in the past year. This gap is smaller or absent in the age groups above 65.
  - Self-reported health status: When correcting for other characteristics, individuals with bad, fair and good health have a higher probability to go to a doctor in the past year (increase up to 5 percentage points). The presence of either a chronic disorder or limitations to daily activities increase the probability to consult a doctor (increase up to 5 percentage points), there is no additional combination effect on the probability when both a chronic disorder and limitations are reported.
  - Administrative health information: invalidity or disability has no significant effect on the probability to consult a doctor. However,

being incapacitated for work has a strong positive association on the probability of consulting a doctor (increase by 16 to 19 percentage points). This should not be surprising as the incident causing the incapacity may well result in one or multiple doctor consultations.

- Medication use: Medication use for various disorders is strongly associated with the probability to consult a doctor (increase of 6 to 16 percentage points).[c] There is of course a degree of reversed causality that explains this variation. Medication use is based on the use of prescribed medication, which can only be obtained through a doctor consultation.

- There is some variation in the probability to consult a doctor by **socioeconomic profile**, especially with regard to activity status and material deprivation.
  - Education degree: there is almost no variation in the probability to consult a doctor by obtained education degree.
  - Activity status: Being unemployed or inactive is associated with a lower probability to consult a doctor compared to full-time employees (reduction of 3 to 5 percentage points, except that for being inactive the effect is not significant anymore in 2016). No such effect is found for retired individuals. Self-employed individuals have a significantly lower probability to consult a doctor. The gap with employees is most pronounced in 2008, the year that doctor consultations were added to the insurance package of the self-employed, and is clearly decreasing over time.
  - Income level: there is no variation in the probability to consult a doctor by income in 2008 and 2012 and a positive effect in 2016 (i.e. higher income have, ceteris paribus a higher probability to consult a doctor).
  - Material deprivation: The more severe the material deprivation of the household, the lower the probability to consult a doctor. This is a strong association, which is, however, decreasing in magnitude over time.
  - Household composition: Single persons aged have a lower probability to consult a doctor, compared to adults in a couple without children. No effects are found for other household composition, such as single parents or a couple with children
  - Country of birth: Individuals who were not born in Belgium have a lower probability to consult a doctor.
- Individuals who benefit from **increased reimbursement** have a higher probability to consult a doctor. Although the impact is limited (increase by 2 to 5 percentage points) when accounting for various other effects, it suggest that the policy measures taken in the past improve the accessibility to primary care for this subgroup.
- The density of **healthcare providers** nor the distance to a hospital with an emergency department are associated with a difference in the probability to consult a doctor.
- The probability to go to a doctor is about 2.5 and 3.5 percentage points lower for individuals living in Wallonia and Brussels, respectively. There is no effect of urbanization.
- In general, we observe that the marginal effects, both positive and negative, decrease somewhat in absolute value over time.

[c] For certain disorders, no marginal effect is reported in the year-specific models. This is the case because medication use perfectly predicts the probability to see a doctor, i.e. all individuals who regularly use a particular medication have consulted a doctor in the past year.

Table 8 – Regression output for the probability to have at least one doctor consultation in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 627)		Reduced model 2008 (Obs. = 10 444)		Reduced model 2012 (Obs. = 9 959)		Reduced model 2016 (Obs. = 9 855)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.103	(0.006)***	-0.103	(0.006)***	-0.112	(0.011)***	-0.096	(0.012)***	-0.103	(0.010)***
Male aged 35-49 years	-0.096	(0.007)***	-0.096	(0.007)***	-0.093	(0.012)***	-0.106	(0.014)***	-0.097	(0.012)***
Female aged 35-49 years	-0.015	(0.006)**	-0.015	(0.006)**	-0.022	(0.013)°	-0.022	(0.014)	-0.022	(0.012)°
Male aged 50-64 years	-0.072	(0.007)***	-0.072	(0.007)***	-0.093	(0.013)***	-0.070	(0.014)***	-0.078	(0.013)***
Female aged 50-64 years	-0.009	(0.005)°	-0.009	(0.005)°	-0.013	(0.013)	-0.010	(0.015)	-0.018	(0.014)
Male aged 65-79 years	-0.035	(0.011)***	-0.037	(0.011)***	-0.064	(0.021)**	-0.025	(0.022)	-0.049	(0.023)*
Female aged 65-79 years	-0.016	(0.010)	-0.018	(0.010)°	-0.016	(0.022)	0.005	(0.022)	-0.052	(0.025)*
Male aged 80 years or more	-0.043	(0.020)*	-0.044	(0.021)*	-0.098	(0.032)**	-0.065	(0.033)°	0.038	(0.055)
Female aged 80 years or more	-0.042	(0.020)*	-0.045	(0.021)*	-0.069	(0.034)*	-0.047	(0.040)	-0.056	(0.036)
Self-assessed health (reference = very good)										
Self-assessed health - good	0.018	(0.004)***	0.017	(0.004)***	0.024	(0.008)**	0.016	(0.008)*	0.011	(0.007)°
Self-assessed health - fair	0.028	(0.007)***	0.028	(0.007)***	0.043	(0.012)***	0.035	(0.016)*	0.011	(0.014)
Self-assessed health - bad	0.020	(0.013)	0.021	(0.013)	0.054	(0.023)*	0.052	(0.025)*	-0.029	(0.021)
Self-assessed health - very bad	0.012	(0.023)	0.014	(0.022)	-0.005	(0.035)	0.047	(0.050)	0.009	(0.033)
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.038	(0.009)***	0.038	(0.009)***	0.051	(0.018)**	0.024	(0.021)	0.045	(0.020)*
Chronic disorder, no limitations	0.020	(0.008)*	0.020	(0.008)*	0.027	(0.014)*	0.002	(0.017)	0.031	(0.018)°
Chronic disorder, limitations	0.037	(0.007)***	0.038	(0.007)***	0.047	(0.013)***	0.036	(0.018)*	0.046	(0.012)***
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.017	(0.012)								

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 627)		Reduced model 2008 (Obs. = 10 444)		Reduced model 2012 (Obs. = 9 959)		Reduced model 2016 (Obs. = 9 855)	
Incapacity to work	0.089	(0.003)***	0.090	(0.003)***	0.185	(0.031)***	0.158	(0.024)***	0.168	(0.025)***
Entitled to lump sum chronic illness	0.022	(0.010)*	0.026	(0.010)*	0.008	(0.022)	0.047	(0.026)°	0.030	(0.022)
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.067	(0.012)***	0.069	(0.011)***	0.072	(0.040)°	0.150	(0.053)**	0.104	(0.056)°
Medication use - other disorder	0.082	(0.011)***	0.083	(0.011)***					0.076	(0.052)
Medication use - cardiovascular disorder	0.082	(0.004)***	0.082	(0.004)***	0.101	(0.013)***	0.138	(0.013)***	0.107	(0.012)***
Medication use - thrombosis	0.056	(0.007)***	0.056	(0.007)***	0.072	(0.028)*	0.077	(0.021)***	0.062	(0.019)***
Medication use - chronic obstructive pulmonary disease (COPD)	0.064	(0.010)***	0.063	(0.010)***	0.061	(0.031)°	0.157	(0.058)**	0.105	(0.036)**
Medication use - asthma	0.070	(0.009)***	0.070	(0.009)***			0.083	(0.034)*	0.079	(0.032)*
Medication use - diabetes	0.065	(0.010)***	0.065	(0.010)***	0.112	(0.037)**	0.097	(0.046)*	0.072	(0.028)**
Medication use - epilepsy	0.024	(0.019)								
Medication use - thyroid disorder	0.063	(0.008)***	0.063	(0.008)***	0.120	(0.032)***	0.073	(0.024)**	0.080	(0.027)**
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.023	(0.005)***	-0.023	(0.005)***	-0.025	(0.007)***	-0.012	(0.008)	-0.031	(0.007)***
Region of residence - Brussels	-0.020	(0.013)	-0.035	(0.007)***	-0.035	(0.011)**	-0.018	(0.011)	-0.045	(0.009)***
Urbanization - medium	0.006	(0.005)								
Urbanization - thin	0.002	(0.007)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.002	(0.007)	0.002	(0.007)	-0.002	(0.011)	-0.003	(0.010)	0.010	(0.011)
Occupation - inactive	-0.030	(0.009)**	-0.027	(0.009)**	-0.025	(0.013)°	-0.039	(0.015)**	-0.010	(0.012)
Occupation - self-employed in 2008	-0.075	(0.014)***	-0.075	(0.014)***	-0.062	(0.011)***				
Occupation - self-employed in 2012	-0.056	(0.016)***	-0.057	(0.016)***			-0.053	(0.012)***		

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 627)		Reduced model 2008 (Obs. = 10 444)		Reduced model 2012 (Obs. = 9 959)		Reduced model 2016 (Obs. = 9 855)	
Occupation - self-employed in 2016	-0.038	(0.013)**	-0.038	(0.013)**					-0.025	(0.010)*
Occupation - unemployed	-0.040	(0.010)***	-0.041	(0.010)***	-0.032	(0.015)*	-0.049	(0.014)***	-0.029	(0.012)*
Occupation - student	-0.021	(0.008)*	-0.022	(0.008)**	-0.014	(0.014)	-0.016	(0.016)	-0.024	(0.011)*
Occupation - retired	-0.002	(0.008)	-0.001	(0.008)	0.010	(0.014)	-0.016	(0.013)	0.003	(0.016)
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.002	(0.008)	-0.001	(0.008)	0.008	(0.013)	-0.010	(0.015)	-0.005	(0.014)
Education degree - lower secondary	0.012	(0.006)*	0.013	(0.006)*	0.021	(0.009)*	0.016	(0.011)	0.004	(0.010)
Education degree - upper secondary	0.012	(0.004)**	0.013	(0.004)**	0.032	(0.008)***	0.007	(0.009)	0.002	(0.007)
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.007	(0.005)	0.007	(0.005)	-0.004	(0.008)	0.001	(0.009)	0.027	(0.008)**
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.082	(0.017)***	-0.084	(0.017)***	-0.128	(0.032)***	-0.074	(0.032)*	-0.049	(0.028)°
Household composition (reference = couple without children)										
Household composition - single without children	-0.029	(0.006)***	-0.029	(0.006)***	-0.032	(0.012)**	-0.031	(0.011)**	-0.018	(0.010)°
Household composition - single with children	0.013	(0.009)	0.013	(0.009)	0.004	(0.018)	0.018	(0.019)	0.016	(0.016)
Household composition - couple with children	0.008	(0.005)	0.008	(0.005)	0.012	(0.009)	0.021	(0.010)*	-0.005	(0.010)
Household composition - other	-0.009	(0.007)	-0.009	(0.007)	-0.010	(0.011)	-0.008	(0.010)	-0.010	(0.011)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.021	(0.007)**	-0.023	(0.007)**	-0.019	(0.012)°	-0.025	(0.011)*	-0.017	(0.009)°
Insurance status										
Insurance - increased reimbursement in 2008	0.027	(0.008)**	0.028	(0.008)***	0.031	(0.012)**				
Insurance - increased reimbursement in 2012	0.027	(0.009)**	0.027	(0.009)**			0.024	(0.013)°		
Insurance - increased reimbursement in 2016	0.029	(0.009)***	0.030	(0.009)***					0.047	(0.011)***

Independent variables	Full model (Obs. = 30 618)	Reduced model (Obs. = 30 627)	Reduced model 2008 (Obs. = 10 444)	Reduced model 2012 (Obs. = 9 959)	Reduced model 2016 (Obs. = 9 855)
Healthcare supply (density per 10 000 population, distance in km)					
Density of GPs in municipality	-0.001 (0.001)				
Density of GPs in neighbouring municipalities	0.001 (0.002)				
Density of specialists in municipality	0.000 (0.000)				
Density of specialists in neighbouring municipalities	-0.001 (0.001)				
Distance to nearest ED	0.000 (0.001)				
Number of EDs within 10km radius	-0.000 (0.001)				
Time (reference = 2008)					
Time: year 2012	-0.003 (0.005)	-0.003 (0.005)			
Time: year 2016	0.003 (0.005)	0.003 (0.005)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.2.2.3. Overview inequity and evolution in the different scenarios

Figure 3 visualizes the absolute Gini coefficient for inequality in the probability of at least one doctor consultation in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of at least one doctor consultation in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 3, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a decrease in inequity in the probability to have consulted a doctor in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient decreased from about 0.12 in 2008 to about 0.10 in 2016. Hence, we find that the disparity

between individuals in the probability of going at least once to a doctor in the past year that cannot be explained and justified by (observable) healthcare needs has decreased over time.

Table 9 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not going to a doctor in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Based on the trends, we conclude that inequity in the probability to consult a doctor has diminished over time. For the reversed indicator, inequity is stable over time. Overall, this is a positive finding. In combination with the high probability of doctor utilization, we can say that a doctor is fairly accessible.

Figure 3 – Evolution (2008-2016) of the absolute Gini index by scenario

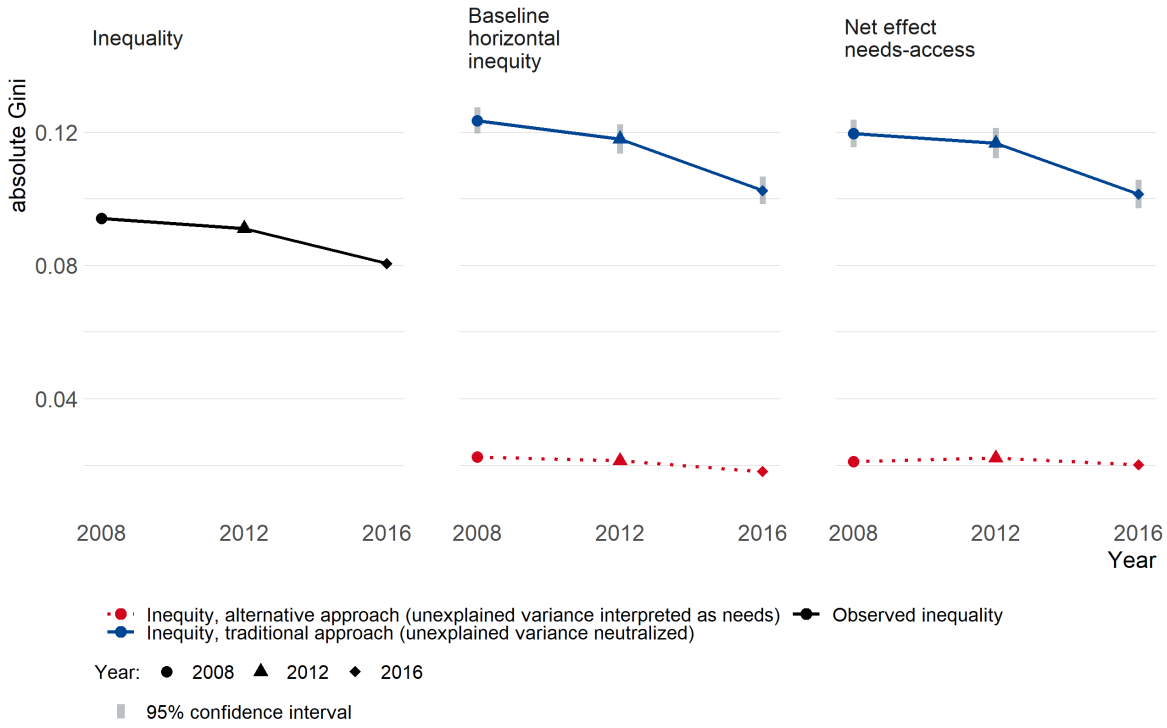


Table 9 – Evolution (2008-2016) of the inequity in the probability to have at least one doctor consultation in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend[§]
Baseline horizontal inequity	Absolute	0.123	0.118	0.102^*	↓
	Relative	0.138	0.131	0.112^*	↓
	Reversed relative	0.771	0.775	0.784	→
Net effect needs-access	Absolute	0.119	0.117	0.101^*	↓
	Relative	0.133	0.130	0.111^*	↓
	Reversed relative	0.778	0.778	0.787	→
Baseline-residual	Absolute	0.022	0.021	0.018^*	↓
	Relative	0.025	0.024	0.020^*	↓
	Reversed relative	0.213	0.211	0.205	→

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.2.2.4. Overview inequity over time for different population subgroups

Figure 4 and Figure 5 show how the probability to consult a doctor in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 4, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 5, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability of consulting a doctor than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 4 and Figure 5, we find that in general disparities are less pronounced once a correction is made for healthcare needs, i.e. the deviations from the population average are lower in the inequity scenario compared to inequality. This is especially true for subgroups based on age and (self-assessed) health status. In the net effect needs-access scenario, differences in socioeconomic groups (as proxy for healthcare needs) are only considered justified if they benefit the worse off. Hence, socioeconomic groups with potential accessibility issues or with (unmeasured) lower healthcare needs remain visible, in this case individuals at risk of poverty, singles aged between 18 and 65, the unemployed, the self-employed and materially deprived individuals.

In the baseline inequity scenario, we find that:

- While there is a higher probability to consult a doctor for individuals with primary education (column inequality), this is no longer the case after correcting for healthcare needs (baseline horizontal inequity).
- There is a gradient by income group (even though income was not a significant factor in the regression in 2008 and 2012) with a lower probability to consult a doctor for individuals at risk of poverty. After correcting for needs, individuals in the lower middle class do no longer have a probability to consult a doctor above the population mean, but below the mean. For the top middle class, their use is – except for 2008 - in line with the population average after correcting for needs. The univariate analysis for this group showed a lower probability of use, but with an important catch up effect over time (see section 1.1.6.2)
- Individuals in fair, bad and very bad self-reported health have a higher probability of going to a doctor (column inequality). This is no longer the case when correcting for healthcare needs (baseline horizontal inequity)
- Among the vulnerable groups, there is a lower probability of consulting a doctor in the past year among individuals who are unemployed, self-employed, singles between 18 and 65 and individuals in households with material deprivation (baseline horizontal inequity). The probability of consulting a doctor decreases with the intensity of material deprivation. A positive finding is that for these groups, the average probability is evolving towards the population mean. On the other side, the situation has deteriorated among household with children which are at risk of poverty. Between 2008 and 2016, their probability to consult a doctor has decreased relative to the population average. Individuals who benefit from increased reimbursement have a probability to consult a doctor in line with the population average after correcting for needs.

The results of the net effect needs-access scenario and the baseline-residual scenario are similar to those of the baseline scenario.

Figure 4 – Deviation in the needs-corrected probability to have at least one doctor consultation from population average for subgroups based on income, education and self-assessed health, by scenario and year

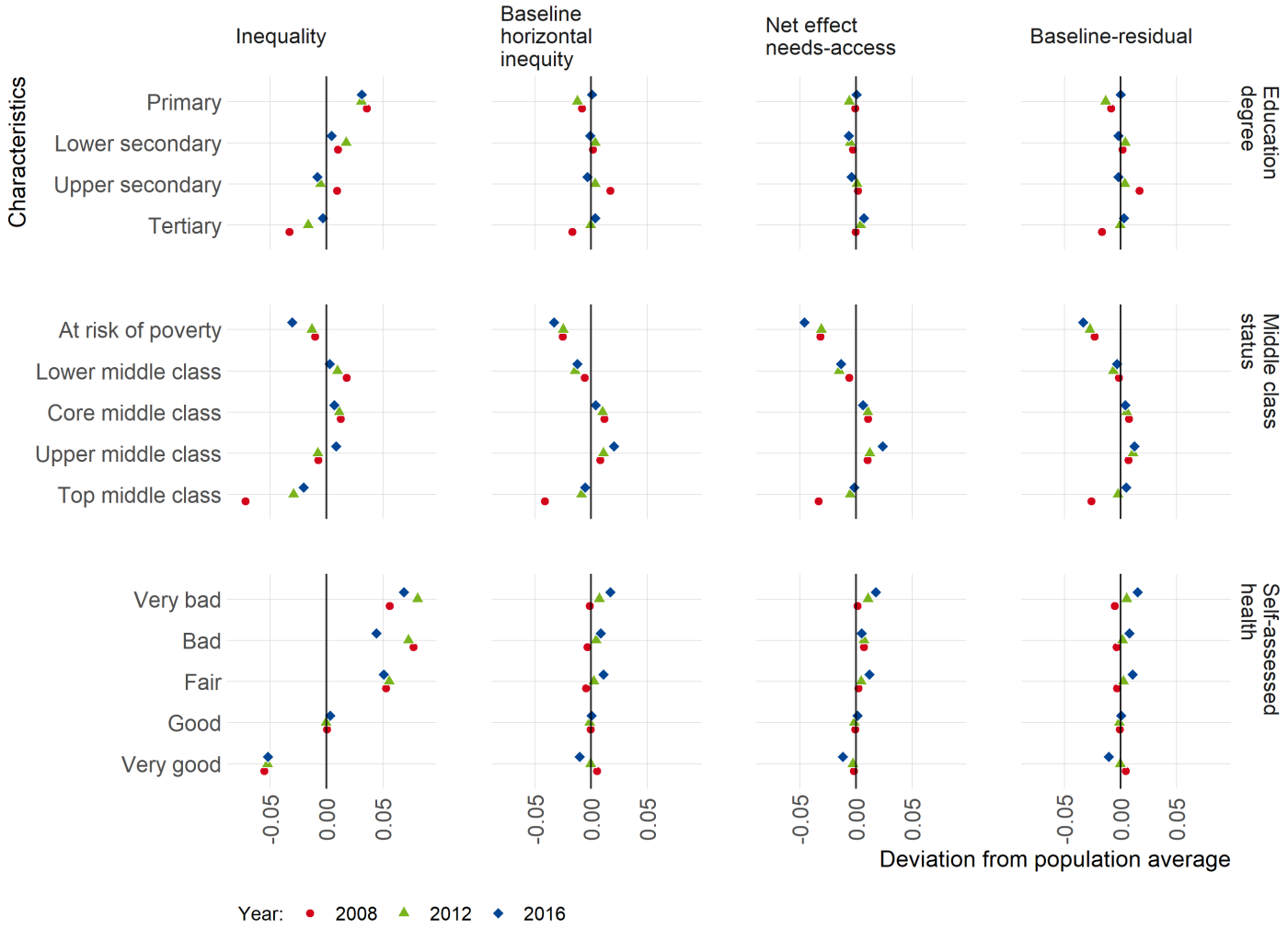


Figure 5 – Deviation in needs-corrected probability to have at least one doctor consultation from population average for specific vulnerable subgroups, by scenario and year

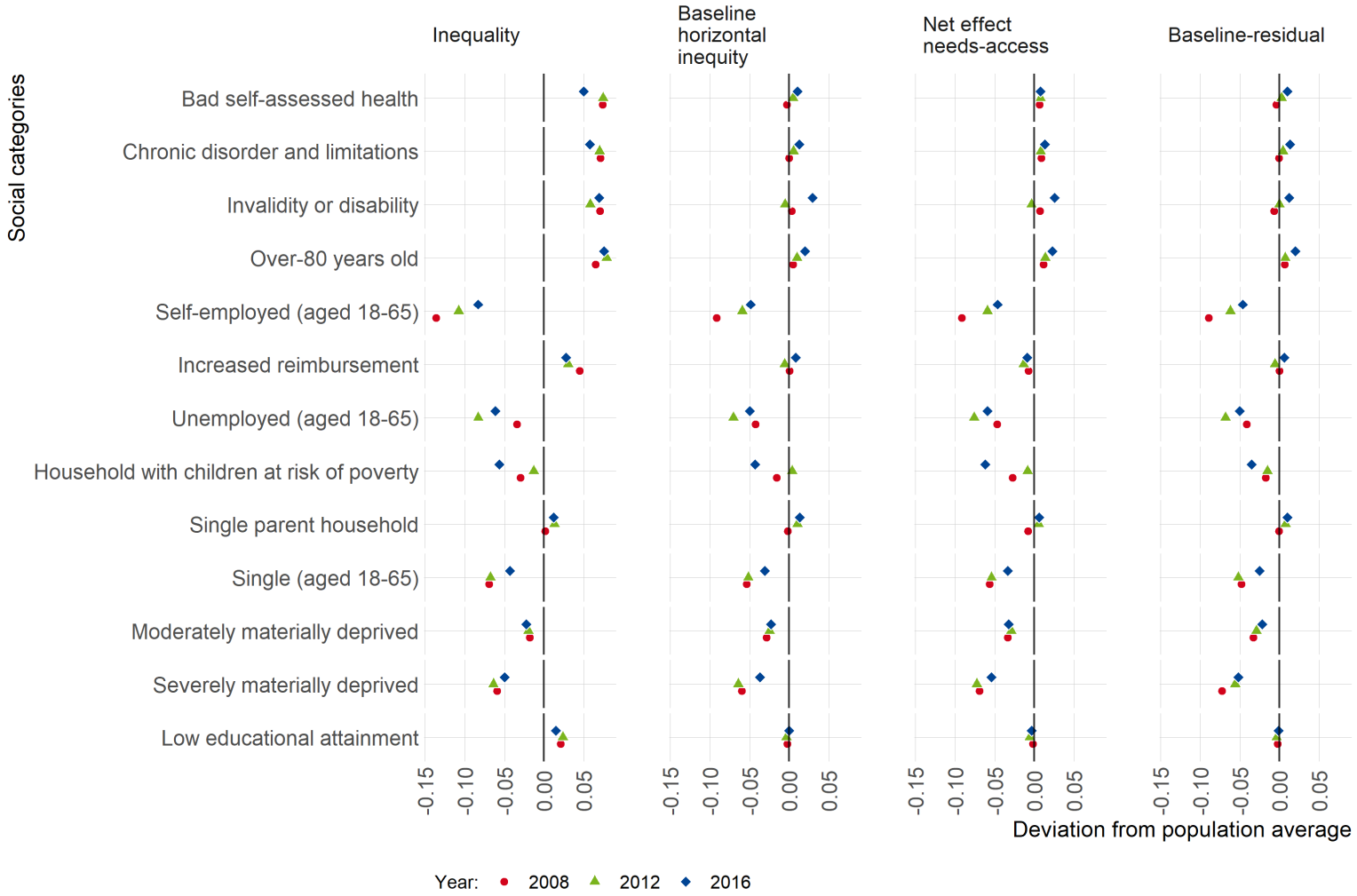
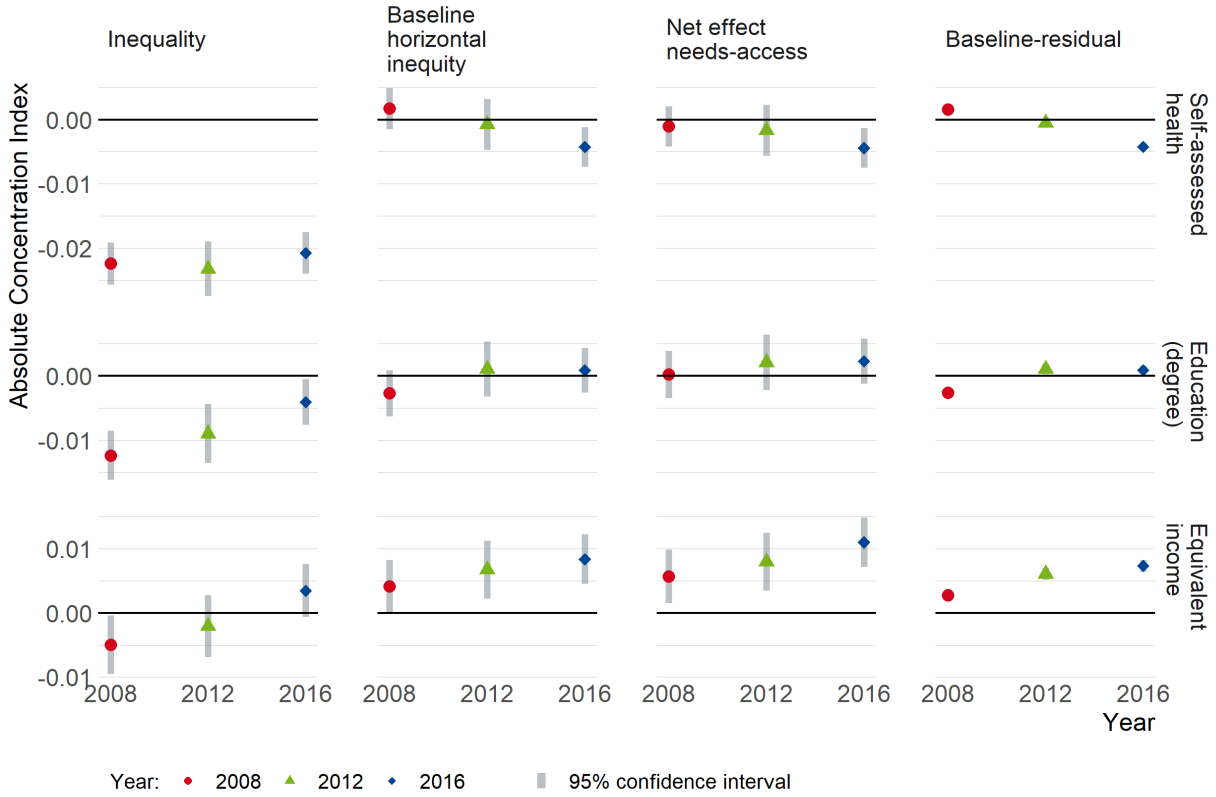


Figure 6 shows the absolute concentration index of the needs-corrected probability to have a doctor consultation to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of consulting a doctor concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 6 show that there are systematic inequalities in the probability to consult a doctor, with a higher use among low educated individuals and individuals with a worse self-reported health status. No inequalities are found by income level. After correcting for needs, an analysis of inequity indicates the opposite, there are no inequities based on self-reported health status or obtained education degree. However, there is inequity with regard to income in favour of more affluent individuals after needs are taken into account. While the inequity is limited in 2008, it is increasing over time.

The results of the net effect needs-access scenario and the baseline-residual scenario are in line with the baseline inequity scenario.

Figure 6 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.2.3. Conditional number of doctor consultations in the past year

1.2.3.1. Evolution over time for the population and population subgroups

Table 10 and Figure 7 show the evolution over time of the number of doctor consultations in the past year for individuals with at least one such consultation. There was no information in the KCE HSPA report of 2019 on the population average number of doctor consultations that can be used as benchmark, hence only the number of doctor consultations in the EU-SILC/IMA-AIM sample is reported.[18] From Table 7 and Figure 2, we concluded that the probability of having at least one doctor consultation was high, at about 90%, and has increased with a few percentage points between 2008 and 2016. Table 10 and Figure 7 additionally indicate that conditional on going at least once to a doctor, either GP or specialist, in the past year, the average number of consultations per individual has increased over time from 7.9 consultations on average in 2008 to 8.6 consultations in 2016. The number of consultations is higher when restricting the sample to the adult population, but equally increasing, from 8.5 consultations in 2008 to 9.3 consultations in 2016.

Table 10 – Evolution (2008-2016) of the number of doctor consultations in the past year given at least one consultation

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	7.93	8.36	8.58
Survey (18+)	Indicator	8.52	9.06	9.30

Figure 7 shows the evolution of the number of doctor consultations conditional on having at least one consultation, for a variety of population subgroups (see section 1.1.2).

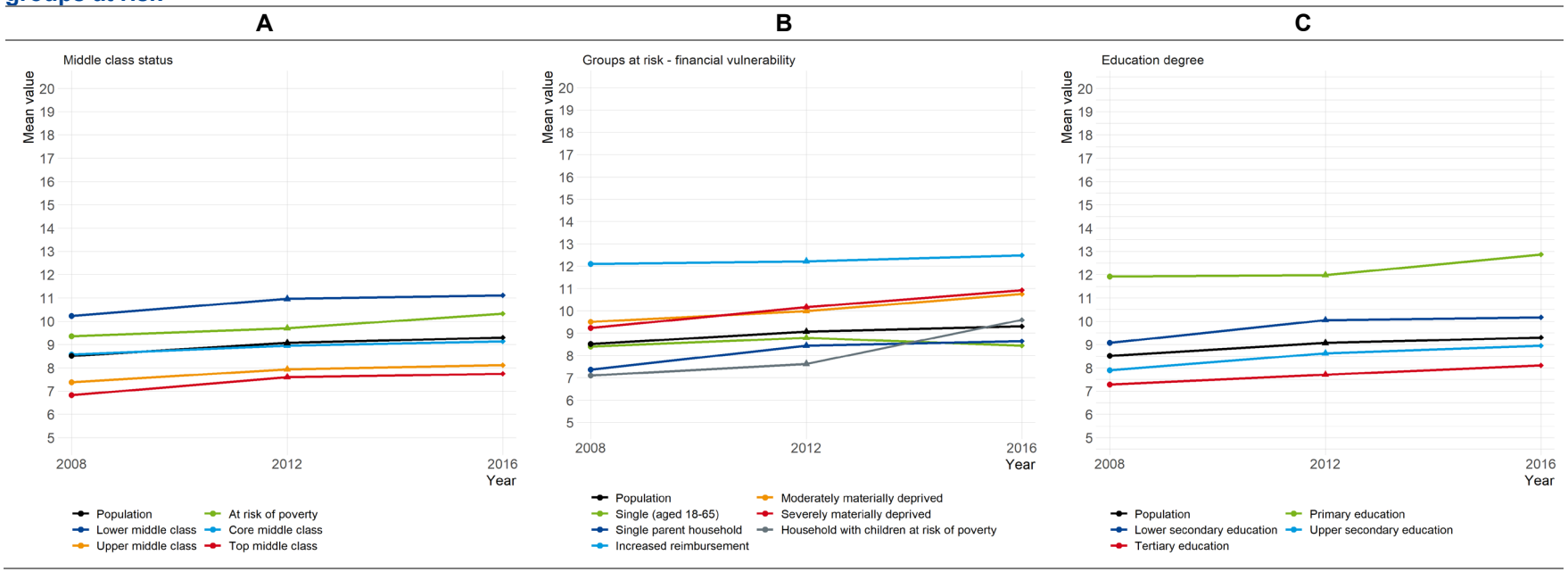
First, we find that for most population groups the 2016 number of doctor consultations is slightly higher or similar compared to the 2008 value, with the subgroup of unemployed individuals as an exception (see panel D). Second, a higher number of doctor consultations (annually between 14 and 18 on average, see panel F) is observed for individuals with higher care needs, i.e. those in (very) bad health, with chronic disorders and limitations to daily activities, over-80 year olds and individuals with invalidity/disability. Third, while individuals who qualify their health status as fair and (very) bad have the same probability to consult a doctor (see section 1.1.6.2), there is a divergence in the average number of consultations (panel E). Fourth, there appears to be some financial issues related to the frequency at which a doctor is consulted. Individuals who experience material deprivation (of whom a large fraction belong to the group with higher care needs (see Scientific report section 2.4.1), have a number of consultations only slightly above the population average (see panel B). It is striking in that sense that individuals at risk of poverty have a lower number of consultations than individuals in the lower middle class (panel A). The subgroup of individuals with increased reimbursement, who benefit from a reduced rate and for GP care form the social third payer system, have a significantly higher number of consultations than the average number among individuals with low incomes.

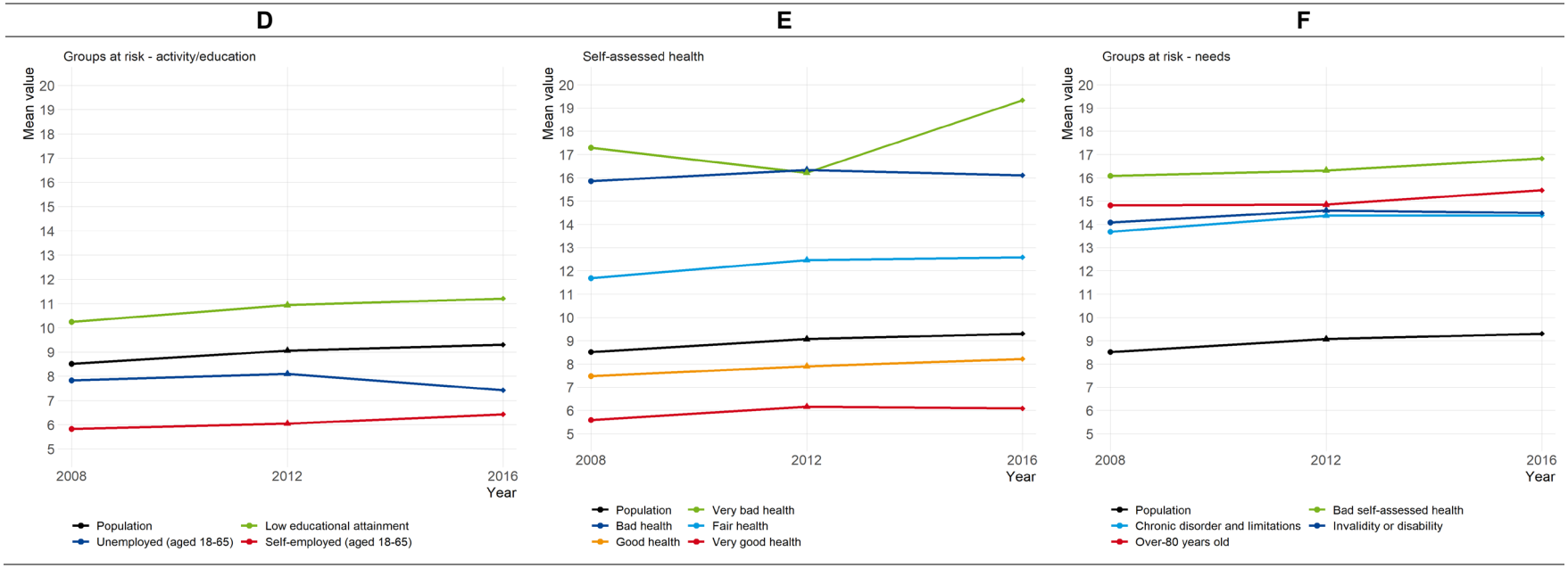
- In addition, we have the following findings:
- Panel A: the average number of annual doctor consultations ranges from 7 to 11 for the different income groups. The number is generally higher as income decreases, except that individuals at risk of poverty have a lower number of consultations than individuals in the lower middle class.
- Panel B: Individuals who experience material deprivation have only 1 to 2 additional doctor consultations per year compared to the population average. Remark that there are higher care needs in this population subgroup (see Scientific report section 2.4.1), and that they have a lower probability to consult a doctor in the first place (see section 1.1.6.2). The subgroup of individuals who benefit from increased reimbursement have a significantly higher number of consultations. Singles (18-65), single parents and adults in households with children at risk of poverty have a number of doctor consultations slightly below the population average.
- Panel C and D: the average number of annual doctor consultation ranges from 7 to 13 for subgroups based on educational attainment,

with a higher number of consultations for individuals with a lower educational attainment. In addition to a lower probability to consult a doctor, the self-employed are with an annual average of 6 doctor consultations clearly below the population average. The group of unemployed is one of the few population subgroup where the number of doctor consultations has decreased over time

- Panel E and F: There is a clear association between the number of doctor consultations and an individual's health status. Individuals in (very) good health have a number of consultations below the average, while those in fair health or with health issues have a higher number of annual consultations.

Figure 7 – Evolution (2008-2016) of the number of doctor consultations given at least one consultation for different subgroups and populations groups at risk





1.2.3.2. Regression output

Table 11 reports the average marginal effects of a truncated negative binomial count model for the sample of individuals with at least one doctor consultation (see section 1.1.3). The results should be interpreted as a change in number of consultations expressed in consultations.

The regression analysis presented in Table 11 indicates that the conditional number of doctor consultations is especially associated with healthcare needs, i.e. age and sex, self-reported health status, incapacity to work and medication use, and to a lesser degree with socioeconomic and sociodemographic characteristics or healthcare supply. We find the following associations:

- **Healthcare needs** are strongly associated with the number of doctor consultations.
  - Age and sex: Males in the age category 18-65 have, ceteris paribus 3 to 4 fewer consultations on a yearly basis. This gap is smaller or absent in the age groups above 65. Moreover, there is some increase in number of consultations by age.
  - Self-reported health status: When correcting for other characteristics, individuals with fair and (very) bad health have a higher number of doctor consultations, about 2.5 and 4 consultations, respectively. The presence of either a chronic disorder or limitations to daily activities also increase the frequency

of doctor contacts with about 1.5 consultations, there is no additional combination effect when both a chronic disorder and limitations are reported.

- Administrative health information: Being incapacitated for work has not only the strongest positive association on the probability of consulting a doctor, but also on the number of doctor consultations with an increase of about 5 to 6 consultations on average per year. Being incapacitated clearly results in a period of high primary care needs. In addition, invalidity or disability and lump sum chronic illness are both associated with a higher number of doctor consultations.
- Medication use: Medication use for various disorders is strongly associated with the number of doctor consultations. There is however quite some variation depending on the underlying disorder, with increases of 0.5 up to 3 doctor consultations per year. Effects of 2 or more consultations are found for individuals taking medication for asthma, cardiovascular disease, thrombosis and epilepsy.

- There is limited variation in the conditional number of doctor consultations by **socioeconomic profile**, especially with regard to activity status and income.
  - Activity status: Unemployed and self-employed individuals have on average about 1 doctor consultation less than employees. Students have even fewer doctor consultations, which is not surprising given their age profile. Inactive individuals have a negative but non-significant association, while retired individuals have a positive but non-significant association.
  - Income level: there is positive association between income and the number of consultations, implying that more affluent individuals ceteris paribus have a higher frequency to consult a doctor.
  - Material deprivation: Despite the strong relation between material deprivation and the probability to go to a doctor, there is no effect on the number of doctor consultations.
  - There is no important effect of household composition, education, or country of birth
- Individuals who benefit from **increased reimbursement** have about 1 additional doctor consultation. Although the impact is limited when accounting for various other effects, it suggest that the policy measures taken in the past improve the accessibility to primary care for this subgroup.
- There is a small positive effect of the density of GPs in the neighbouring municipality and small negative effect of the number of hospital sites with emergency department on the number of doctor consultations. The latter may suggest some substitution between care in hospital and the emergency department versus ambulatory care.
- The number of doctor consultations is lower in Wallonia compared to Flanders and Brussels. In Wallonia, the average number of doctor consultations is about 1.5 consultations lower than in Flanders. There is no effect of urbanization.

Table 11 – Regression output for the conditional number of doctor consultations, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 27 677)		Reduced model (Obs. = 27 680)		Reduced model 2008 (Obs. = 9 596)		Reduced model 2012 (Obs. = 9 133)		Reduced model 2016 (Obs. = 8 951)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-4.019	(0.204)***	-3.974	(0.203)***	-4.546	(0.400)***	-4.602	(0.395)***	-3.734	(0.398)***
Male aged 35-49 years	-3.690	(0.219)***	-3.640	(0.215)***	-4.187	(0.351)***	-3.561	(0.362)***	-3.704	(0.423)***
Female aged 35-49 years	-1.052	(0.227)***	-1.028	(0.225)***	-1.054	(0.299)***	-1.227	(0.325)***	-0.471	(0.364)
Male aged 50-64 years	-2.887	(0.227)***	-2.832	(0.224)***	-2.598	(0.348)***	-3.039	(0.392)***	-2.922	(0.390)***
Female aged 50-64 years	-1.282	(0.224)***	-1.236	(0.222)***	-1.281	(0.355)***	-1.385	(0.377)***	-0.731	(0.374)°
Male aged 65-79 years	-1.459	(0.306)***	-1.411	(0.304)***	-0.952	(0.479)*	-1.408	(0.503)**	-1.508	(0.502)**
Female aged 65-79 years	-0.198	(0.317)	-0.118	(0.317)	-0.098	(0.455)	-0.420	(0.477)	0.223	(0.498)
Male aged 80 years or more	-0.229	(0.429)	-0.157	(0.429)	0.275	(0.664)	-0.689	(0.662)	0.167	(0.604)
Female aged 80 years or more	0.266	(0.397)	0.362	(0.388)	0.472	(0.537)	0.018	(0.664)	0.553	(0.589)
Self-assessed health (reference = very good)										
Self-assessed health - good	0.898	(0.127)***	0.905	(0.128)***	1.140	(0.235)***	0.819	(0.216)***	1.183	(0.268)***
Self-assessed health - fair	2.549	(0.183)***	2.564	(0.184)***	2.593	(0.320)***	2.743	(0.293)***	2.651	(0.353)***
Self-assessed health - bad	4.092	(0.259)***	4.090	(0.259)***	3.647	(0.390)***	4.221	(0.407)***	3.811	(0.414)***
Self-assessed health - very bad	4.434	(0.548)***	4.424	(0.549)***	4.433	(0.930)***	3.661	(0.797)***	4.493	(0.585)***
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	1.575	(0.206)***	1.573	(0.206)***	1.437	(0.324)***	1.410	(0.411)***	1.769	(0.367)***
Chronic disorder, no limitations	1.152	(0.198)***	1.143	(0.198)***	1.104	(0.308)***	1.216	(0.311)***	1.097	(0.350)**
Chronic disorder, limitations	1.401	(0.161)***	1.398	(0.161)***	1.491	(0.261)***	1.251	(0.280)***	1.443	(0.279)***
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.975	(0.280)***	0.988	(0.279)***	0.956	(0.405)*	1.135	(0.491)*	0.845	(0.435)°
Incapacity to work	6.830	(0.316)***	6.894	(0.320)***	4.981	(0.307)***	5.609	(0.314)***	5.190	(0.339)***
Entitled to lump sum chronic illness	1.845	(0.257)***	1.850	(0.256)***	1.655	(0.350)***	1.670	(0.428)***	1.850	(0.323)***
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.994	(0.367)**	0.991	(0.367)**	1.566	(0.565)**	0.640	(0.525)	0.732	(0.547)

Independent variables	Full model (Obs. = 27 677)		Reduced model (Obs. = 27 680)		Reduced model 2008 (Obs. = 9 596)		Reduced model 2012 (Obs. = 9 133)		Reduced model 2016 (Obs. = 8 951)	
Medication use - other disorder	2.743	(0.457)***	2.744	(0.457)***	2.034	(0.753)**	2.738	(0.614)***	2.485	(0.503)***
Medication use - cardiovascular disorder	2.040	(0.139)***	2.048	(0.139)***	2.402	(0.187)***	2.058	(0.225)***	1.560	(0.204)***
Medication use - thrombosis	2.008	(0.167)***	2.006	(0.166)***	2.188	(0.258)***	2.057	(0.229)***	1.844	(0.248)***
Medication use - chronic obstructive pulmonary disease	1.616	(0.225)***	1.622	(0.226)***	1.280	(0.317)***	1.617	(0.303)***	1.606	(0.345)***
Medication use - asthma	2.734	(0.365)***	2.752	(0.365)***	3.027	(0.556)***	1.506	(0.487)**	2.738	(0.438)***
Medication use - diabetes	1.265	(0.169)***	1.263	(0.167)***	1.335	(0.268)***	1.105	(0.271)***	1.233	(0.286)***
Medication use - epilepsy	2.158	(0.378)***	2.155	(0.378)***	2.129	(0.486)***	1.825	(0.579)**	2.154	(0.533)***
Medication use - thyroid disorder	1.392	(0.213)***	1.391	(0.214)***	1.509	(0.313)***	1.627	(0.293)***	0.899	(0.312)**
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-1.437	(0.153)***	-1.439	(0.139)***	-1.086	(0.222)***	-1.702	(0.220)***	-1.605	(0.260)***
Region of residence - Brussels	-0.032	(0.409)	-0.094	(0.385)	0.676	(0.583)	-0.548	(0.616)	-0.366	(0.719)
Urbanization - medium	0.012	(0.147)								
Urbanization - thin	0.057	(0.244)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.119	(0.175)	-0.102	(0.176)	-0.591	(0.299)*	0.440	(0.291)	-0.247	(0.294)
Occupation - inactive	0.138	(0.210)	0.162	(0.206)	-0.165	(0.326)	0.936	(0.374)*	-0.335	(0.411)
Occupation - self-employed in 2008	-1.160	(0.403)**	-1.157	(0.404)**	-1.185	(0.451)**				
Occupation - self-employed in 2012	-1.144	(0.398)**	-1.145	(0.396)**			-0.962	(0.488)*		
Occupation - self-employed in 2016	-0.774	(0.422)°	-0.771	(0.422)°					-1.073	(0.506)*
Occupation - unemployed	-0.871	(0.246)***	-0.857	(0.244)***	-1.098	(0.419)**	-0.145	(0.465)	-1.578	(0.492)**
Occupation - student	-1.685	(0.241)***	-1.597	(0.241)***	-1.831	(0.407)***	-1.271	(0.526)*	-2.155	(0.508)***
Occupation - retired	0.322	(0.222)	0.347	(0.221)	-0.021	(0.359)	0.740	(0.369)*	0.297	(0.394)
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	0.245	(0.186)								
Education degree - lower secondary	0.303	(0.152)*								
Education degree - upper secondary	0.237	(0.125)°								

Independent variables	Full model (Obs. = 27 677)		Reduced model (Obs. = 27 680)		Reduced model 2008 (Obs. = 9 596)		Reduced model 2012 (Obs. = 9 133)		Reduced model 2016 (Obs. = 8 951)	
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.714	(0.133)***	0.662	(0.125)***	0.531	(0.193)**	0.802	(0.217)***	0.591	(0.266)*
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.262	(0.531)								
Household composition (reference = couple without children)										
Household composition - single without children	-0.196	(0.144)	-0.220	(0.140)	-0.162	(0.236)	-0.084	(0.269)	-0.415	(0.258)
Household composition - single with children	-0.131	(0.292)	-0.173	(0.288)	-0.842	(0.427)*	0.058	(0.516)	0.162	(0.519)
Household composition - couple with children	-0.328	(0.174)°	-0.353	(0.173)*	-0.535	(0.299)°	-0.348	(0.282)	-0.165	(0.321)
Household composition - other	-0.757	(0.177)***	-0.751	(0.176)***	-1.172	(0.280)***	-0.744	(0.303)*	-0.378	(0.370)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.057	(0.170)								
Insurance status										
Insurance - increased reimbursement in 2008	0.974	(0.265)***	0.972	(0.267)***	0.504	(0.243)*				
Insurance - increased reimbursement in 2012	0.518	(0.288)°	0.502	(0.282)°			0.340	(0.305)		
Insurance - increased reimbursement in 2016	0.851	(0.299)**	0.837	(0.291)**					1.133	(0.309)***
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.012	(0.025)	0.012	(0.026)	-0.023	(0.034)	-0.029	(0.034)	0.064	(0.043)
Density of GPs in neighbouring municipalities	0.150	(0.056)**	0.145	(0.059)*	0.073	(0.073)	0.252	(0.080)**	0.120	(0.099)
Density of specialists in municipality	-0.011	(0.009)	-0.012	(0.009)	-0.013	(0.010)	-0.005	(0.014)	-0.017	(0.016)
Density of specialists in neighbouring municipalities	-0.023	(0.015)	-0.022	(0.016)	0.035	(0.020)°	-0.064	(0.024)**	-0.037	(0.025)
Distance to nearest ED	-0.006	(0.017)								
Number of EDs within 10km radius	-0.056	(0.025)*	-0.054	(0.022)*	-0.106	(0.035)**	-0.028	(0.033)	-0.027	(0.046)
Time (reference = 2008)										
Time: year 2012	0.305	(0.135)*	0.298	(0.135)*						
Time: year 2016	0.203	(0.164)	0.190	(0.166)						

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.2.3.3. Overview inequity and evolution in the different scenarios

Figure 8 visualizes the absolute Gini coefficient for inequality in the number of doctor consultations in the past year (so without needs correction) as well as inequity in the fairness gap for the conditional number of doctor consultations in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 8, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower.

If we follow the traditional approach, we observe an increase in inequity in the number of doctor consultations in the past year. Hence, we find that the disparity between individuals in the number of doctor consultations that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 12 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Using the traditional approach, we observe an upward trend in inequity as measured by the absolute Gini index and a constant trend based on the relative Gini index. In the alternative approach, there is an unambiguous downward trend.

Figure 8 – Evolution (2008-2016) of the absolute Gini index by scenario

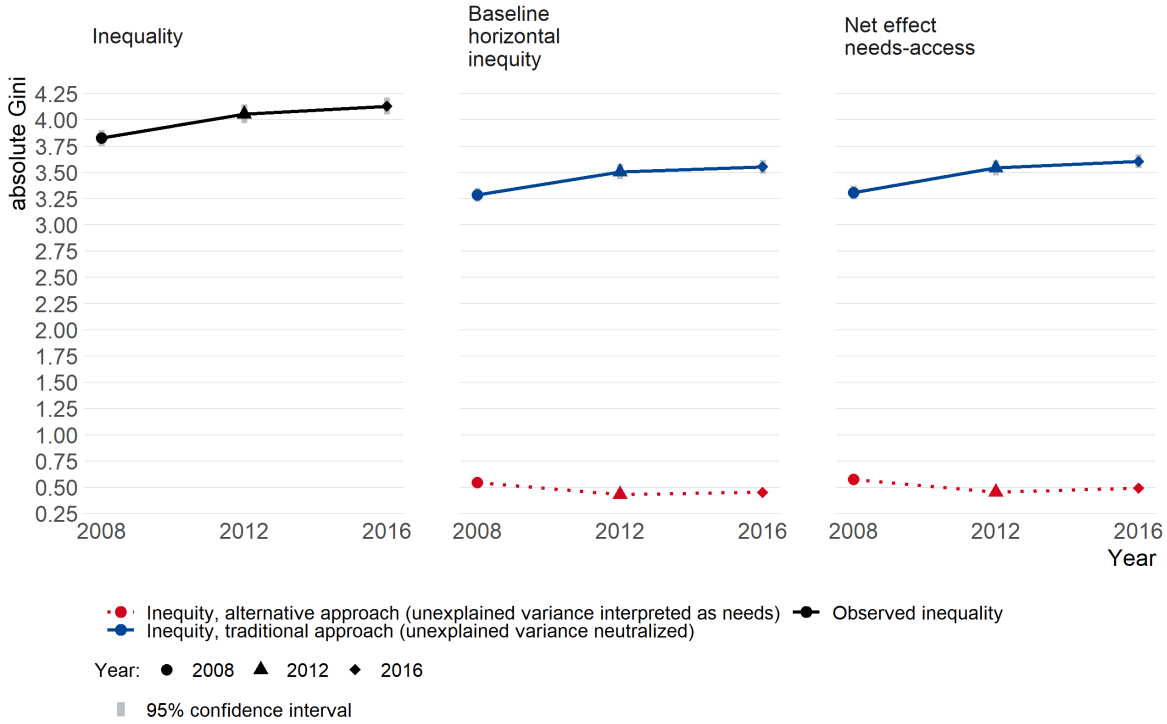


Table 12 – Evolution (2008-2016) of the inequity in the conditional number of doctor consultations for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	3.285	3.504^	3.552^	↑
	Relative	0.386	0.387	0.382	→
Net effect needs-access	Absolute	3.306	3.541^	3.605^	↑
	Relative	0.388	0.391	0.388	→
Baseline-residual	Absolute	0.542	0.430^	0.451^*	↓
	Relative	0.064	0.047^	0.049^	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).

**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*

§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.2.3.4. Overview inequity over time for different population subgroups

Figure 9 and Figure 10 show how care use in various population subgroups differs from the population average when looking at inequality as well as inequity. When analysing inequity, a correction is made for healthcare needs and preferences according to the different inequity-scenarios, both for the average population and subgroup value. In Figure 9, population groups are defined based on categories of equivalized income, categories of education degree, and categories of self-assessed health. In Figure 10, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower number of doctor consultations than the population average. Values to the right of the vertical line, on the other hand, indicate a higher number of consultations than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 9 and Figure 10, we find that disparities are much less pronounced once a correction is made for healthcare needs, i.e. the deviations from the population average are generally lower or have even disappeared in the inequity scenario compared to inequality. While inequalities in number of doctor consultations are important (range between -3 and +10 consultations) and in favour of individuals with worse health status, low educational attainment and increased reimbursement, these disparities are small once a correction for needs is made (range between -2 and 1). The conditional number of doctor consultations is below the population average for the unemployed, for individuals at risk of poverty (especially in 2008 and 2012), and for individuals with higher care needs (especially in 2008 and 2012), i.e. with bad or very bad self-assessed health, with a chronic disorder and limitations to daily activities, with invalidity or disability and for high age individuals. Moreover, for individuals with severe material deprivation and for single parents, we find a number of doctor consultations below the population average in 2008, which has evolved over time towards the population average

For individuals with (very) bad self-assessed health, we observe a lower number of consultations in 2008 (baseline horizontal inequity scenario). This negative gap relative to the population mean is likely related to the unexplained variance, because the deviation is much smaller in the baseline-residual scenario where the impact of the unexplained variance is neutralized.

It appears that in 2016, unemployed individuals are one of the few groups with a below average number of doctor consultations after need correction.

Figure 9 – Deviation in the needs-corrected conditional number of doctor consultations from population average for subgroups based on income, education and self-assessed health, by scenario and year

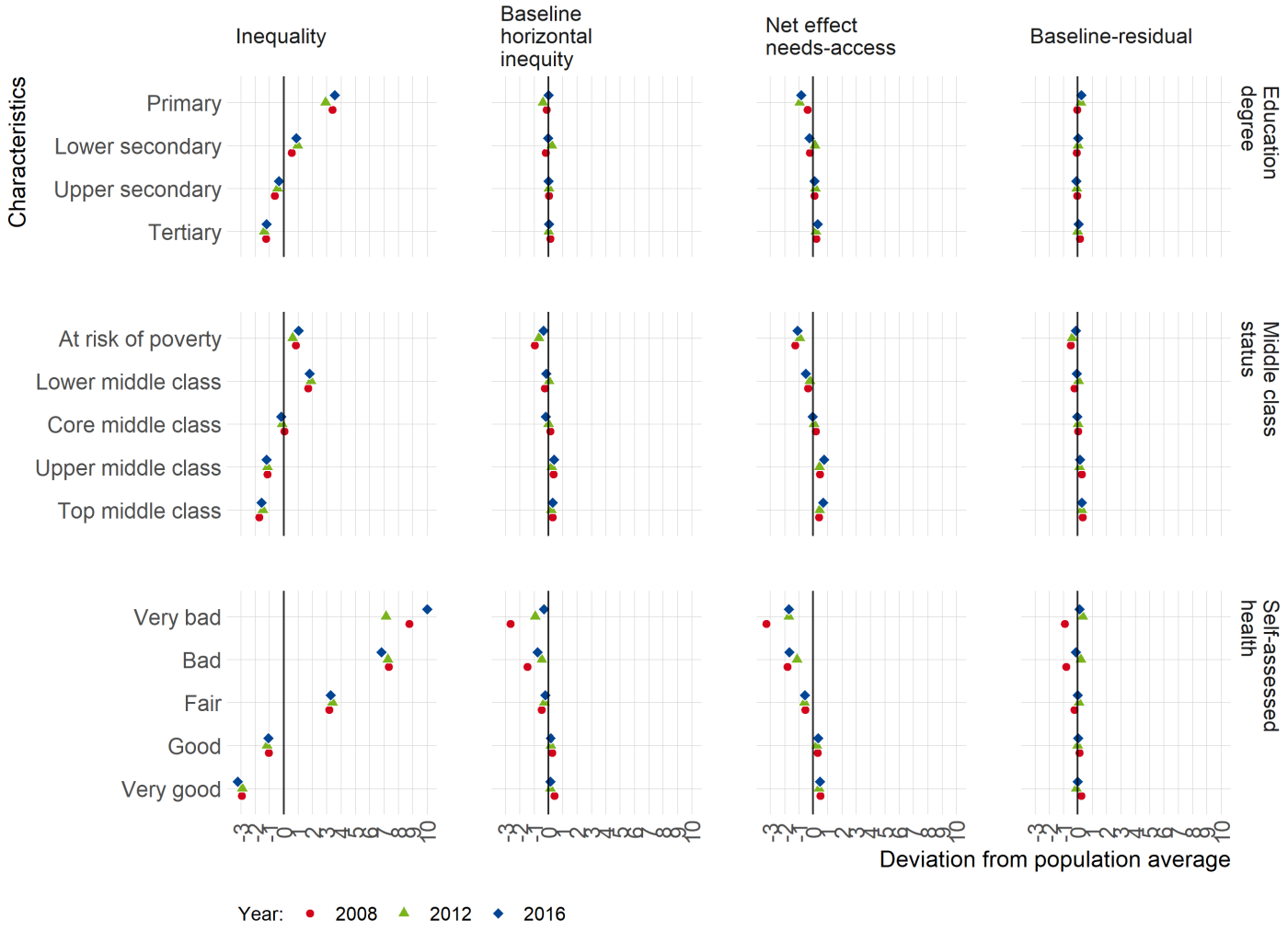


Figure 10 – Deviation in the needs-corrected conditional number of doctor consultations from population average for specific vulnerable subgroups, by scenario and year

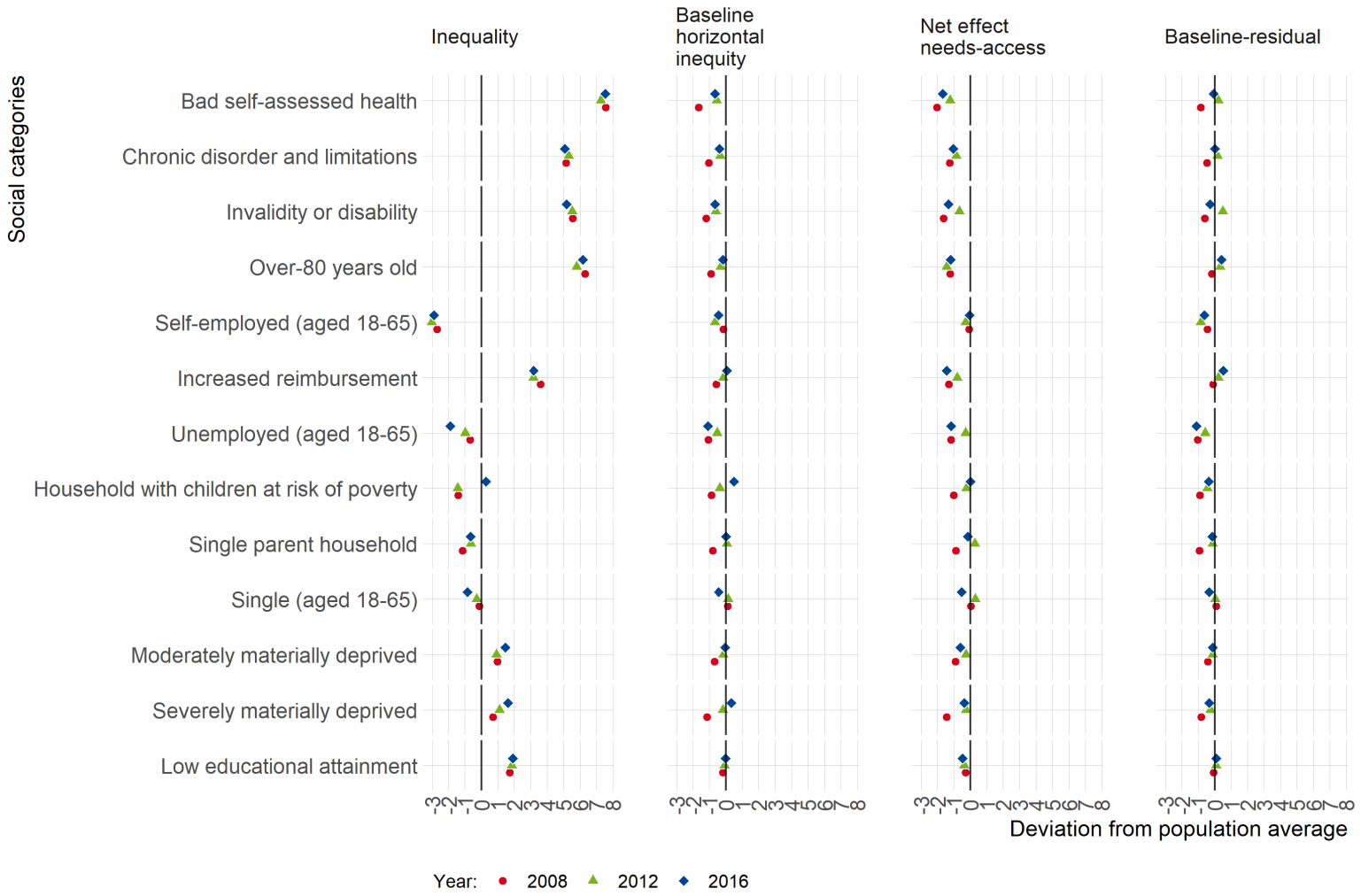
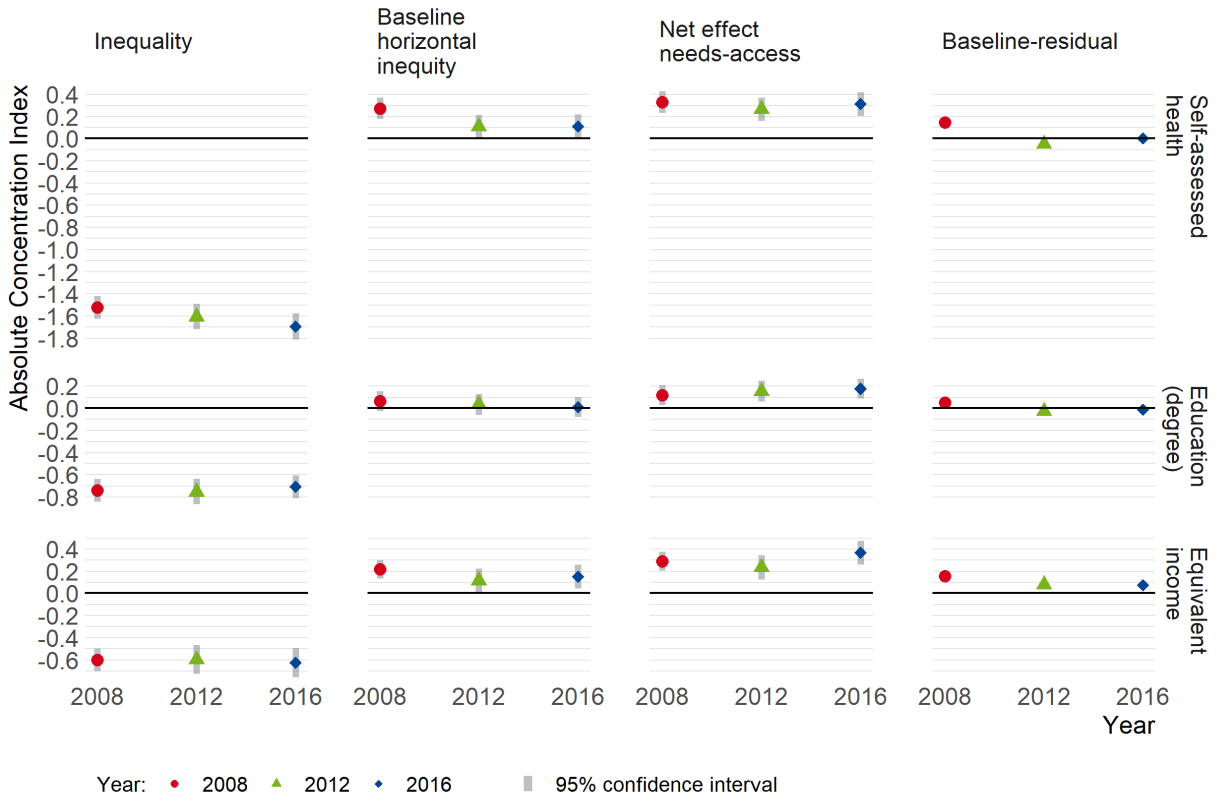


Figure 11 shows the absolute concentration index of the needs-corrected number of doctor consultations to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher needs-corrected number of doctor consultations concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher needs-corrected number of doctor consultations for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 11 reveal systematic inequalities in the number of doctor consultations in all three dimensions (panel inequality), with doctor consultations more concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. After correcting for healthcare needs, disparities are small. They are not significant with respect to educational attainment. We find small pro-rich inequities, especially in the net effect needs-access scenario and inequities in favour of individuals with better self-assessed health. The effects are potentially driven by unexplained variance, as they are smaller in the baseline-residual scenario.

Figure 11 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.3. GP consultations and visits

1.3.1. Summary

We analyse inequity in GP consultations and visits over the past 12 months. Two types of utilisation are examined consecutively, the probability of a consultation or visit and the number of contacts given at least one contact. Individuals who are registered in a community health centre are excluded from the analysis as no registration is made for a GP consultation.

GP consultations and visits are identified by the combination of

- the nomenclature code (variable ss00020 in IMA-AIM GZSS database): 101010, 101032, 101076, 102410, 102432, 102454, 102476, 101091, 101113, 103110, 103132, 103213, 103235, 103412, 103434, 104296, 104311, 104333, 104591, 104613, 104635, 104215, 104230, 104252, 104510, 104532, 104554
- the qualification of the healthcare provider (variable ss00065B in IMA-AIM GZSS database) equal to 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9

Key points inequity in GP consultations and visits in the past year

- EU-SILC/IMA-AIM survey value for the indicator closely matches population values.
- GPs are fairly accessible. About 80% of the population has consulted a GP in the past year; about 90% to 95% among higher care groups. The average annual number of consultations (among those consulting a GP) has increased from 6 in 2008 to 6.3 in 2016 among the survey sample (18+).

Probability to consult a GP

- Affected by both healthcare needs and socioeconomic status. **Main associations (regression):**
  - Health status: higher probabilities for individuals incapacitated from work, for a large range of disorders as defined by prescribed medication use (in particular asthma, cardiovascular disease and neurological disease) and females (except in the age category 65-79). Weak association with self-reported health status. While the presence of a chronic disorder increases the probability, limitations to daily activities do not.
  - Lower probabilities for individuals with material deprivation in 2008; individuals who are inactive, unemployed, self-employed or student (relative to full-time employee); individuals living in Wallonia and Brussels (relative to Flanders).
  - Higher probabilities for individuals who benefit from increased reimbursement in 2012 and 2016.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Small systematic socioeconomic inequity by income level with above-average probabilities among individuals in core/upper middle class; below-average probabilities among individuals at risk of poverty and in lower middle class; and below-average probabilities in top middle class.
  - No systematic inequities by educational attainment or self-assessed health.
  - Among the groups of interest, probabilities below the population mean are found for individuals at risk of poverty, the unemployed, individuals with severe material deprivation, singles between 18 and 65 and the self-employed. For individuals with material deprivation, the situation is relatively improving.
  - Compared to other individuals in a difficult financial situation, i.e. individuals at risk of poverty, the unemployed and individuals with severe material deprivation, those who benefit from increased reimbursement have a higher probability, in line with the needs corrected population average, suggesting an

improved accessibility for this group, that does not extend to other financially vulnerable groups.

Conditional number of GP consultations

- Strong association with healthcare needs, but also variation by socioeconomic status. **Main associations (regression):**
  - Health status: more consultations for worse self-reported health (fair, bad or very bad self-assessed health); for individuals incapacitated from work; for individuals eligible for the lump sum chronic illness; in higher age groups; for females (gap with males decreasing by age); and for individuals who take medication for asthma, cardiovascular disease, and thrombosis.
  - Fewer consultations for the unemployed, self-employed and students (relative to full-time employees); individuals with lower income; individuals living in Wallonia.
  - More consultations for individuals who benefit from increased reimbursement; individuals without tertiary education; individuals with material deprivation.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Disparities are small; conditional number of GP consultations below the population mean for the unemployed and self-employed; above the population mean for individuals with material deprivation (positive gap is widening over time), for households with children at risk of poverty, for individuals with increased reimbursement status, for individuals with (very) bad self-assessed health
  - Systematic socioeconomic inequities in favour of individuals with lower educational attainment (below-average number of consultations for individuals with tertiary education and above-average for individuals with primary education). The results go in the opposite direction in the net effect needs-access inequity scenario.
  - No systematic socioeconomic inequities by income in the baseline horizontal scenario; pro-rich inequity in the net effect needs-access scenario

1.3.2. Probability of a GP consultation in the past year

1.3.2.1. Evolution over time for the population and population subgroups

Table 13 reports the evolution over time of the probability to have one or more GP consultations in the past year. 78.5% in 2008 and 2012 and 80.1% in 2016 of the insured population has had at least one GP contact over the past 12 months.[20] Among the individuals included in the EU-SILC/IMA-AIM sample, this fraction is slightly higher with 80.5% in 2008, 81.2% in 2012 and 83.0% in 2016 of the interviewed individuals who have consulted a GP at least once in the past year. The upward trend is also more positive over time. Remark that this probability is less than 10 percentage points lower than the probability to consult a doctor (GP and specialist combined), implying that the overwhelming majority of individuals who consulted a doctor has in fact consulted a GP (possibly in combination with a specialist consultation) (see section 1.2.2.1) The probability to consult a GP is higher when restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, with 83.0%, 83.9% and 85.3% of the sample with at least one GP consultation in the past year in 2008, 2012 and 2016, respectively.

The reversed value is given as well, i.e. the probability of not consulting a GP in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 13 – Evolution (2008-2016) of the probability to have at least one GP consultation in the past year

Sample	Definition	2008	2012	2016
Population	Indicator	78.5%	78.5%	80.1%
Survey (all)	Indicator	80.5%	81.2%	83.0%
	Reverse	19.5%	18.8%	17.0%
Survey (18+)	Indicator	83.0%	83.9%	85.3%
	Reverse	17.0%	16.1%	14.7%

Figure 12 shows the evolution of the probability to have at least one GP consultation in the past year for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.3.2.2.

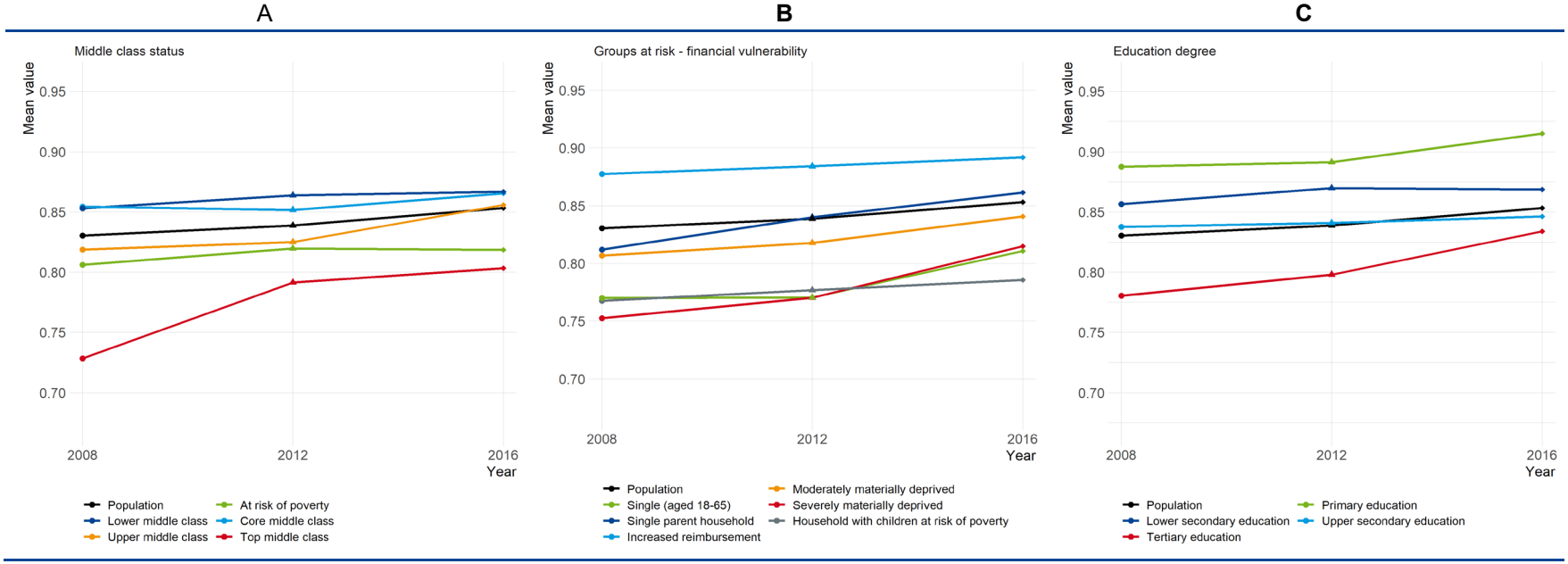
Figure 12 indicates that for most population subgroup, there is a stable or slightly upward trend over time. Most trends are in line with the trends observed for doctor consultations (see section 1.2.2.1). There is an increase in probability to go to a GP for the upper and top middle class, the self-employed and individuals with tertiary education, albeit to a lesser extent than for GP and specialist consultations combined. Moreover, there is an increase among single persons aged below 65 and especially among materially deprived individuals. Although there is little variation in probability by income level or educational attainment, a socioeconomic gradient can be observed, with higher probabilities among individuals with lower educational attainment (panel C) and lower income (panel A). Remark, however, that individuals at risk of poverty have a lower probability than individuals in the lower, core and upper middle class. Other individuals in a difficult financial situation, such as individuals with material deprivation or single adults between 18 and 65 also have a substantially lower probability to go to the GP. Finally, individuals with higher care needs, i.e. those with fair, bad and very bad self-reported health, with chronic disorders and limitation, invalidity or disability have the highest probability to consult a GP. Moreover individuals who benefit from increased reimbursement are more likely to go to a GP.

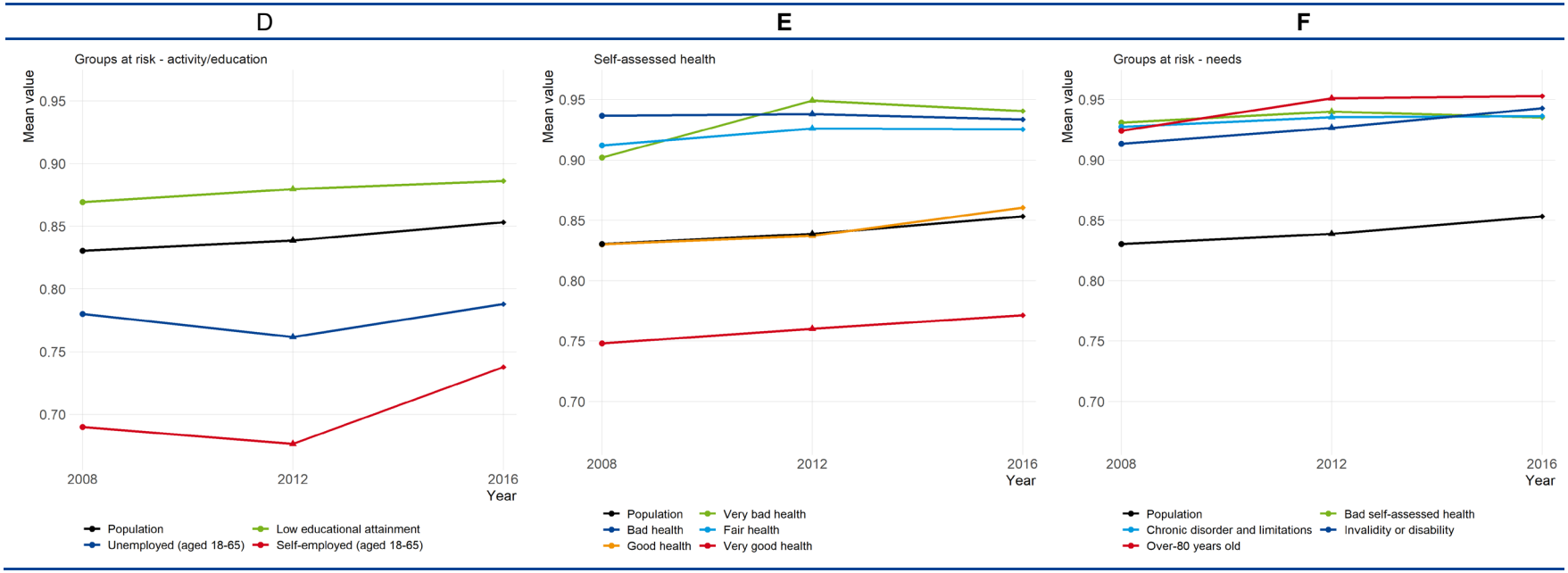
In addition, we have the following findings:

- Panel A: There is little variation in the probability to consult a GP by income level (range 2016: 0.80 – 0.87). Individuals at risk of poverty and in the top middle class have somewhat lower probability. While the latter group shows a strong positive trend, the probability to go to a GP has remained constant over time for individuals at risk of poverty.
- Panel B: individuals with severe material deprivation, single adults between 18 and 65 and households with children which are below the poverty line are less likely to go to a GP than the population in general. Individuals with moderate material deprivation have a slightly lower probability to consult a GP than the population average, while adults in single parent household have a probability that is around the population average. individuals who benefit from increased reimbursement re more likely to go to a GP
- Panel C: The variation in the probability to consult a GP by educational attainment (range 2016: 0.83 – 0.92) is higher than the variation observed in consulting a doctor (see section 1.2.2.1). For individuals with primary education, both probabilities are more or less the same (0.92% has consulted a GP, 0.94% has consulted either GP or specialist), the probability differs more for individuals with tertiary education (0.83% for GP versus 0.88% for either GP or specialist). There is somewhat higher usage among individuals with lower educational attainment.
- Panel D: We have observed that self-employed individuals go less frequently to a doctor (GP and specialist combined), but that there is an important catch-up in doctor usage over time (see section 1.2.2.1). The trend for GP use, indicates that the increase in consultation for the self-employed was rather limited with respect to GP use. The unemployed have a probability to consult a GP that is below the population mean.

- Panel E and F: There is quite some variation in the probability to consult a GP by self-assessed health status (range 2016: 0.77 – 0.94). Individuals in (very) good health have a lower probability than individuals in fair or (very) bad health. Between 90% and 95% of those reporting to have fair or (very) bad health have consulted a GP in the past year. Similar probabilities are found for individuals over 80 years old, individuals with disability or in invalidity, and individuals reporting chronic disorders in combination with limitation to daily activities.

Figure 12 – Evolution (2008-2016) of the probability to have at least one GP consultation for different subgroups and populations groups at risk





1.3.2.2. Regression output

Table 14 reports the average marginal effects of a probit regression of the indicator of having at least one GP consultation in the past year (value = 1) or no consultation (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 14):

- **Healthcare needs** are clearly associated with the probability to consult a GP. Males have a lower probability (except in the age group 65-79) and needs captured by bad self-assessed health, presence of chronic disorders, medication use for various disorders and especially incapacity to work are associated with higher probabilities.
  - Age and sex: Except in the age group 65-79, males have a 5 to 11 percentage point lower probability to consult a GP in the past year than females in the same age category. Females have more or less the same probability to consult a GP irrespective of age.
  - Self-reported health status: When correcting for other characteristics, individuals with bad, fair and good health have a higher probability to go to a GP in the past year. The presence of a chronic disorder increases the probability to consult a GP, there is



no effect on the probability when limitations to daily activities are reported.

- Administrative health information: invalidity or disability has a borderline significant positive effect in 2016 and was not significant in other years. Being incapacitated for work has a very strong positive association on the probability of consulting a GP (an increase of 14 to 16 percentage points in the year-specific models). This should not be surprising as the incident causing the incapacity may well result in one or multiple GP consultations.
- Medication use: Medication use for various disorders is strongly associated with the probability to consult a GP. There is of course a degree of reversed causality that explains this variation. Profiles of disorders related to medication use are based on medication prescribed by a doctor. Effects of 10 percentage points or more are found for individuals taking medication for a neurological disorder, cardiovascular disorder and asthma.

- There is some variation in the probability to consult a GP by **socioeconomic profile**, especially with regard to activity status and financial situation.
  - Education degree: there is almost no variation in the probability to consult a GP by obtained education degree. In 2008 and 2012, there was a higher probability in use for individuals with a lower or upper secondary degree.
  - Activity status: Being unemployed or inactive is associated with a lower probability to consult a GP (5 percentage points lower) compared to full-time employees. No such effect is found for retired individuals. Self-employed individuals have a significantly lower probability to consult a GP, about 7, 9 and 6 percentage points lower than full-time employees in 2008, 2012 and 2016, respectively. Also student have a lower probability to consult a GP.
  - Income level: there is no variation in the probability to consult a GP by income in 2008 and 2012 and a positive effect in 2016 (i.e. higher income have, ceteris paribus a higher probability to consult a GP).
  - Material deprivation: In 2008, there was a strong association being material deprivation and the probability to consult a GP. The more severe the material deprivation of the household, the lower the probability to consult a GP. However, the effect is decreasing over time and was not significant in 2012 and 2016.
  - Household composition: Single persons have a lower probability to consult a GP, compared to adults in a couple without children. No or minor effects are found for other household composition, such as single parents or a couple with children
  - Country of birth: Individuals who were not born in Belgium have a lower probability to consult a GP in 2008 and 2012.
- Individuals who benefit from **increased reimbursement** have a higher probability to consult a GP in 2012 and 2016. There is an upwards trend, with a 3 and 5 percentage point higher probability in 2012 and 2016, respectively. Although the impact is limited when accounting for various other effects, it suggest that the policy measures taken in the past improve the accessibility to primary care for this subgroup.
- The density of **healthcare providers** and the distance to a hospital with an emergency department (ED) are weakly associated with the probability to consult a GP. A higher density of GPs in neighbouring municipalities and a longer distance to a hospital with an ED lead to small increases in the probability to consult a GP.
- The probability to go to a GP is about 6 to 7 percentage points and 7 to 9 percentage points lower for individuals living in Wallonia and Brussels, respectively. This lower probability is much more pronounced than the lower probability for doctor consultations (see section 1.2.2.2). There is no effect of urbanization.

In general, we observe that the marginal effects, both positive and negative, decrease somewhat in absolute value over time.

Table 14 – Regression output for the probability to have at least one GP consultation in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 618)		Reduced model 2008 (Obs. = 10 675)		Reduced model 2012 (Obs. = 10 088)		Reduced model 2016 (Obs. = 9 855)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.104	(0.008)***	-0.104	(0.008)***	-0.112	(0.012)***	-0.098	(0.014)***	-0.093	(0.012)***
Male aged 35-49 years	-0.092	(0.008)***	-0.092	(0.008)***	-0.095	(0.015)***	-0.103	(0.016)***	-0.075	(0.014)***
Female aged 35-49 years	-0.017	(0.007)*	-0.017	(0.007)*	-0.031	(0.015)*	-0.025	(0.016)	-0.005	(0.014)
Male aged 50-64 years	-0.067	(0.009)***	-0.067	(0.009)***	-0.091	(0.016)***	-0.054	(0.016)**	-0.062	(0.016)***
Female aged 50-64 years	-0.004	(0.008)	-0.004	(0.008)	-0.016	(0.017)	-0.013	(0.015)	0.012	(0.016)
Male aged 65-79 years	-0.030	(0.013)*	-0.030	(0.013)*	-0.070	(0.024)**	0.000	(0.026)	-0.031	(0.025)
Female aged 65-79 years	0.002	(0.013)	0.002	(0.013)	-0.014	(0.024)	0.040	(0.024)	-0.012	(0.026)
Male aged 80 years or more	-0.094	(0.024)***	-0.095	(0.023)***	-0.123	(0.041)**	-0.090	(0.036)*	-0.072	(0.038)°
Female aged 80 years or more	-0.010	(0.021)	-0.010	(0.021)	-0.051	(0.037)	0.037	(0.042)	-0.019	(0.038)
Self-assessed health (reference = very good)										
Self-assessed health - good	0.031	(0.005)***	0.031	(0.005)***	0.039	(0.009)***	0.025	(0.009)**	0.027	(0.009)**
Self-assessed health - fair	0.056	(0.009)***	0.056	(0.009)***	0.084	(0.014)***	0.060	(0.018)***	0.028	(0.016)°
Self-assessed health - bad	0.057	(0.013)***	0.056	(0.013)***	0.093	(0.024)***	0.067	(0.024)**	0.017	(0.025)
Self-assessed health - very bad	0.038	(0.024)	0.034	(0.024)	0.027	(0.043)	0.066	(0.042)	0.005	(0.036)
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.020	(0.011)°	0.020	(0.011)°	0.042	(0.019)*	-0.027	(0.022)	0.032	(0.021)
Chronic disorder, no limitations	0.036	(0.009)***	0.036	(0.009)***	0.043	(0.015)**	0.031	(0.019)	0.040	(0.018)*
Chronic disorder, limitations	0.037	(0.009)***	0.036	(0.009)***	0.049	(0.015)**	0.028	(0.019)	0.038	(0.016)*
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.024	(0.013)°	0.022	(0.014)	-0.002	(0.029)	0.020	(0.025)	0.044	(0.025)°
Incapacity to work	0.113	(0.006)***	0.113	(0.006)***	0.145	(0.025)***	0.160	(0.024)***	0.161	(0.023)***
Entitled to lump sum chronic illness	-0.012	(0.014)								
Clinical profile based on medication use (reference = no disorder)										

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 618)		Reduced model 2008 (Obs. = 10 675)		Reduced model 2012 (Obs. = 10 088)		Reduced model 2016 (Obs. = 9 855)	
Medication use - neurological disorder	0.090	(0.015)***	0.089	(0.015)***	0.078	(0.042)°	0.147	(0.050)**	0.125	(0.043)**
Medication use - other disorder	0.006	(0.026)								
Medication use - cardiovascular disorder	0.122	(0.005)***	0.122	(0.005)***	0.141	(0.013)***	0.170	(0.011)***	0.139	(0.013)***
Medication use - thrombosis	0.038	(0.010)***	0.038	(0.010)***	-0.002	(0.024)	0.062	(0.016)***	0.040	(0.018)*
Medication use - chronic obstructive pulmonary disease (COPD)	0.068	(0.014)***	0.067	(0.014)***	0.082	(0.033)*	0.065	(0.034)°	0.087	(0.036)*
Medication use - asthma	0.090	(0.012)***	0.090	(0.012)***	0.130	(0.048)**	0.118	(0.034)***	0.104	(0.029)***
Medication use - diabetes	0.051	(0.011)***	0.050	(0.011)***	0.055	(0.025)*	0.025	(0.023)	0.084	(0.024)***
Medication use - epilepsy	0.058	(0.018)**	0.057	(0.018)**	0.031	(0.041)	0.095	(0.044)*	0.068	(0.041)°
Medication use - thyroid disorder	0.068	(0.010)***	0.067	(0.010)***	0.098	(0.028)***	0.092	(0.022)***	0.054	(0.020)**
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.070	(0.007)***	-0.068	(0.007)***	-0.058	(0.010)***	-0.062	(0.011)***	-0.075	(0.010)***
Region of residence - Brussels	-0.063	(0.019)***	-0.083	(0.010)***	-0.077	(0.016)***	-0.067	(0.015)***	-0.087	(0.013)***
Urbanization - medium	0.006	(0.006)								
Urbanization - thin	0.006	(0.009)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.017	(0.009)°	-0.017	(0.009)°	-0.018	(0.013)	-0.006	(0.013)	-0.026	(0.014)°
Occupation - inactive	-0.055	(0.011)***	-0.055	(0.011)***	-0.050	(0.016)**	-0.045	(0.018)*	-0.050	(0.016)**
Occupation - self-employed in 2008	-0.079	(0.016)***	-0.079	(0.016)***	-0.069	(0.014)***				
Occupation - self-employed in 2012	-0.103	(0.019)***	-0.103	(0.019)***			-0.086	(0.015)***		
Occupation - self-employed in 2016	-0.066	(0.016)***	-0.066	(0.016)***					-0.056	(0.013)***
Occupation - unemployed	-0.056	(0.012)***	-0.056	(0.012)***	-0.053	(0.017)**	-0.050	(0.017)**	-0.052	(0.017)**
Occupation - student	-0.048	(0.011)***	-0.048	(0.011)***	-0.051	(0.016)**	-0.043	(0.018)*	-0.033	(0.014)*
Occupation - retired	-0.009	(0.010)	-0.009	(0.010)	0.010	(0.017)	-0.024	(0.017)	-0.014	(0.020)
Highest obtained educational degree (reference = tertiary education)										

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 618)		Reduced model 2008 (Obs. = 10 675)		Reduced model 2012 (Obs. = 10 088)		Reduced model 2016 (Obs. = 9 855)	
Education degree - primary	0.022	(0.010)*	0.022	(0.010)*	0.035	(0.016)*	0.008	(0.017)	0.021	(0.017)
Education degree - lower secondary	0.035	(0.008)***	0.036	(0.008)***	0.053	(0.012)***	0.036	(0.014)**	0.018	(0.012)
Education degree - upper secondary	0.028	(0.005)***	0.028	(0.005)***	0.045	(0.010)***	0.029	(0.010)**	0.011	(0.009)
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.009	(0.006)	0.009	(0.006)	0.004	(0.010)	0.006	(0.011)	0.026	(0.011)*
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.065	(0.023)**	-0.065	(0.023)**	-0.123	(0.040)**	-0.050	(0.041)	-0.006	(0.038)
Household composition (reference = couple without children)										
Household composition - single without children	-0.024	(0.007)***	-0.025	(0.007)***	-0.020	(0.014)	-0.026	(0.012)*	-0.025	(0.012)*
Household composition - single with children	0.019	(0.011)°	0.019	(0.011)°	0.015	(0.023)	0.030	(0.023)	0.015	(0.021)
Household composition - couple with children	0.002	(0.006)	0.003	(0.006)	0.014	(0.012)	0.015	(0.011)	-0.020	(0.011)°
Household composition - other	-0.015	(0.008)*	-0.015	(0.008)*	-0.010	(0.013)	-0.006	(0.013)	-0.029	(0.014)*
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.027	(0.008)***	-0.028	(0.008)***	-0.030	(0.014)*	-0.039	(0.012)**	-0.012	(0.012)
Insurance status										
Insurance - increased reimbursement in 2008	0.013	(0.012)	0.012	(0.012)	0.016	(0.014)				
Insurance - increased reimbursement in 2012	0.036	(0.011)**	0.034	(0.011)**			0.031	(0.015)*		
Insurance - increased reimbursement in 2016	0.037	(0.012)**	0.036	(0.012)**					0.049	(0.014)***
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.000	(0.001)	0.000	(0.001)	-0.001	(0.002)	0.000	(0.002)	0.001	(0.002)
Density of GPs in neighbouring municipalities	0.005	(0.002)*	0.005	(0.002)*	0.006	(0.003)°	0.006	(0.004)°	0.003	(0.003)
Density of specialists in municipality	-0.001	(0.000)°	-0.001	(0.000)°	-0.000	(0.001)	-0.001	(0.001)	-0.001	(0.001)
Density of specialists in neighbouring municipalities	-0.001	(0.001)°	-0.001	(0.001)°	-0.001	(0.001)	-0.002	(0.001)	-0.000	(0.001)
Distance to nearest ED	0.001	(0.001)*	0.002	(0.001)***	0.002	(0.001)°	0.003	(0.001)**	0.001	(0.001)
Number of EDs within 10km radius	-0.001	(0.001)								

Independent variables	Full model (Obs. = 30 618)	Reduced model (Obs. = 30 618)	Reduced model 2008 (Obs. = 10 675)	Reduced model 2012 (Obs. = 10 088)	Reduced model 2016 (Obs. = 9 855)
Time (reference = 2008)					
Time: year 2012	0.005 (0.006)	0.005 (0.006)			
Time: year 2016	0.010 (0.006)	0.010 (0.006)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.3.2.3. Overview inequity and evolution in the different scenarios

Figure 13 visualizes the absolute Gini coefficient for inequality in the probability of at least one GP consultation in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of at least one GP consultation or visit in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 13, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a decrease in inequity in the probability to have consulted a GP in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient decreased from about 0.17 in 2008 to about 0.15 in 2016. Hence, we find that the disparity between individuals in the probability of going at least once to a GP in the past year that cannot be explained and justified by (observable) healthcare needs has decreased over time.

Table 15 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not going to a GP in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

The trends are quite similar to those of the probability to consult a doctor, although in the latter case, the value of the Gini coefficients were lower. Based on the trends, we conclude that inequity in the probability to consult a GP has diminished over time. For the reversed indicator, inequity is stable over time. Overall, this is a positive finding. In combination with the high probability of GP utilization, we can say that a GP is fairly accessible.

Figure 13 – Evolution (2008-2016) of the absolute Gini index by scenario

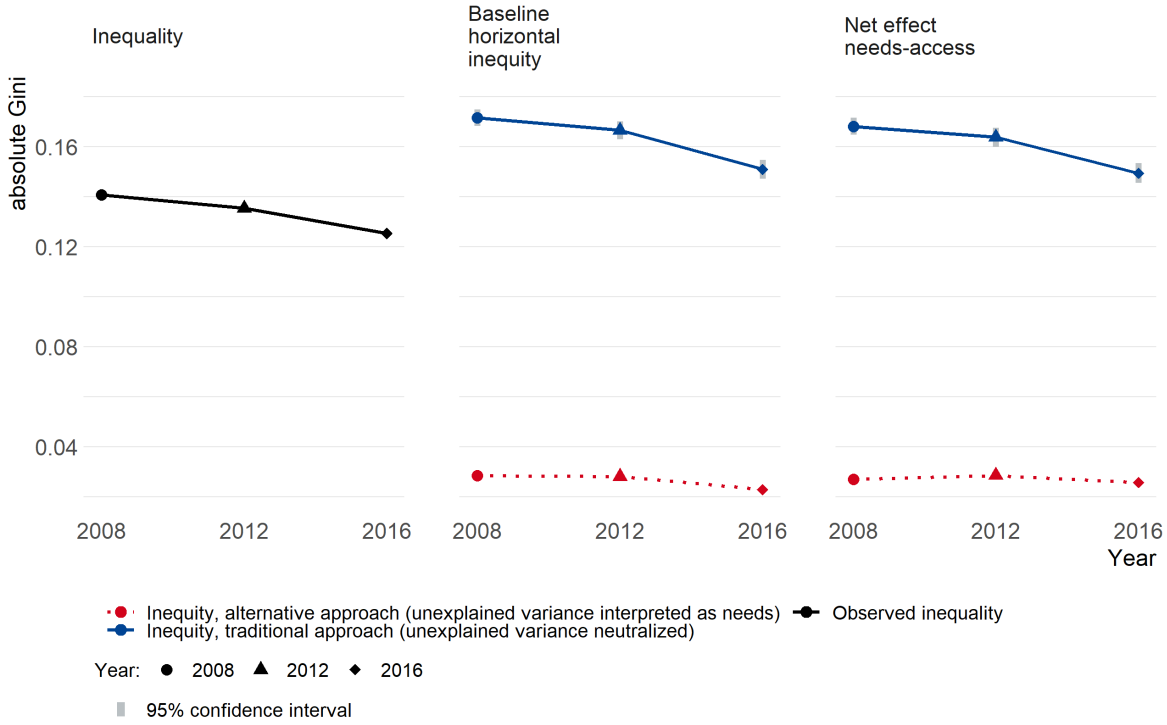


Table 15 – Evolution (2008-2016) of the inequity in the probability to have at least one GP consultation in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.172	0.167	0.151^*	↓
	Relative	0.205	0.198	0.176^*	↓
	Reversed relative	0.737	0.731	0.755	→
Net effect needs-access	Absolute	0.168	0.164	0.149^*	↓
	Relative	0.201	0.195	0.175^*	↓
	Reversed relative	0.741	0.735	0.758	→
Baseline-residual	Absolute	0.028	0.028	0.023^*	↓
	Relative	0.034	0.033	0.027^*	↓
	Reversed relative	0.168	0.174	0.155^*	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).

**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*

§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.3.2.4. Overview inequity over time for different population subgroups

Figure 14 and Figure 15 show how the probability to consult a GP in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 14, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 15, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability of consulting a GP than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 14 and Figure 15 indicate that the inequalities with respect to the probability to consult a GP at least once over the past year are more pronounced than those for the probability to consult a doctor at least once over the past year. This is not surprising as 90% of the population has consulted a doctor, reducing the potential to find inequalities. Once a correction is made for healthcare needs, the disparities are less pronounced, i.e. the deviations from the population average are lower in the inequity scenario compared to inequality. This is especially true for subgroups based on age and (self-assessed) health status.

The inequity pattern is rather similar than for doctor consultations. After correcting for needs, there are lower probabilities to consult a GP for individuals at risk of poverty, individuals with material deprivation, singles aged between 18 and 65, the unemployed, individuals in the top middle class and the self-employed. This might indicate potential accessibility issues as well as (unmeasured) lower healthcare needs or preferences to seek GP care (e.g. for the self-employed or the top middle class). The probabilities for individuals with material deprivation, the self-employed and the top middle class are evolving toward the population average, while for households with children at risk of poverty, the gap with the population average is widening. The effects are going in the same direction when considering the baseline, baseline-residual and net effect needs-access scenario.

In the baseline inequity scenario, we find that:

- While there is a higher probability to consult a GP for individuals with primary education (column inequality), this is no longer the case after correcting for healthcare needs (baseline horizontal inequity).
- There is a gradient by income group (even though income was not a significant factor in the regression in 2008 and 2012) with a lower probability to consult a GP for individuals at risk of poverty. After correcting for needs, individuals in the lower middle class do no longer have a probability to consult a GP above the population mean, but below the mean. For the top middle class, their use is below the population average both before and after correcting for needs. This is most pronounced in 2008. The univariate analysis for this group showed a lower probability of use, but with a catch up effect over time (see section 1.1.6.2)
- Individuals in fair, bad and very bad self-reported health have a higher probability of going to a GP (column inequality). This is no longer the case when correcting for healthcare needs (baseline horizontal inequity)
- Among the vulnerable groups, there is a lower probability of consulting a GP in the past year among individuals who are unemployed, self-employed, singles between 18 and 65 and individuals in households with material deprivation (baseline horizontal inequity). The probability of consulting a GP decreases with the intensity of material deprivation. A positive finding is that for these groups, the average probability is evolving towards the population mean. On the other side, the situation has deteriorated among household with children which are at risk of poverty. Individuals who benefit from increased reimbursement have a probability to consult a GP in line with the population average after correcting for needs.

Figure 14 – Deviation in the needs-corrected probability to have at least one GP consultation from population average for subgroups based on income, education and self-assessed health, by scenario and year

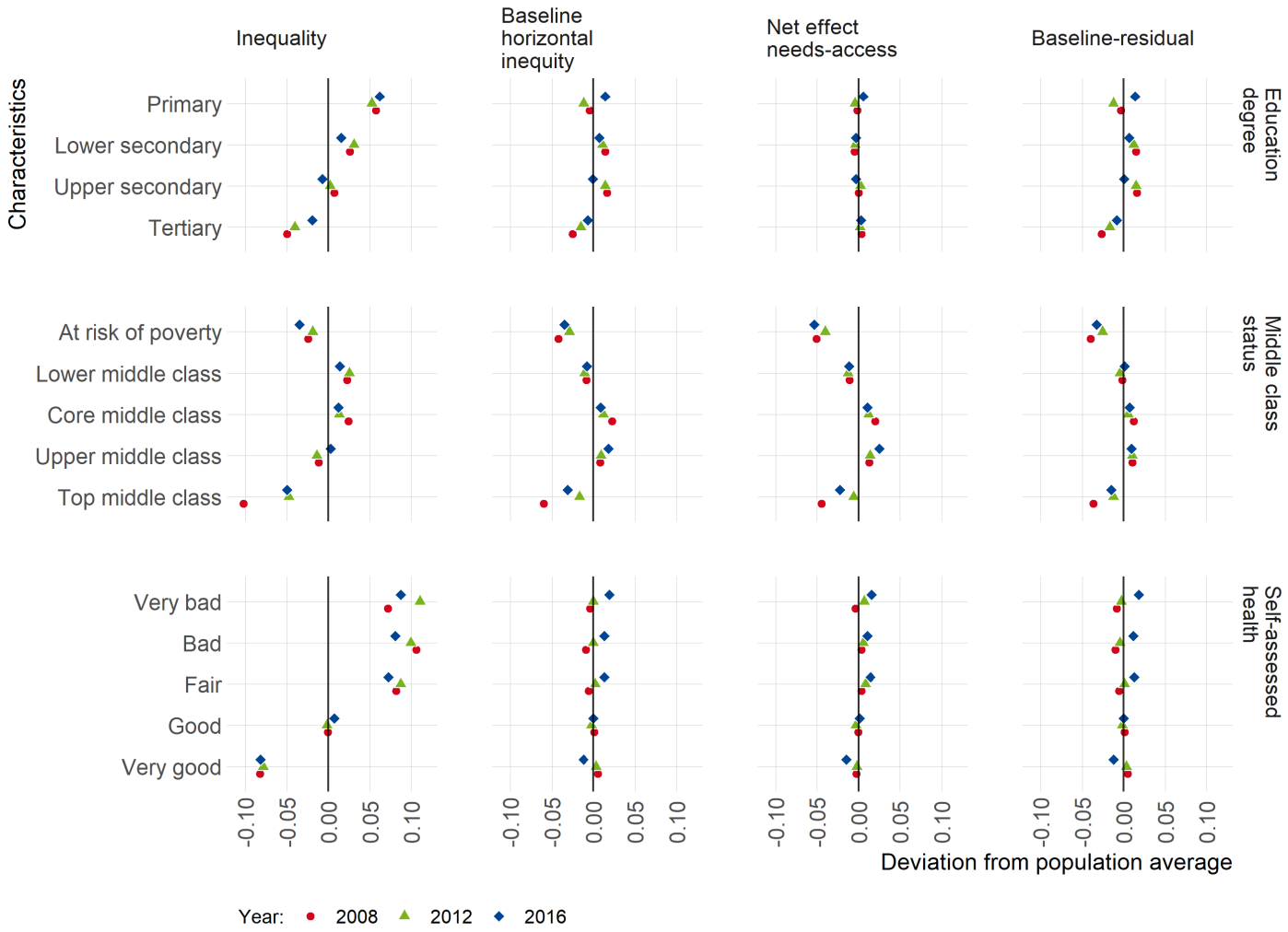


Figure 15 – Deviation in the needs-corrected probability to have at least one GP consultation from population average for specific vulnerable subgroups, by scenario and year

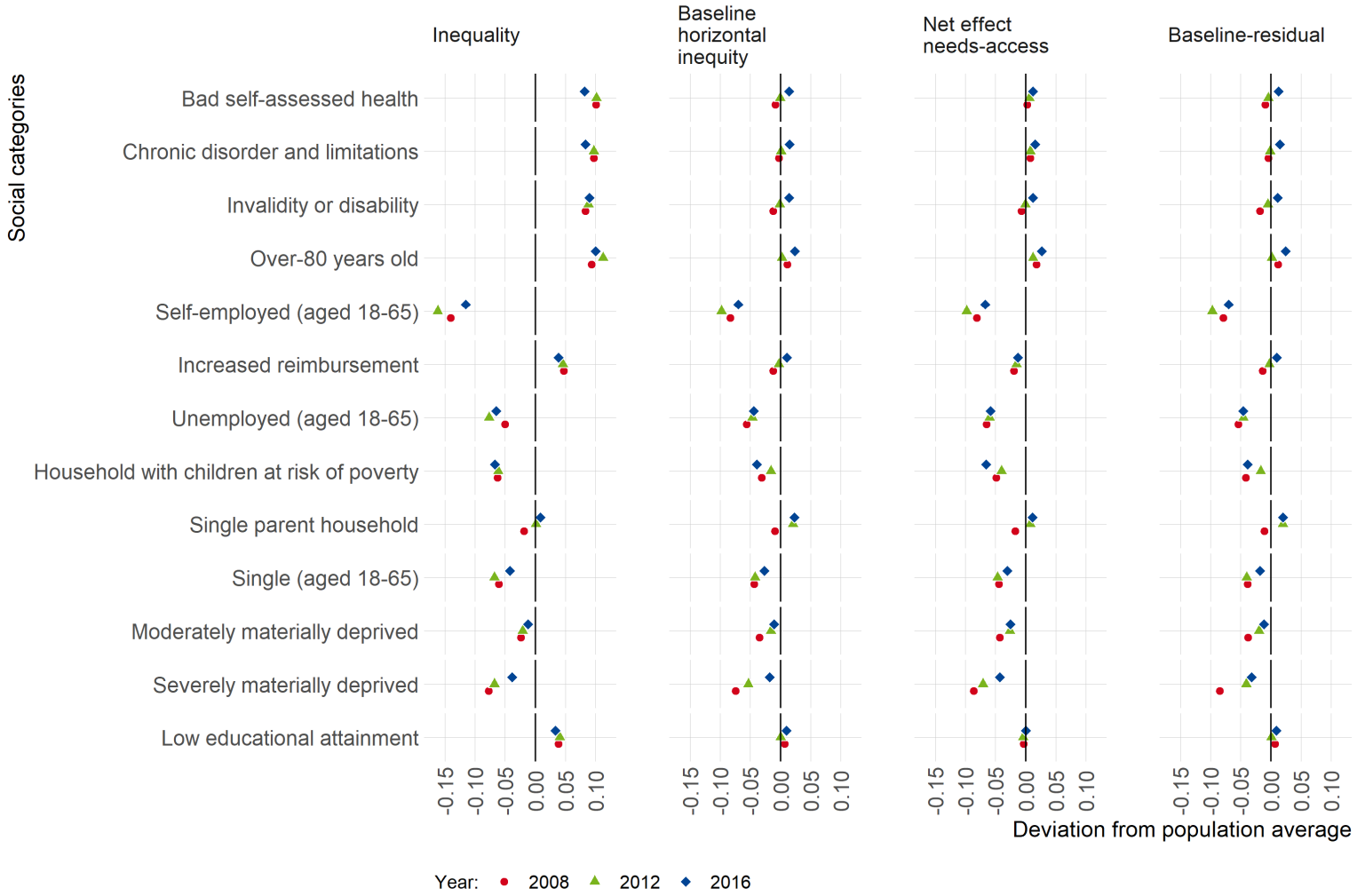
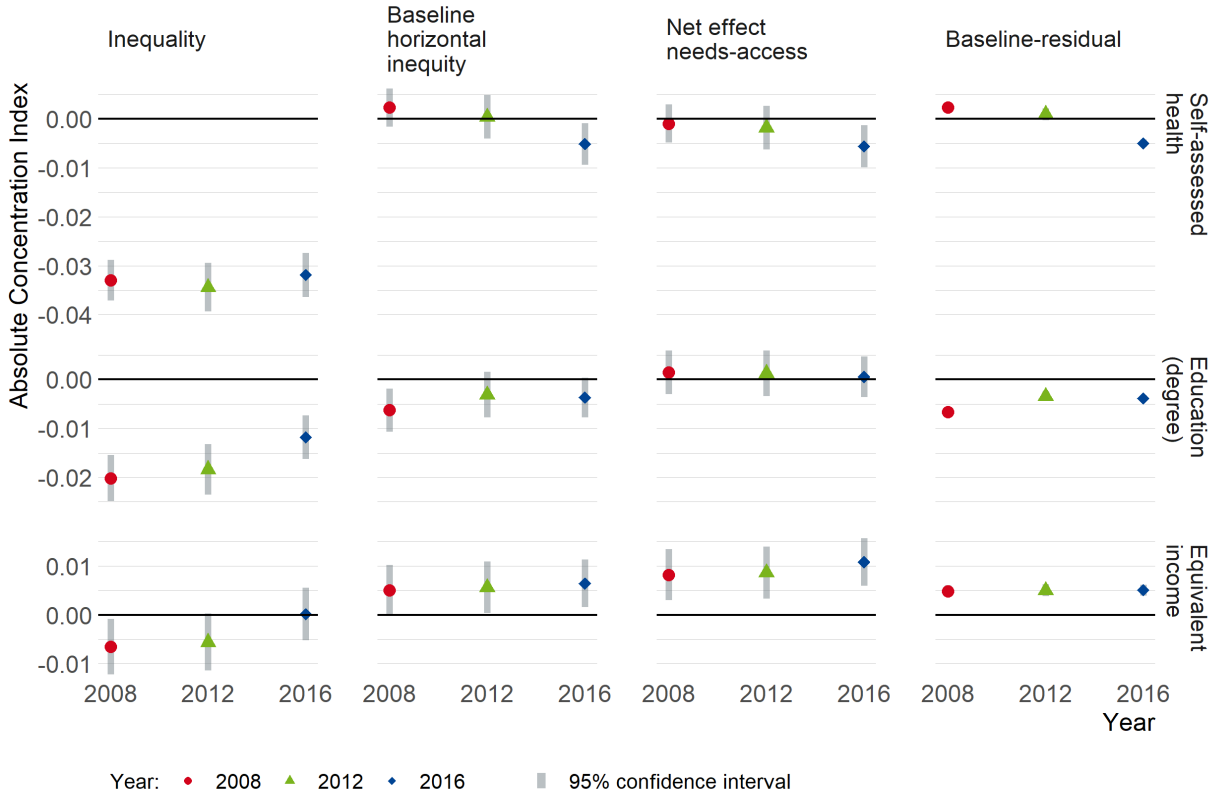


Figure 16 shows the absolute concentration index of the needs-corrected probability to have a GP consultation to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of consulting a GP concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 16 show that there are inequalities in the probability to consult a GP, with a higher use among low educated individuals and individuals with a worse self-reported health status. Small inequalities are found by income level in 2008 and 2012. After correcting for needs, the concentration index indicates that there are no inequities based on self-reported health status or obtained education degree. However, there is limited inequity with regard to income in favour of more affluent individuals after needs are taken into account. This is somewhat more pronounced in the net effect needs-access scenario.

Overall, the results of the net effect needs-access scenario and the baseline-residual scenario are in line with the baseline scenario.

Figure 16 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.3.3. Conditional number of GP consultations in the past year

1.3.3.1. Evolution over time for the population and population subgroups

Table 16 and Figure 17 show the evolution over time of the number of GP consultation and visits in the past year for individuals with at least one such consultation. There was no information in the KCE HSPA report of 2019 on the population average number of GP consultations that can be used as benchmark, hence only the number of GP consultations in the EU-SILC/IMA-AIM sample is reported.[18] From Table 13 and Figure 12, we concluded that the probability of having at least one GP consultation was high, between 79% and 85%, depending on the year and sample. It has increased with a few percentage points between 2008 and 2016. Table 16 and Figure 17 additionally indicate that conditional on going at least once to a GP in the past year, the average number of GP consultations per individual has increased slightly over time, from 5.6 consultations in 2008 on average to 6 consultations in 2016 in the EU-SILC/IMA-AIM sample. The number of consultations is higher when restricting the sample to the adult population, but with the same trend, from 6 consultations in 2008 to 6.3 consultations in 2016.

Remark that the number of GP consultations and visits amounts to about 70% of the conditional average number of doctor consultations (see section 1.2.3.1).

Table 16 – Evolution (2008-2016) of the number of GP consultations in the past year given at least one consultation

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	5.64	5.87	5.96
Survey (18+)	Indicator	5.95	6.22	6.30

Figure 17 shows the evolution of the number of GP consultations conditional on having at least one consultation, for a variety of population subgroups (see section 1.1.2).

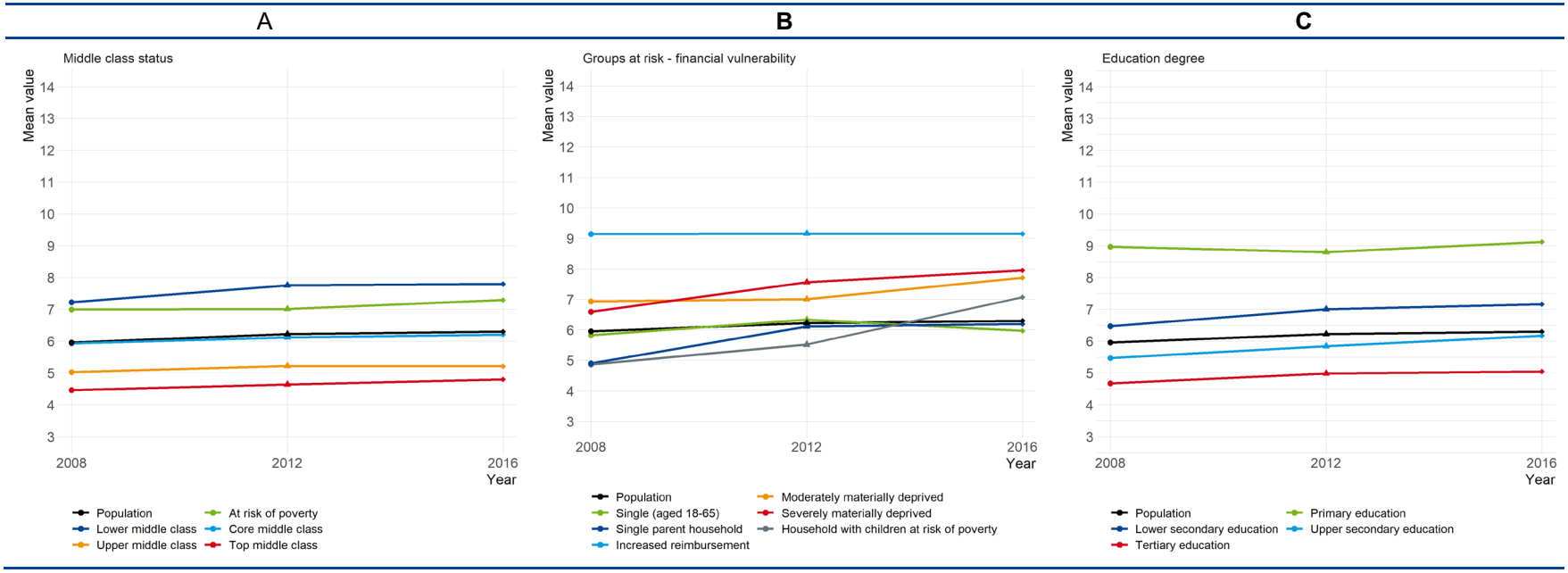
First, we find that for most population groups the 2016 number of GP consultations is slightly higher or similar compared to the 2008 value. The evolution for individuals with very bad self-assessed health shows a lot of variability, given the small sample size. Second, a higher number of GP consultations (annually between 9 and 12 on average, see panel F) is observed for individuals with higher care needs, i.e. those in (very) bad health, with chronic disorders and limitations to daily activities, over-80 year olds and individuals with invalidity/disability. Third, while individuals who qualify their health status as fair and (very) bad have about the same probability to consult a GP (see section 1.1.6.2), there is a divergence in the average number of consultations (panel E). Fourth, there appears to be some financial issues related to the frequency at which a GP is consulted. Individuals with severe or moderate material deprivation (of whom a large fraction belong to the group with higher care needs (see Scientific report section 2.4.1), have on average only 1 to 2 consultations above the population average (see panel B). On the positive side, there was an upward trend over time for the subpopulation with material deprivation as well as for household with children at risk of poverty and single parent households (see panel B). It is striking in that sense that individuals at risk of poverty have a lower number of consultations than individuals in the lower middle class (panel A). The subgroup of individuals with increased reimbursement, who benefit from a reduced rate and for GP care form the social third payer system, have a significantly higher number of consultations than the average number among individuals with low incomes (see panel B).

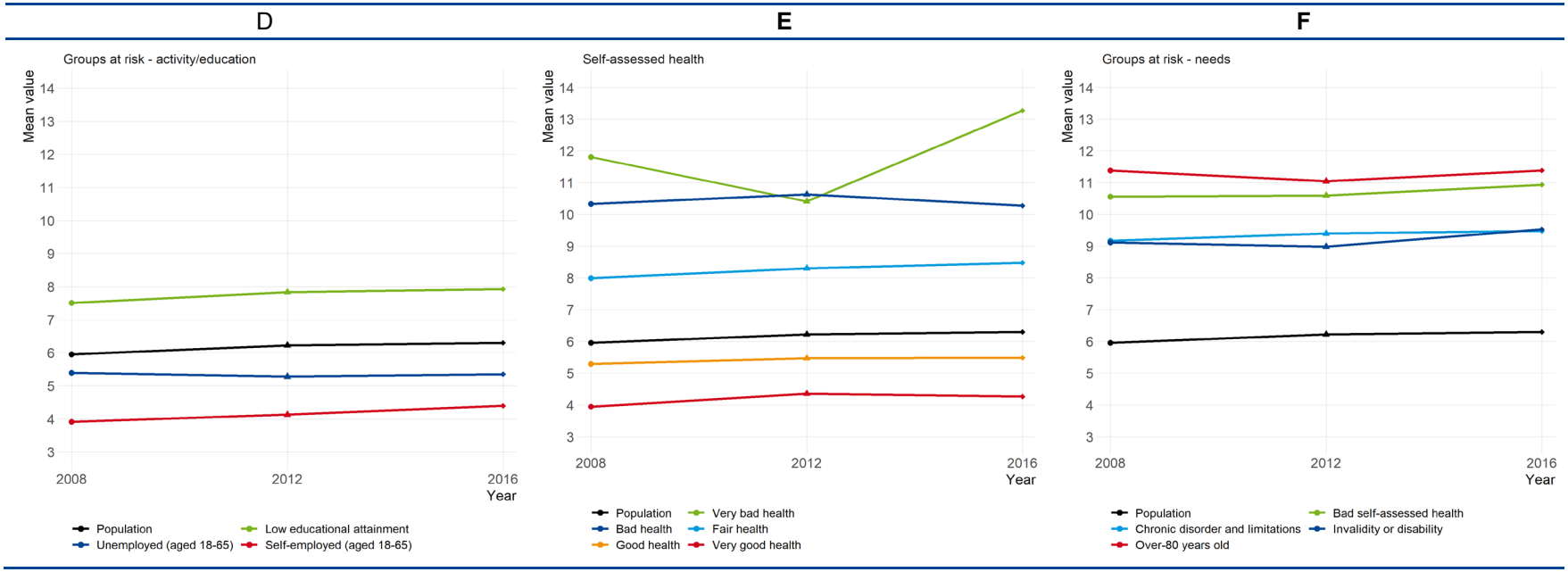
In addition, we have the following findings:

- Panel A: the average number of annual GP consultations ranges from 4 to 8 for the different income groups. The number is generally higher as income decreases, except that individuals at risk of poverty have a lower number of consultations than individuals in the lower middle class.

- Panel B: Individuals who experience material deprivation have only 1 to 2 additional GP consultations per year compared to the population average. Remark that there are higher care needs in this population subgroup (see Scientific report section 2.4.1), and that they have a lower probability to consult a GP in the first place (see section 1.1.6.2). The subgroup of individuals who benefit from increased reimbursement have a significantly higher number of consultations. Singles (18-65), single parents and adults in households with children at risk of poverty have a number of GP consultations and visits in line with or slightly below the population average. There is an upward trend for the latter two groups.
- Panel C and D: the average number of annual GP consultations ranges from 5 to 9 for subgroups based on educational attainment, with a higher number of consultations for individuals with a lower educational attainment. In addition to a lower probability to consult a GP, the self-employed are with an annual average of 4 GP consultations clearly below the population average. The group of unemployed has a lower number of annual GP consultations on average than the population.
- Panel E and F: There is a clear association between the number of GP consultations and an individual's health status. Individuals in (very) good health have a number of consultations below the average, while those in fair health or with health issues have a higher number of annual consultations.

Figure 17 – Evolution (2008-2016) of the number of GP consultations given at least one consultation for different subgroups and populations groups at risk





1.3.3.2. Regression output

Table 17 reports the average marginal effects of a truncated negative binomial count model for the sample of individuals with at least one GP consultation (see section 1.1.3). The results should be interpreted as a change in number of consultations expressed in consultations

The regression analysis presented in Table 17 indicates that the conditional number of GP consultations is strongly associated with healthcare needs, i.e. age and sex, self-reported health status, incapacity to work and medication use, but also to socioeconomic and sociodemographic characteristics and healthcare supply. With respect to healthcare supply we find suggestive evidence of substitution effects. We find the following associations:

- **Healthcare needs** are strongly associated with the number of GP consultations.
  - Age and sex: Males have, ceteris paribus, fewer GP consultations than females. This ranges from 1.3 fewer consultations in the age group 18-34 to 0.6 fewer consultations in the 80+ age group. The gap is decreasing by age. Moreover, there is an increase in number of consultations by age.
  - Self-reported health status: The effect on the conditional number of GP consultations is more clearly associated with healthcare needs

than the probability to consult a GP. When correcting for other characteristics, individuals with fair and (very) bad health have a higher number of GP consultations, between 1.6 and 3 consultations. The presence of either a chronic disorder or limitations to daily activities also increase the frequency of GP contacts with 0.5 to 0.8 consultations, there is no additional combination effect when both a chronic disorder and limitations are reported.

- Administrative health information: Being incapacitated for work has not only the strongest positive association on the probability of consulting a GP, but also on the number of GP consultations with an increase of about 3 consultations on average per year. Being incapacitated clearly results in a period of high primary care needs. In addition, invalidity or disability and lump sum chronic illness are both associated with a higher number of GP consultations.
- Medication use: Medication use for various disorders is strongly associated with the number of GP consultations. There is however quite some variation depending on the underlying disorder, with increases of 0.5 up to 2 GP consultations per year. The effect is particularly higher for individuals taking medication for asthma, cardiovascular disease and thrombosis.
- Individuals who are registered in a community health centre are excluded as no registration is made for a GP consultation.

- There is more variation in the conditional number of GP consultations by **socioeconomic profile** than was found for doctor consultations.
  - While education was not associated with the number of doctor consultations, we find an association with GP consultations. The number of GP consultations increases as educational attainment decreases. Individuals with primary education have about 0.7 more GP consultations per year than individuals with tertiary education.
  - Activity status: Unemployed individuals have on average about 1 GP consultation less than employees. Self-employed individuals also have about 1 consultation less in 2008 and 2012, but this decreases to 0.7 fewer consultations in 2016. Students have even fewer GP consultations, which is not surprising given their age profile. Inactive individuals have a negative but not always significant association which was about 0.5 fewer consultations in 2016. Retired individuals have a negative but non-significant association.
  - Income level: there is positive association between income and the number of GP consultations, implying that more affluent individuals ceteris paribus have a higher frequency to consult a GP when health status is accounted for.
  - Material deprivation: Individuals with material deprivation have seen an increase in the probability to consult a GP. In addition we find a strong positive effect on the number of GP consultations in 2016 (2008 and 2012 had non-significant effects). Hence there might be an effect on accessibility of GP care for this group.
  - Households with children had a lower number of GP consultations in 2008 compared to households without children. For single parent households there is an upward evolution in the number of GP consultations, with a positive (but non-significant) association in 2016
  - There is a small negative association between being borne outside Belgium and the number of GP consultations.
- Individuals who benefit from **increased reimbursement** have about 0.9 additional GP consultations in 2008 and 2012 which increases to 1.2 consultations in 2016. Although the impact is limited when accounting for various other effects, it suggest that the policy measures taken in the past improve the accessibility to primary care for this subgroup, and this on top of the increase in number of consultations found for e.g. low educational attainment or material deprivation.
- The number of GP consultations increases if the density of GPs in the neighbouring municipality is higher, the density of specialist in the municipality or the neighbouring municipalities is lower or if there are fewer hospital sites with an emergency department (ED) within a 10 km radius. The effect for density of specialists and hospital sites with an ED provide suggestive evidence of some substitution of GP care towards

specialist or the ED in case the supply of these types of care is more abundant.

- The number of GP consultations is lower in Wallonia compared to Flanders and Brussels. In Wallonia, the average number of GP consultations is about 1.5 consultations lower than in Flanders. There is no effect of urbanization.

Table 17 – Regression output for the conditional number of GP consultations, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 25 630)		Reduced model (Obs. = 25 630)		Reduced model 2008 (Obs. = 8 843)		Reduced model 2012 (Obs. = 8 449)		Reduced model 2016 (Obs. = 8 338)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-1.286	(0.146)***	-1.284	(0.146)***	-1.654	(0.298)***	-1.291	(0.281)***	-1.336	(0.279)***
Male aged 35-49 years	-1.136	(0.155)***	-1.134	(0.155)***	-1.445	(0.280)***	-0.918	(0.306)**	-1.327	(0.302)***
Female aged 35-49 years	0.093	(0.164)	0.094	(0.164)	0.263	(0.266)	-0.066	(0.266)	0.105	(0.262)
Male aged 50-64 years	-0.875	(0.161)***	-0.870	(0.162)***	-0.728	(0.276)**	-0.904	(0.304)**	-1.200	(0.294)***
Female aged 50-64 years	-0.131	(0.160)	-0.127	(0.160)	-0.158	(0.267)	-0.041	(0.306)	-0.171	(0.289)
Male aged 65-79 years	-0.174	(0.218)	-0.169	(0.218)	0.091	(0.375)	-0.162	(0.365)	-0.394	(0.383)
Female aged 65-79 years	0.593	(0.226)**	0.596	(0.226)**	0.809	(0.369)*	0.417	(0.348)	0.519	(0.375)
Male aged 80 years or more	1.127	(0.328)***	1.129	(0.327)***	1.265	(0.501)*	0.543	(0.488)	1.351	(0.468)**
Female aged 80 years or more	1.800	(0.300)***	1.798	(0.299)***	1.667	(0.460)***	1.291	(0.432)**	1.767	(0.449)***
Self-assessed health (reference = very good)										
Self-assessed health - good	0.536	(0.091)***	0.535	(0.092)***	0.810	(0.175)***	0.373	(0.173)*	0.673	(0.196)***
Self-assessed health - fair	1.626	(0.138)***	1.623	(0.139)***	1.765	(0.245)***	1.575	(0.236)***	1.723	(0.273)***
Self-assessed health - bad	2.377	(0.190)***	2.371	(0.192)***	2.326	(0.311)***	2.510	(0.317)***	2.084	(0.321)***
Self-assessed health - very bad	2.846	(0.437)***	2.850	(0.440)***	3.068	(0.844)***	2.097	(0.574)***	2.927	(0.467)***
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.703	(0.163)***	0.702	(0.162)***	0.536	(0.218)*	0.831	(0.357)*	0.751	(0.263)**
Chronic disorder, no limitations	0.510	(0.165)**	0.521	(0.163)**	0.659	(0.251)**	0.462	(0.253)°	0.419	(0.271)
Chronic disorder, limitations	0.596	(0.125)***	0.605	(0.126)***	0.699	(0.211)**	0.482	(0.214)*	0.582	(0.210)**
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.457	(0.224)*	0.467	(0.225)*	0.708	(0.343)*	0.219	(0.399)	0.502	(0.351)

Independent variables	Full model (Obs. = 25 630)		Reduced model (Obs. = 25 630)		Reduced model 2008 (Obs. = 8 843)		Reduced model 2012 (Obs. = 8 449)		Reduced model 2016 (Obs. = 8 338)	
Incapacity to work	3.534	(0.243)***	3.543	(0.243)***	2.674	(0.253)***	3.223	(0.256)***	2.661	(0.260)***
Entitled to lump sum chronic illness	0.908	(0.203)***	0.920	(0.203)***	0.607	(0.295)*	1.018	(0.326)**	0.976	(0.239)***
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	1.003	(0.288)***	0.993	(0.287)***	1.159	(0.462)*	0.547	(0.417)	1.072	(0.407)**
Medication use - other disorder	0.269	(0.312)								
Medication use - cardiovascular disorder	1.618	(0.107)***	1.618	(0.107)***	1.833	(0.153)***	1.626	(0.166)***	1.286	(0.163)***
Medication use - thrombosis	1.228	(0.118)***	1.226	(0.118)***	1.658	(0.190)***	1.177	(0.179)***	1.071	(0.166)***
Medication use - chronic obstructive pulmonary disease (COPD)	1.196	(0.161)***	1.192	(0.161)***	0.855	(0.228)***	1.301	(0.243)***	1.197	(0.237)***
Medication use - asthma	1.765	(0.278)***	1.768	(0.278)***	1.732	(0.389)***	1.060	(0.373)**	1.867	(0.302)***
Medication use - diabetes	0.757	(0.135)***	0.756	(0.136)***	0.786	(0.213)***	0.694	(0.225)**	0.769	(0.233)**
Medication use - epilepsy	1.238	(0.304)***	1.235	(0.304)***	0.973	(0.356)**	1.196	(0.465)*	1.317	(0.439)**
Medication use - thyroid disorder	0.670	(0.163)***	0.668	(0.162)***	0.592	(0.233)*	0.767	(0.228)***	0.617	(0.251)*
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-1.430	(0.112)***	-1.397	(0.101)***	-0.984	(0.175)***	-1.707	(0.181)***	-1.573	(0.189)***
Region of residence - Brussels	-0.561	(0.348)	-0.558	(0.320)°	-0.149	(0.479)	-1.262	(0.527)*	-0.124	(0.566)
Urbanization - medium	0.091	(0.124)								
Urbanization - thin	0.200	(0.199)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.075	(0.140)	-0.075	(0.139)	-0.377	(0.239)	0.153	(0.246)	-0.101	(0.227)
Occupation - inactive	-0.310	(0.166)°	-0.316	(0.165)°	-0.611	(0.271)*	0.147	(0.314)	-0.541	(0.328)°
Occupation - self-employed in 2008	-1.002	(0.308)**	-0.998	(0.309)**	-0.984	(0.369)**				
Occupation - self-employed in 2012	-0.972	(0.327)**	-0.965	(0.328)**			-1.017	(0.407)*		
Occupation - self-employed in 2016	-0.557	(0.347)	-0.550	(0.348)					-0.693	(0.410)°
Occupation - unemployed	-0.830	(0.195)***	-0.835	(0.194)***	-0.933	(0.337)**	-0.784	(0.370)*	-0.994	(0.385)*
Occupation - student	-0.622	(0.212)**	-0.623	(0.212)**	-0.496	(0.335)	-0.598	(0.389)	-0.943	(0.374)*

Independent variables	Full model (Obs. = 25 630)		Reduced model (Obs. = 25 630)		Reduced model 2008 (Obs. = 8 843)		Reduced model 2012 (Obs. = 8 449)		Reduced model 2016 (Obs. = 8 338)	
Occupation - retired	-0.105	(0.175)	-0.108	(0.174)	-0.235	(0.282)	0.121	(0.272)	-0.248	(0.301)
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	0.713	(0.146)***	0.719	(0.146)***	0.917	(0.223)***	0.368	(0.241)	0.847	(0.248)***
Education degree - lower secondary	0.623	(0.121)***	0.630	(0.121)***	0.746	(0.194)***	0.422	(0.201)*	0.791	(0.219)***
Education degree - upper secondary	0.454	(0.095)***	0.456	(0.095)***	0.601	(0.157)***	0.223	(0.179)	0.584	(0.162)***
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.320	(0.105)**	0.320	(0.105)**	0.362	(0.161)*	0.134	(0.175)	0.492	(0.227)*
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	1.113	(0.433)*	1.093	(0.430)*	0.315	(0.799)	0.408	(0.654)	2.591	(0.709)***
Household composition (reference = couple without children)										
Household composition - single without children	0.145	(0.115)	0.139	(0.115)	0.129	(0.180)	0.336	(0.205)	-0.026	(0.199)
Household composition - single with children	0.167	(0.270)	0.165	(0.271)	-0.754	(0.379)*	0.554	(0.427)	0.555	(0.418)
Household composition - couple with children	-0.282	(0.133)*	-0.279	(0.134)*	-0.586	(0.231)*	-0.292	(0.220)	0.030	(0.223)
Household composition - other	-0.238	(0.150)	-0.237	(0.151)	-0.647	(0.233)**	-0.251	(0.226)	0.137	(0.296)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.319	(0.133)*	-0.331	(0.132)*	-0.121	(0.233)	-0.515	(0.224)*	-0.411	(0.234)°
Insurance status										
Insurance - increased reimbursement in 2008	1.255	(0.233)***	1.254	(0.233)***	0.893	(0.204)***				
Insurance - increased reimbursement in 2012	0.990	(0.239)***	0.987	(0.238)***			0.945	(0.224)***		
Insurance - increased reimbursement in 2016	1.311	(0.262)***	1.311	(0.262)***					1.213	(0.247)***
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.011	(0.021)	0.012	(0.022)	-0.002	(0.029)	-0.013	(0.026)	0.036	(0.035)

Independent variables	Full model (Obs. = 25 630)		Reduced model (Obs. = 25 630)		Reduced model 2008 (Obs. = 8 843)		Reduced model 2012 (Obs. = 8 449)		Reduced model 2016 (Obs. = 8 338)	
Density of GPs in neighbouring municipalities	0.144	(0.042)***	0.141	(0.045)**	0.075	(0.060)	0.164	(0.065)*	0.174	(0.068)*
Density of specialists in municipality	-0.021	(0.007)**	-0.022	(0.007)**	-0.029	(0.008)***	-0.018	(0.010)°	-0.019	(0.012)°
Density of specialists in neighbouring municipalities	-0.033	(0.011)**	-0.032	(0.012)**	0.010	(0.017)	-0.048	(0.021)*	-0.052	(0.017)**
Distance to nearest ED	-0.005	(0.012)								
Number of EDs within 10km radius	-0.068	(0.022)**	-0.071	(0.019)***	-0.091	(0.027)***	-0.044	(0.029)	-0.074	(0.034)*
Time (reference = 2008)										
Time: year 2012	0.083	(0.108)	0.083	(0.108)						
Time: year 2016	-0.047	(0.115)	-0.051	(0.115)						

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.3.3.3. Overview inequity and evolution in the different scenarios

Figure 18 visualizes the absolute Gini coefficient for inequality in the number of GP consultations in the past year (so without needs correction) as well as inequity in the fairness gap for the conditional number of GP consultations and visits in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 18, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower.

If we follow the traditional approach, we observe an increase in inequity in the number of GP consultations in the past year. Hence, we find that the disparity between individuals in the number of GP consultations that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 18 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Using the traditional approach, we observe an upward trend in inequity as measured by the absolute Gini index and a constant trend based on the relative Gini index. In the alternative approach, there is an upward trend for both the relative and absolute Gini coefficient.

Figure 18 – Evolution (2008-2016) of the absolute Gini index by scenario

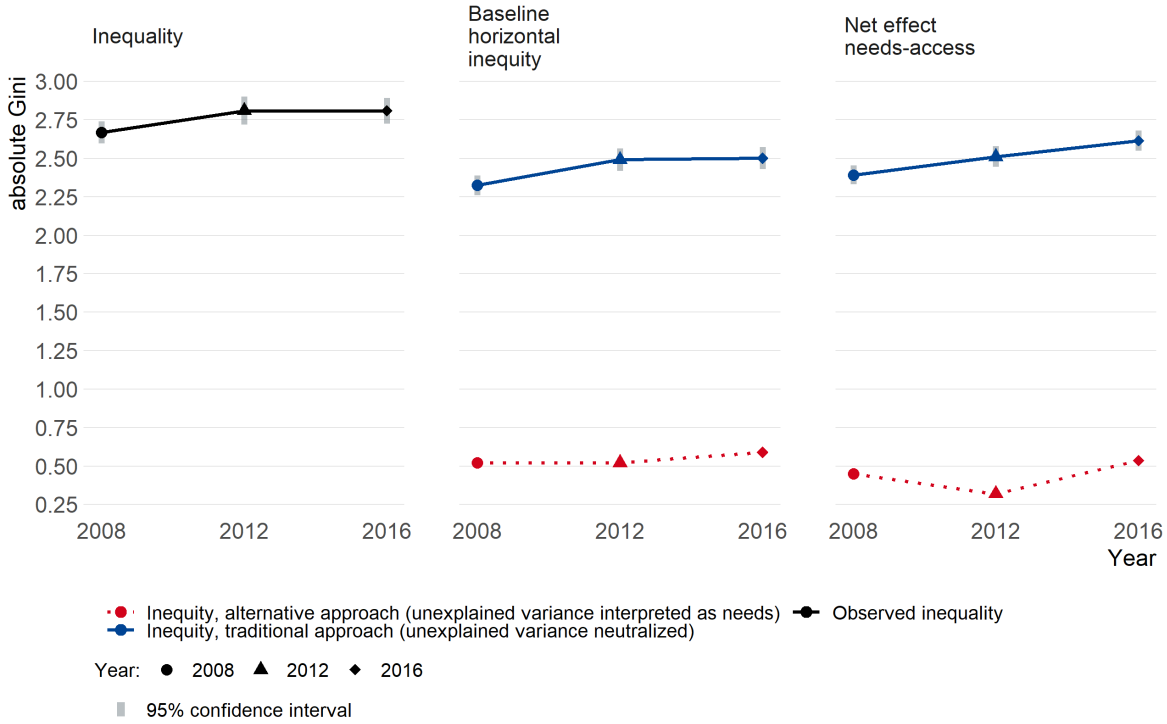


Table 18 – Evolution (2008-2016) of the inequity in the conditional number of GP consultations for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	2.323	2.490^	2.500^	↑
	Relative	0.390	0.400	0.397	→
Net effect needs-access	Absolute	2.391	2.510	2.614^	↑
	Relative	0.402	0.403	0.415	→
Baseline-residual	Absolute	0.519	0.519	0.588^*	↑
	Relative	0.087	0.083	0.093^*	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.3.3.4. Overview inequity over time for different population subgroups

Figure 19 and Figure 20 show how care use in various population subgroups differs from the population average when looking at inequality as well as inequity. When analysing inequity, a correction is made for healthcare needs and preferences according to the different inequity-scenarios, both for the average population and subgroup value. In Figure 19, population groups are defined based on categories of equivalized income, categories of education degree, and categories of self-assessed health. In Figure 20, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower number of GP consultations than the population average. Values to the right of the vertical line, on the other hand, indicate a higher number of consultations than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 19 and Figure 20, we find that disparities are much less pronounced once a correction is made for healthcare needs, i.e. the deviations from the population average are generally lower or have even disappeared in the inequity scenario compared to inequality. While inequalities in number of GP consultations are important and in favour of individuals with worse health status, low educational attainment, low income, material deprivation and increased reimbursement, these disparities are small once a correction for needs is made.

In the baseline inequity scenario, we find a consistent higher number of GP consultations in all years for individuals benefitting from increased reimbursement. Moreover, we find an increase in GP consultations relative to the population mean for individuals with material deprivation, single parent household and households with children at risk of poverty. Unemployed and self-employed individuals have a lower number of GP consultations than the population average once healthcare needs are taken into account.

There are some striking differences between the inequity scenarios. Individuals at risk of poverty, with primary education, with increased reimbursement or with worse health (e.g. (very) bad self-assessed health, chronic disorder and limitations, invalidity) have a lower number of GP consultations the population average in the net effect needs-access inequity scenario. This was not the case in the baseline scenario. This is due to the different associations between socioeconomic characteristics and number of GP consultations, both positive and negative effects are found. In the net effect needs-access scenario, the former are considered justified (as a proxy for increased needs), while the latter are not (as a proxy for accessibility issues).

The effects of the baseline-residual scenario go in the opposite direction and indicate a slightly higher number of consultations for individuals with primary education, with increased reimbursement or with worse health (e.g. (very) bad self-assessed health, chronic disorder and limitations, invalidity) relative to the population mean in comparison to the baseline scenario.

Figure 19 – Deviation in the needs-corrected conditional number of GP consultations from population average for subgroups based on income, education and self-assessed health, by scenario and year

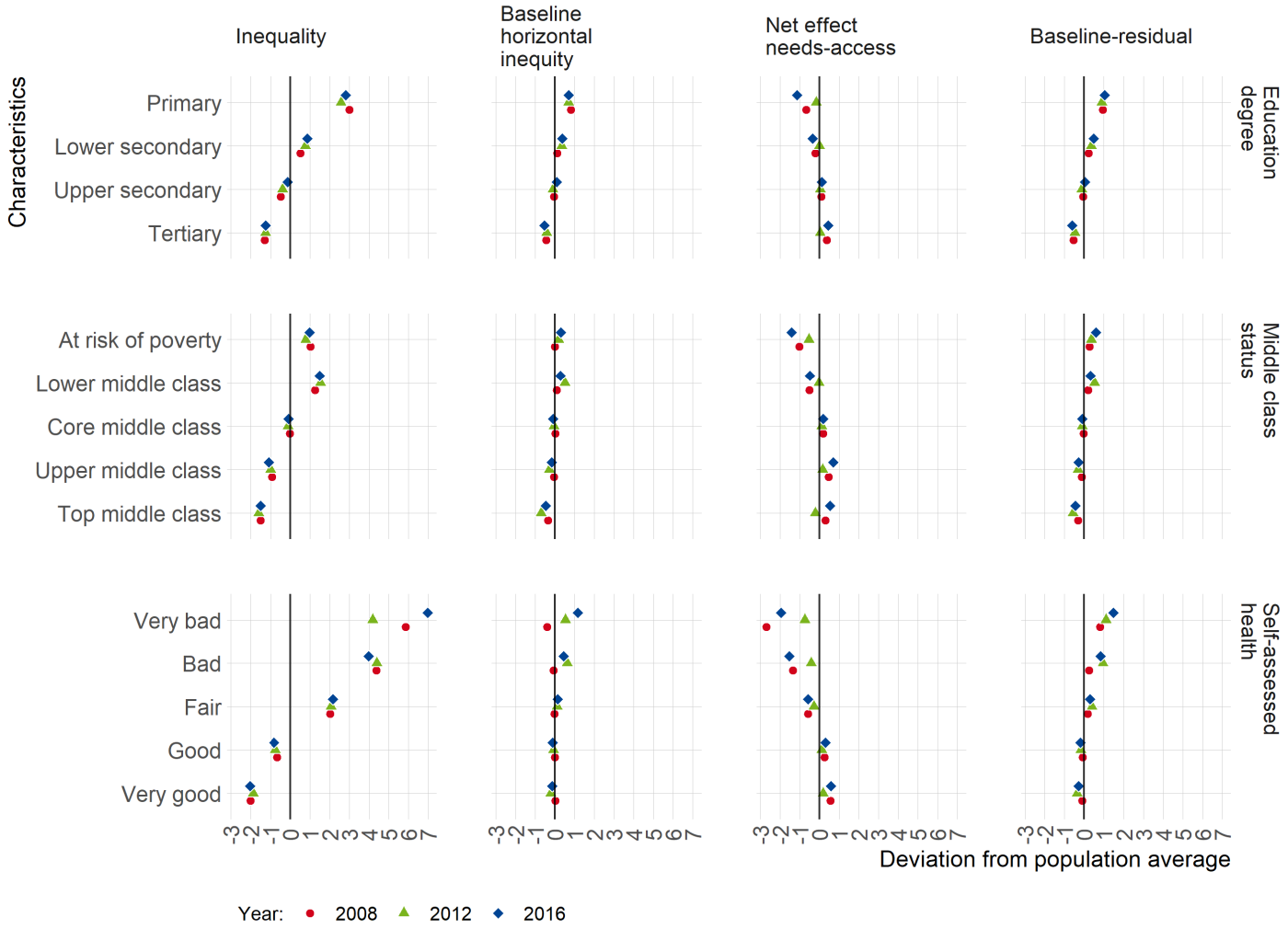


Figure 20 – Deviation in the needs-corrected conditional number of GP consultations from population average for specific vulnerable subgroups, by scenario and year

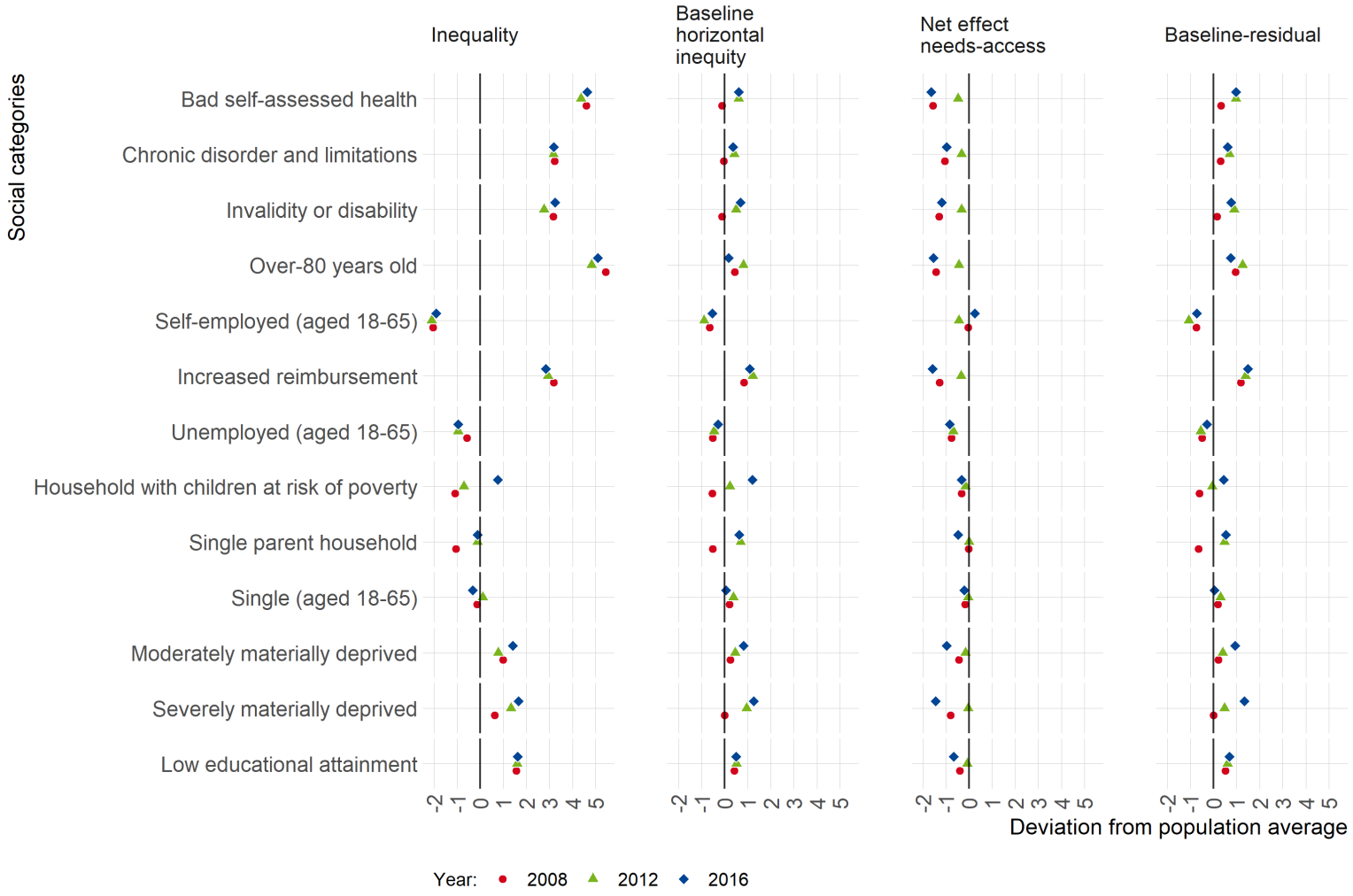
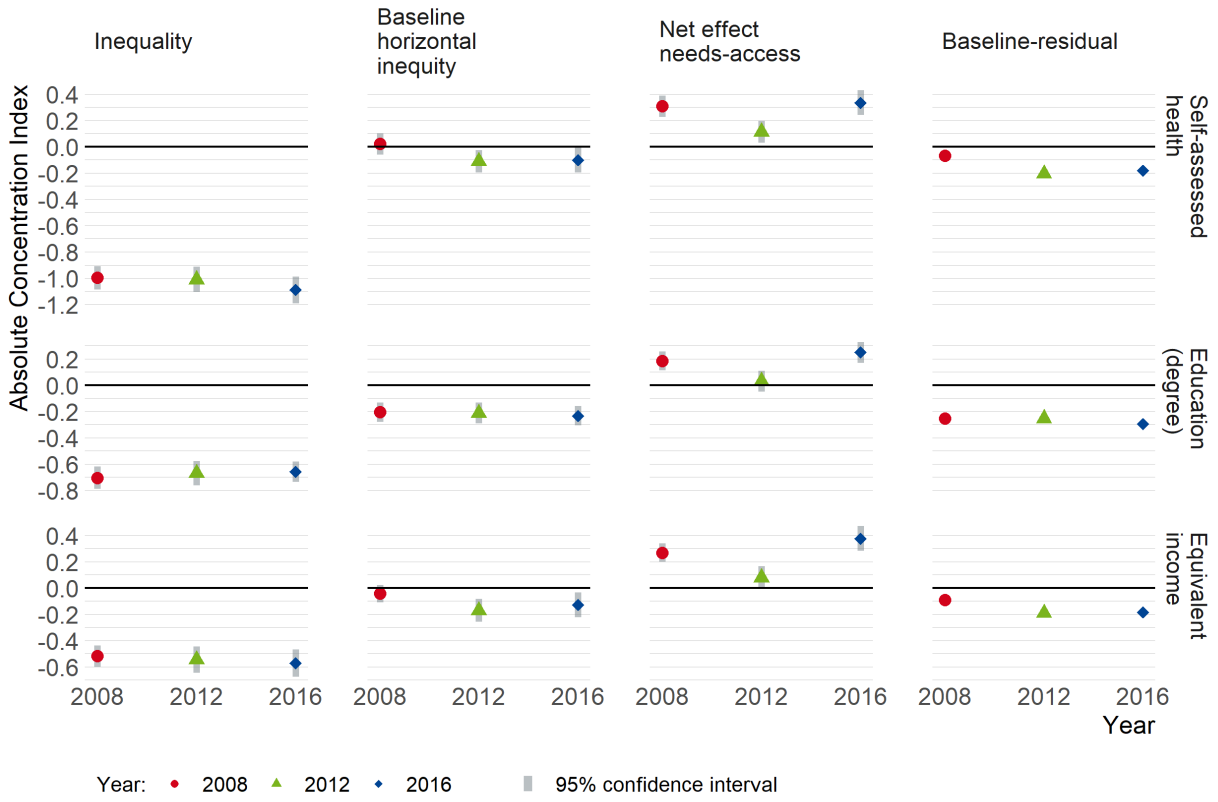


Figure 21 shows the absolute concentration index of the needs-corrected number of GP consultations to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher needs-corrected number of GP consultations concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher needs-corrected number of GP consultations for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 21 reveal systematic inequalities in the number of GP consultations in all three dimensions (panel inequality), with GP consultations more concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. This is comparable to the inequality measured for doctor consultations (see section 1.2.3.4).

After correcting for healthcare needs, disparities are small. They are most pronounced with respect to educational attainment with GP consultations concentrated among low educated individuals (panel baseline horizontal inequity and baseline-residual scenario). There is also some concentration among low income individuals in the baseline and baseline-residual scenario. In the net effect needs-access scenario, a different picture emerges, with higher concentration of GP use among individuals with higher educational attainment, higher income and better health.

Figure 21 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.4. Specialist consultations

1.4.1. Summary

We analyse inequity in specialist consultations over the past 12 months. Two types of utilisation are examined consecutively, the probability of a consultations and the number of consultations given at least one consultation. The key points are summarized in the box below.

Specialist consultations are identified by the combination of

- the nomenclature code (variable ss00020 in IMA-AIM GZSS database): 103213, 103530, 101275, 104694, 103611, 103832, 102933, 104532, 104871, 103935, 103773, 104414, 104230, 104576, 104834, 104134, 104554, 109410, 102734, 102874, 102211, 102955, 102174, 109336 , 102896, 102196, 102911, 102712, 102815, 102675, 103810, 102535, 101054, 102034, 103110, 102970, 102292, 102830, 102336, 103471, 103014, 104370, 102616, 104451, 103670, 104856, 102756, 103751, 103552, 103950, 104753, 102992, 102594, 103132, 104156, 103073, 103736, 103714, 104672, 103456, 102270, 101290, 103633, 103235, 109395, 102351, 102653, 103434, 102152, 109432, 102314, 102012, 109675, 109454, 102550, 109351, 102071, 102373, 103913, 104812, 104252, 103412, 109373, 102115, 104392, 104716, 104112, 103353, 102572, 102255, 104215, 103051, 104510, 104731, 103316, 103795, 103331, 102093, 102130, 104274, 103515, 103655, 102631, 104436, 102690
- the qualification of the healthcare provider (variable ss00065B in IMA-AIM GZSS database) not equal to 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9

Key points inequity in specialist consultations in the past year

- About 65% of the population has consulted a specialist in the past year; about 75% to 85% among higher care groups. The average annual number of consultations (among those consulting a specialist) has increased from 4.2 in 2008 to 4.6 in 2016 among the survey sample (18+).
- In general, the conclusions are in line with those of doctor consultations in general, but socioeconomic differences are more pronounced.

Probability to consult a specialist

- Affected by both healthcare needs and socioeconomic status. **Main associations (regression):**
  - Health status: higher probabilities for individuals incapacitated from work; with limitations to daily activities; with worse self-assessed health; a large range of disorders as defined by prescribed medication use; females (in the age category 18-64). The over-80 year olds have a lower probability.
  - Lower probabilities for individuals with lower incomes; with material deprivation; the self-employed in 2008 (between 2008 and 2012, there was an important increase in probability to consult a specialist among the self-employed, possibly related to change in insurance coverage in 2008).
  - Higher probabilities for individuals with tertiary education; who are retired; who benefit from increased reimbursement (in 2016); living in Brussels and Wallonia.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Increasing socioeconomic inequities over time with respect to income with below-average probabilities among individuals at risk of poverty, in lower middle class; above-average probabilities among upper/top middle class. For the latter two groups the positive gap relative to the population mean is widening. Other individuals in a difficult financial situation, i.e. unemployment, material deprivation and increased reimbursement status, have probabilities below the average. Hence, increased reimbursement status does not ensure a needs-based access to specialists.

- Increasing socioeconomic inequities over time with respect to educational attainment with below-average probabilities among individuals with primary/lower secondary education and above-average probabilities for individuals with tertiary education. For the latter group the positive gap relative to the population mean is widening.
- Below-average probabilities for singles (aged 18-64) and the self-employed in 2008.

Conditional number of specialist consultations

- Strong association with healthcare needs, but also variation by socioeconomic status. **Main associations (regression):**
  - Health status: more consultations for individuals with worse self-reported health (fair, bad or very bad self-assessed health, presence of chronic disorder, limitations to daily activities); incapacitated from work; eligible for the lump sum chronic illness; in higher age categories for males; among 18-34 year olds among females; for females (except among the over-80 year olds, gap with males decreasing by age); and for a large range of disorders as defined by prescribed medication use.
  - Fewer consultations are found for students (relative to full-time employees); individuals with primary/lower secondary education (relative to tertiary education); individuals benefitting from increased reimbursement.
  - More consultations are found for individuals with better financial situation, either through an association with income or material deprivation.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Systematic inequities in favour of individuals with better self-assessed health. Groups of interest reflecting higher care needs (except the over-80 year olds) have a conditional number of specialist consultations below the population average.
  - Systematic socioeconomic inequities by income and obtained education degree. There are clear gradients by education and income that favour individuals with higher income and higher educational attainment.
  - Conditional number of specialist consultations below the population mean for individuals in a difficult financial situation (material deprivation, unemployed, increased reimbursement status, at risk of poverty); also lower for single parent households.

1.4.2. Probability of a specialist consultation in the past year

1.4.2.1. Evolution over time for the population and population subgroups

Table 19 shows the evolution over time of the probability to have one or more specialist consultations in the past year. There was no information in the KCE HSPA report of 2019 on the population value of this indicator, hence only the propensity in the EU-SILC/IMA-AIM sample is reported.[18] About 65% of the interviewed individuals has seen a specialist at least once in the past year. The fraction that consulted a specialist is lower than the fraction that has consulted a GP in the past year, which was above 80%.

The fraction who consulted a specialist is nearly constant over time and increased with a few percentage points between 2008 and 2016, going from 62.6% in 2008 to 65.4% in 2016. The probability to consult a specialist is slightly higher when restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, with 64.0%, 64.5% and 67.2% of the sample with at least one specialist consultation in the past year in 2008, 2012 and 2016, respectively.

The reversed value is given as well, i.e. the probability of not consulting a specialist in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might

change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 19 – Evolution (2008-2016) of the probability to have at least one specialist consultation in the past year

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	62.6%	63.6%	65.4%
	Reverse	37.4%	36.4%	34.6%
Survey (18+)	Indicator	64.0%	64.5%	67.2%
	Reverse	36.0%	35.5%	32.8%

Figure 22 shows the evolution of the probability to have at least one specialist consultation in the past year for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.4.2.2.

Most trends presented in Figure 22 are in line with the trends observed for doctor consultations (see section 1.2.2.1). We observe an increase in the fraction that consulted a specialist for an important part of the population subgroups. This is, however, not always the case, nor is the trend always linear. For example, we find a decrease in the probability to consult a specialist among individuals who are at risk of poverty (panel A), who are unemployed (panel D), who live in single parent households (panel B), who live in households with children at risk of poverty (panel B), who report bad self-assessed health (panel E) or who benefit from increased reimbursement (panel B). An upward trend is observed for self-employed individuals, especially between 2008 and 2012 (panel D), for individuals who belong to the top middle class (panel A), individuals with material deprivation, especially between 2012 and 2016 (panel B), and singles between 18 and 65 (panel B).

The probability to consult a specialist deviates at certain points from the evolution in the probability to consult a GP and specialist combined. First, we observed that individuals in the top middle class and individuals with tertiary education had a lower probability to consult a doctor compared to individuals with lower income or lower educational attainment, respectively. This is not the case for specialist consultations, where individuals in the top middle class and tertiary education have probabilities above the population mean and the second highest compared to other income or educational categories. The probability to consult a doctor was about the same for individuals with fair and (very) bad self-assessed health. For specialist consultations, the probability is lower for individuals reporting fair health (panel E). Individuals aged above 80 years have a probability to consult a specialist that is below the probabilities in other need categories, the opposite is true for GP consultations (panel F) (see sections 1.2.2.1 and 1.3.2.1)

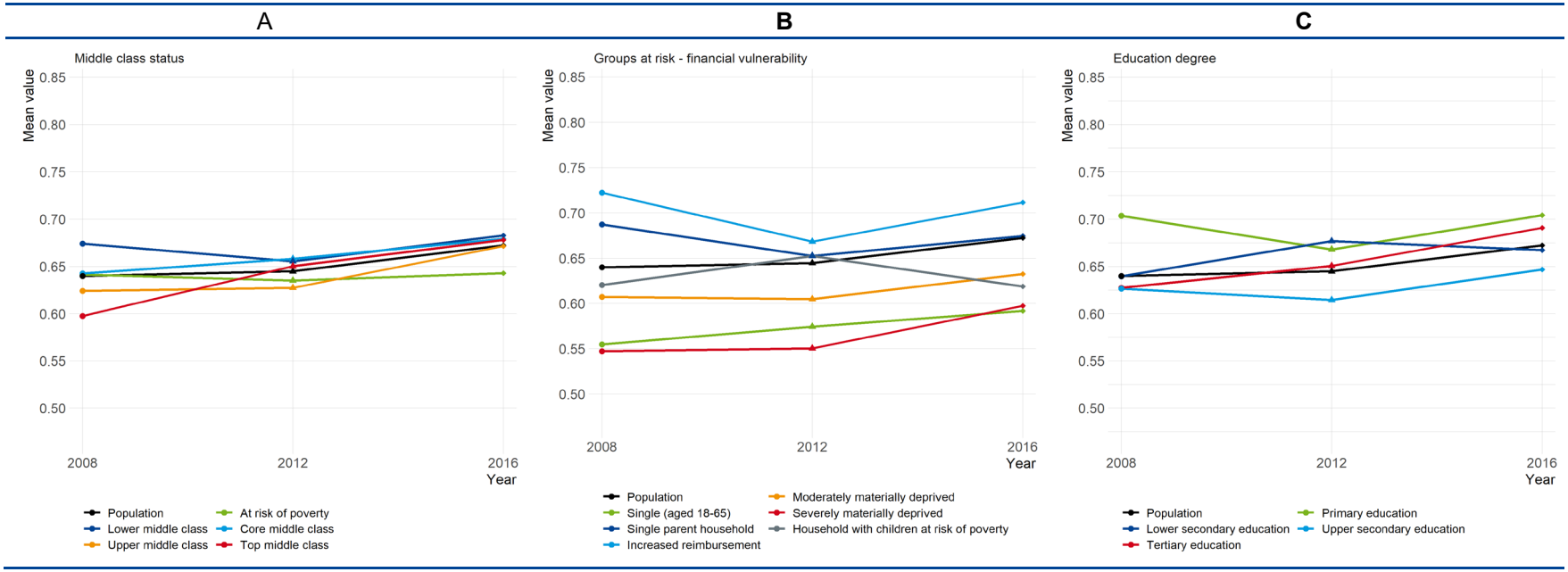
In addition, we have the following findings:

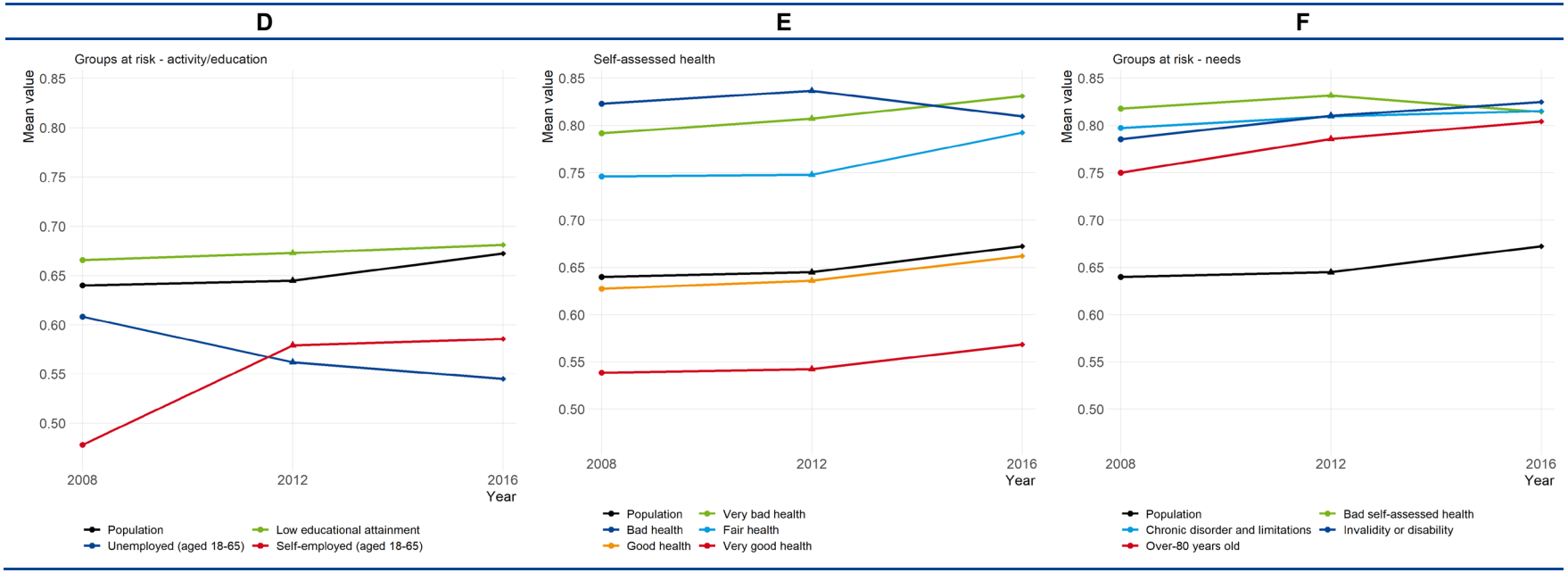
- Panel A: There is little variation in the probability to consult a specialist by income level (range 2016: 0.64 – 0.68). While in 2008 the probability of a specialist consultation in the group of individuals at risk of poverty matched the population average, they have the lowest probability in 2016, clearly below the population average.
- Panel B: individuals with material deprivation and singles aged between 18 and 65 are less likely to go to a specialist than the population in general, but follow the same upward trend. The probability decreases with the intensity of material deprivation. Adults in single parent household have a probability that is around the population average. Households with children which are below the poverty line have a probability around the population average in 2008 and 2012, but have a downward trend between 2012 and 2016, opposite to the population trend.
- Panel C: There is little variation in the probability to consult a specialist by educational attainment (range 2016: 0.65 – 0.70). Individuals with primary education have the highest probability to consult a specialist. The fraction of individuals with tertiary education who has consulted a specialist in the past year has increased strongly over time from 0.63% in 2008 to 0.69% in 2016.
- Panel D: Self-employed individuals go less frequently to a doctor (GP and specialist combined), but that there is an important catch-up in

doctor usage over time (see section 1.2.2.1). Also with respect to specialist consultation, self-employed individuals have a lower probability. There was, however, an important increase in use between 2008 and 2012, possibly linked to the extension of the insured package with minor risks in 2008. The unemployed have a probability to consult a specialist that is below the population mean and clearly decreasing over time.

- Panel E and F: There is quite some variation in the probability to consult a specialist by self-assessed health status (range 2016: 0.57 – 0.83). Individuals in (very) good health have a lower probability than individuals in fair or (very) bad health. Between 80% and 85% of those reporting to have fair or (very) bad health have consulted a specialist in the past year. This probability is about 5 percentage points lower for individuals reporting fair health in 2008 and 2012. In 2016 the gap between individuals with fair and (very) bad self-assessed health was smaller. Similar high probabilities in the range of 75% to 85% are found for individuals over 80 years old, individuals with disability or in invalidity, and individuals reporting chronic disorders in combination with limitation to daily activities.

Figure 22 – Evolution (2008-2016) of the probability to have at least one specialist consultation for different subgroups and populations groups at risk





1.4.2.2. Regression output

Table 20 reports the average marginal effects of a probit regression of the indicator of having at least one consultation with a specialist in the past year (value = 1) or no consultation (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 20):

- **Healthcare needs** are clearly associated with the probability to consult a specialist. Males in the age category 18-65 have a lower probability and needs captured by fair or bad self-assessed health, presence of chronic disorders and limitations to daily activities, medication use for various disorders and incapacity to work are associated with higher probability.
  - Age and sex: in the age group 18 to 65, males have a 10 to 18 percentage point lower probability to consult a specialist in the past year than females in the same age category. This gap is smaller in the age group 65-79 and even reversed in the age group 80+. Moreover, we see an important decrease in probability in the age group 80+ compared to the age group 65-79.
  - Self-reported health status: When correcting for other characteristics, individuals with good, fair and (very) bad health have a higher probability to go to a specialist in the past year in comparison with individuals reporting very good health. While there is some gradient in the probability (higher probability as health

deteriorates), the probability of those reported to have very bad health is generally lower than those reporting bad health. This might be because they have a lower probability to consult a specialist (see section 1.1.6.2) or because the impact of very bad health status is taken up by other variables reflecting healthcare needs (e.g. chronic disorder). The presence of either a chronic disorder or limitations to daily activities increase the probability to consult a specialist by 4 to 13 percentage points. While the effect of having a chronic disorder was stronger associated with the probability to consult a GP, we find that the effect of limitations to daily activities are more strongly related to the probability to consult a specialist (see section 1.3.2.2)]

- Administrative health information: invalidity or disability has a borderline significant positive effect in 2012 and 2016 and was not significant in 2008. Being incapacitated for work has a very strong positive association on the probability of consulting a specialist (an increase of 23 to 27 percentage points in the year-specific models). This should not be surprising as the incident causing the incapacity may well result in one or multiple specialist consultations.
- Medication use: Medication use for various disorders is strongly associated with the probability to consult a specialist (increase by 2 to 32 percentage points). There is of course a degree of reversed causality that explains this variation. Profiles of disorders related to medication use are based on medication prescribed by a GP or specialist. There are association above 10 percentage points for individuals taking medication for thrombosis and other disorders (e.g. multiple sclerosis, cystic fibrosis, pancreas and kidney defections, transplants etc., see section 1.1.1)
- There was no effect on the probability to consult a specialist by membership of a community health centre.

- There is important variation in the probability to consult a specialist by **socioeconomic profile**.
  - Individuals with tertiary education have, ceteris paribus, the highest probability to consult a specialist. In the reduced pooled model, the probability is 6.4, 2.4 and 1.9 percentage points lower for individuals who obtained a primary degree, a lower secondary degree and an upper secondary degree, respectively. The gap with tertiary education increases over time.
  - Activity status: Self-employed individuals have a significantly lower probability to consult a specialist in 2008, no divergent effect was found in 2012 and 2016 in comparison with full-time employees. Part-time employees (+3.7 percentage points in the reduced pooled model), and retired individuals (+6.1 percentage points in the reduced pooled model) have a higher probability to use specialist care compared to full-time employees. No significant differences were found for unemployed individuals and students. A small positive effect was found for individuals in inactivity, especially in 2016 with an increase in the probability to consult a specialist of 4.2 percentage points.
  - Income level: the probability to consult a specialist increases by income. The association increases in magnitude and significance level over time.
  - Material deprivation: The more severe the material deprivation of the household, the lower the probability to consult a specialist. This is a strong association, which is, however, decreasing in magnitude over time.
  - Household composition: Single persons have a lower probability to consult a specialist, compared to adults in a couple without children. A small positive association is found for single parents or a couple with children, but it is only borderline significant.
- The effect of increased reimbursement status changes over time and is estimated with imprecision. The effect is also quite different in the pooled versus the year-specific models. In 2016, we find an increased probability of 5.2% in the year specific model.
- The density of **healthcare providers** and the distance to a hospital with an emergency department (ED) are weakly associated with the probability to consult a specialist. A lower density of GPs in the

municipality and a higher density of specialists increases the probability to consult a specialist. Moreover, a longer distance to a hospital with an ED is associated with a decrease in the probability to consult a specialist.

- The probability to go to a specialist is about 4 to 7 percentage points and 2 to 7 percentage points higher for individuals living in Wallonia and Brussels, respectively. This higher probability is about the same size as the lower probability to consult a GP (see section 1.3.2.2). There is no effect of urbanization.

In general, we observe that the marginal effects, both positive and negative, decrease somewhat in absolute value over time.

Table 20 – Regression output for the probability to have at least one specialist consultation in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 474)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 350)		Reduced model 2016 (Obs. = 10 277)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.261	(0.011)***	-0.261	(0.011)***	-0.277	(0.019)***	-0.258	(0.019)***	-0.216	(0.018)***
Male aged 35-49 years	-0.235	(0.012)***	-0.234	(0.012)***	-0.236	(0.020)***	-0.214	(0.020)***	-0.226	(0.020)***
Female aged 35-49 years	-0.030	(0.011)**	-0.030	(0.011)**	-0.072	(0.019)***	-0.037	(0.019)°	0.014	(0.020)
Male aged 50-64 years	-0.159	(0.012)***	-0.158	(0.012)***	-0.163	(0.022)***	-0.171	(0.022)***	-0.139	(0.019)***
Female aged 50-64 years	-0.030	(0.011)**	-0.030	(0.011)**	-0.030	(0.021)	-0.036	(0.021)°	-0.031	(0.022)
Male aged 65-79 years	-0.069	(0.017)***	-0.069	(0.017)***	-0.084	(0.032)**	-0.084	(0.031)**	-0.045	(0.030)
Female aged 65-79 years	-0.047	(0.016)**	-0.046	(0.016)**	-0.059	(0.030)°	-0.046	(0.029)	-0.040	(0.030)
Male aged 80 years or more	-0.073	(0.025)**	-0.073	(0.025)**	-0.155	(0.046)***	-0.050	(0.044)	-0.025	(0.044)
Female aged 80 years or more	-0.126	(0.024)***	-0.126	(0.024)***	-0.137	(0.044)**	-0.127	(0.043)**	-0.106	(0.039)**
Self-assessed health (reference = very good)										
Self-assessed health - good	0.030	(0.007)***	0.030	(0.007)***	0.036	(0.012)**	0.035	(0.012)**	0.019	(0.011)°
Self-assessed health - fair	0.050	(0.011)***	0.051	(0.011)***	0.063	(0.017)***	0.040	(0.021)°	0.047	(0.017)**
Self-assessed health - bad	0.073	(0.016)***	0.075	(0.016)***	0.093	(0.029)**	0.107	(0.031)***	0.028	(0.030)
Self-assessed health - very bad	0.034	(0.029)	0.036	(0.030)	0.048	(0.054)	0.045	(0.058)	0.019	(0.042)
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.105	(0.014)***	0.104	(0.014)***	0.107	(0.024)***	0.128	(0.028)***	0.086	(0.023)***

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 474)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 350)		Reduced model 2016 (Obs. = 10 277)	
Chronic disorder, no limitations	0.059	(0.012)***	0.058	(0.012)***	0.049	(0.020)*	0.043	(0.021)*	0.090	(0.020)***
Chronic disorder, limitations	0.097	(0.011)***	0.097	(0.011)***	0.090	(0.019)***	0.105	(0.022)***	0.097	(0.019)***
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.047	(0.017)**	0.047	(0.017)**	0.019	(0.030)	0.062	(0.034)°	0.060	(0.028)*
Incapacity to work	0.212	(0.011)***	0.212	(0.011)***	0.256	(0.029)***	0.230	(0.028)***	0.266	(0.029)***
Entitled to lump sum chronic illness	0.025	(0.015)	0.025	(0.015)	0.081	(0.028)**	0.022	(0.028)	-0.007	(0.024)
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.004	(0.025)								
Medication use - other disorder	0.245	(0.021)***	0.245	(0.021)***	0.327	(0.089)***	0.326	(0.059)***	0.316	(0.070)***
Medication use - cardiovascular disorder	0.053	(0.008)***	0.053	(0.008)***	0.058	(0.013)***	0.057	(0.014)***	0.044	(0.013)***
Medication use - thrombosis	0.122	(0.010)***	0.122	(0.010)***	0.122	(0.025)***	0.154	(0.018)***	0.108	(0.020)***
Medication use - chronic obstructive pulmonary disease (COPD)	0.061	(0.017)***	0.061	(0.017)***	0.020	(0.034)	0.091	(0.032)**	0.076	(0.030)*
Medication use - asthma	0.084	(0.021)***	0.084	(0.021)***	0.098	(0.047)*	0.073	(0.038)°	0.090	(0.038)*
Medication use - diabetes	0.067	(0.014)***	0.067	(0.014)***	0.058	(0.028)*	0.086	(0.026)**	0.061	(0.024)*
Medication use - epilepsy	0.073	(0.025)**	0.072	(0.025)**	0.089	(0.046)°	0.068	(0.049)	0.080	(0.043)°
Medication use - thyroid disorder	0.095	(0.014)***	0.095	(0.014)***	0.161	(0.030)***	0.092	(0.029)**	0.068	(0.023)**
Community health centre										
Registered in community health centre	-0.011	(0.018)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	0.048	(0.008)***	0.046	(0.008)***	0.038	(0.015)*	0.066	(0.012)***	0.034	(0.013)**
Region of residence - Brussels	0.023	(0.024)	0.049	(0.009)***	0.066	(0.021)**	0.072	(0.016)***	0.019	(0.016)
Urbanization - medium	0.005	(0.009)								
Urbanization - thin	0.000	(0.012)								
Self-reported current occupation (reference = full-time employee)										

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 474)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 350)		Reduced model 2016 (Obs. = 10 277)	
Occupation - part-time employee	0.037	(0.010)***	0.037	(0.010)***	0.030	(0.017)°	0.041	(0.016)*	0.043	(0.016)**
Occupation - inactive	0.023	(0.012)*	0.024	(0.011)*	0.008	(0.020)	0.019	(0.021)	0.042	(0.022)°
Occupation - self-employed in 2008	-0.061	(0.021)**	-0.062	(0.021)**	-0.063	(0.021)**				
Occupation - self-employed in 2012	0.023	(0.020)	0.023	(0.020)			0.026	(0.021)		
Occupation - self-employed in 2016	0.011	(0.020)	0.011	(0.020)					0.017	(0.021)
Occupation - unemployed	-0.018	(0.014)	-0.017	(0.014)	-0.018	(0.024)	-0.001	(0.023)	-0.034	(0.023)
Occupation - student	-0.003	(0.014)	-0.003	(0.014)	0.015	(0.025)	0.025	(0.024)	-0.033	(0.021)
Occupation - retired	0.062	(0.011)***	0.061	(0.011)***	0.047	(0.021)*	0.055	(0.020)**	0.079	(0.020)***
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.064	(0.012)***	-0.064	(0.012)***	-0.028	(0.022)	-0.075	(0.018)***	-0.088	(0.020)***
Education degree - lower secondary	-0.023	(0.009)**	-0.024	(0.009)**	-0.026	(0.015)°	-0.002	(0.016)	-0.040	(0.016)*
Education degree - upper secondary	-0.019	(0.007)**	-0.019	(0.007)**	0.000	(0.014)	-0.032	(0.012)**	-0.026	(0.011)*
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.036	(0.008)***	0.036	(0.008)***	0.016	(0.013)	0.024	(0.013)°	0.073	(0.014)***
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.238	(0.030)***	-0.236	(0.029)***	-0.322	(0.046)***	-0.237	(0.047)***	-0.148	(0.048)**
Household composition (reference = couple without children)										
Household composition - single without children	-0.037	(0.009)***	-0.037	(0.009)***	-0.057	(0.016)***	-0.019	(0.015)	-0.035	(0.015)*
Household composition - single with children	0.031	(0.016)*	0.031	(0.016)*	0.034	(0.027)	0.031	(0.028)	0.036	(0.027)
Household composition - couple with children	0.018	(0.009)*	0.018	(0.009)*	0.006	(0.016)	0.035	(0.015)*	0.013	(0.014)
Household composition - other	-0.023	(0.011)*	-0.024	(0.011)*	-0.043	(0.017)*	-0.023	(0.017)	-0.004	(0.018)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	0.006	(0.010)								
Insurance status										
Insurance - increased reimbursement in 2008	0.035	(0.016)*	0.035	(0.015)*	0.028	(0.019)				

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 474)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 350)		Reduced model 2016 (Obs. = 10 277)	
Insurance - increased reimbursement in 2012	-0.008	(0.016)	-0.008	(0.016)			-0.030	(0.018)°		
Insurance - increased reimbursement in 2016	0.021	(0.016)	0.021	(0.016)					0.052	(0.018)**
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	-0.003	(0.001)*	-0.003	(0.001)**	-0.006	(0.002)**	-0.004	(0.002)*	-0.001	(0.002)
Density of GPs in neighbouring municipalities	-0.002	(0.003)	-0.001	(0.003)	0.000	(0.005)	0.001	(0.004)	-0.006	(0.004)
Density of specialists in municipality	0.001	(0.000)**	0.001	(0.000)**	0.002	(0.001)***	0.001	(0.001)	0.001	(0.001)
Density of specialists in neighbouring municipalities	0.001	(0.001)	0.001	(0.001)	0.001	(0.001)	-0.000	(0.001)	0.002	(0.001)
Distance to nearest ED	-0.001	(0.001)	-0.002	(0.001)*	-0.001	(0.001)	-0.003	(0.001)**	-0.001	(0.001)
Number of EDs within 10km radius	0.002	(0.002)								
Time (reference = 2008)										
Time: year 2012	-0.010	(0.008)	-0.010	(0.008)						
Time: year 2016	0.000	(0.009)	-0.000	(0.009)						

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.4.2.3. Overview inequity and evolution in the different scenarios

Figure 23 visualizes the absolute Gini coefficient for inequality in the probability of at least one specialist consultation in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of at least one specialist consultation in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 23, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower.

If we follow the traditional approach, we observe a small decrease in inequity in the probability to have consulted a specialist in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient decreased from about 0.25 in 2008 to about 0.24 in 2016. Hence, we find that the disparity between individuals in the probability of going at least once to a

specialist in the past year that cannot be explained and justified by (observable) healthcare needs has decreased over time.

Table 20 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not going to a specialist in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

The trends in inequity for the probability to consult a GP or a doctor (either GP or specialist) were decreasing for the absolute and relative Gini and stable for the reversed relative Gini (see sections 1.2.2.3 and 1.3.2.3). With respect to the inequity for the probability to consult a specialist, the results presented in Table 20 are less positive. We find small decreases in inequity for the absolute and relative Gini when following the traditional approach. The reverse relative Gini coefficient is however increasing over time. Therefore we cannot conclude that inequity in the probability to consult a specialist has diminished over time. In the baseline-residual scenario, we find an increase in inequity over time for the absolute and reversed relative Gini coefficient and a stable trend for the relative Gini coefficient.

Figure 23 – Evolution (2008-2016) of the absolute Gini index by scenario

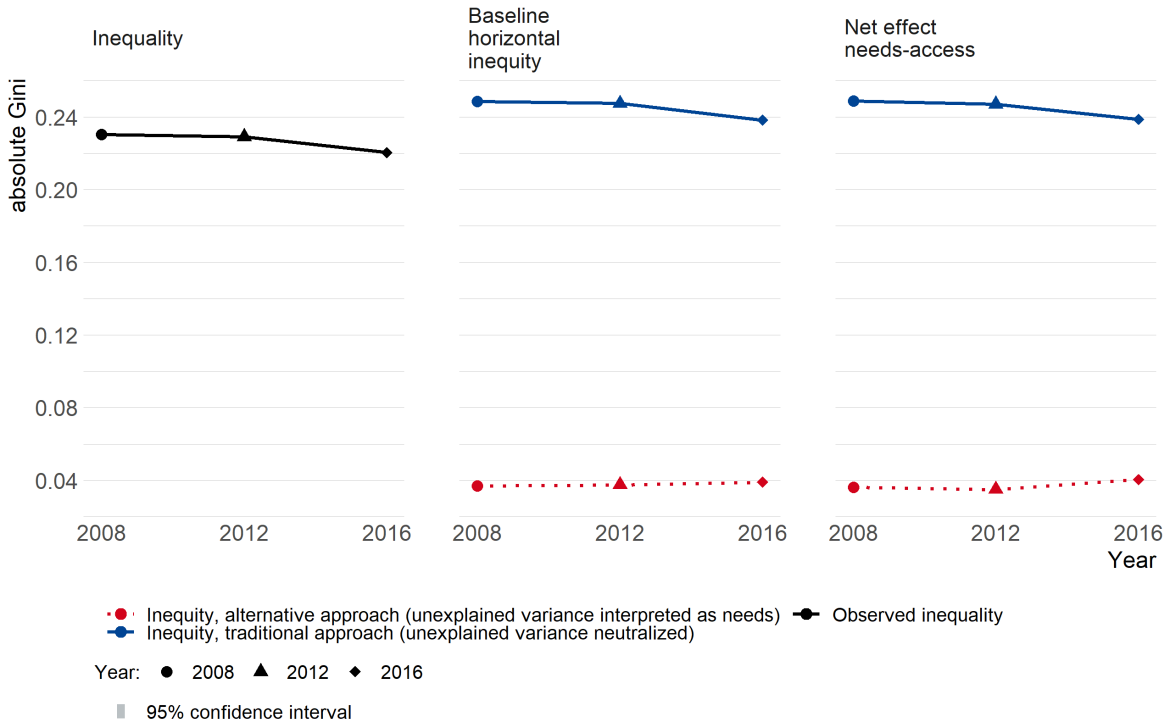


Table 21 – Evolution (2008-2016) of the inequity in the probability to have at least one specialist consultation in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.249	0.247	0.238^*	↓
	Relative	0.374	0.370^	0.345^*	↓
	Reversed relative	0.601	0.600	0.626^*	↑
Net effect needs-access	Absolute	0.249	0.247	0.239^*	↓
	Relative	0.374	0.369^	0.344^*	↓
	Reversed relative	0.599	0.598	0.621^*	↑
Baseline-residual	Absolute	0.037	0.038	0.039^*	↑
	Relative	0.058	0.058	0.058	→
	Reversed relative	0.102	0.106	0.119^*	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).

**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*

§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.4.2.4. Overview inequity over time for different population subgroups

Figure 24 and Figure 25 show how the probability to consult a specialist in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 24, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 25, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability of consulting a specialist than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average.

In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 24 and Figure 25 indicate that the inequalities with respect to the probability to consult a specialist at least once over the past year (range -0.15 – 0.20) are more pronounced than those for the probability to consult a doctor at least once over the past year (range -0.15 – 0.05). This is not surprising as 90% of the population has consulted a doctor (while about 65% has consulted a specialist), reducing the potential to find inequalities. Once a correction is made for healthcare needs, the disparities are less pronounced, i.e. the deviations from the population average are lower in the inequity scenario compared to inequality. This is especially true for subgroups based on age and (self-assessed) health status.

The inequity pattern is in line with what was found for doctor consultations, but the socioeconomic gradients are more pronounced (see Figure 24). After

correcting for needs, we find that individuals with low income (at risk of poverty and lower middle class) have a probability to consult a specialist in the past year below the population average, whereas individuals with high incomes (upper and top middle class) have a probability above the population average. With respect to education, a similar conclusion can be reached, with the probability of individuals with primary education and individuals with tertiary education below and above the population average, respectively.

With regard to the subgroups at risk (see Figure 25), we additionally find that, after correcting for needs, there are lower probabilities to consult a specialist for individuals with material deprivation, singles aged between 18 and 65, the unemployed, household with children at risk of poverty and individuals who benefit from increased reimbursement. The latter is striking, as the probability to consult a GP or a doctor in general was nearly perfectly in line with the population average. Hence, increased reimbursement is not able to sufficiently improve access to specialist care. The probabilities for individuals with material deprivation, the self-employed and the top middle class are evolving toward the population average, while for households with children at risk of poverty and the unemployed, the gap with the population average is widening. The effects are going in the same direction when considering the baseline, baseline-residual and net effect needs-access scenario. Finally, we found that the self-employed had a probability to consult a GP or a doctor in general below the population average; this is not the case for specialist care. While in 2008, the probability to consult a specialist among the group of self-employed individuals was below the population average, in 2012 and 2016 the probability in line with or above the population average.

Additionally, we find that:

- Individuals in fair, bad and very bad self-reported health have a higher probability of going to a specialist (column inequality). This is no longer the case when correcting for healthcare needs
- The probability of consulting a specialist decreases with the intensity of material deprivation. A positive finding is that for these groups, the average probability is evolving towards the population mean. On the other side, the situation has deteriorated among household with children which are at risk of poverty.

The results of the net effect needs-access scenario and the baseline-residual scenario are similar to those of the baseline scenario.

Figure 24 – Deviation in the needs-corrected probability to have at least one specialist consultation from population average for subgroups based on income, education and self-assessed health, by scenario and year

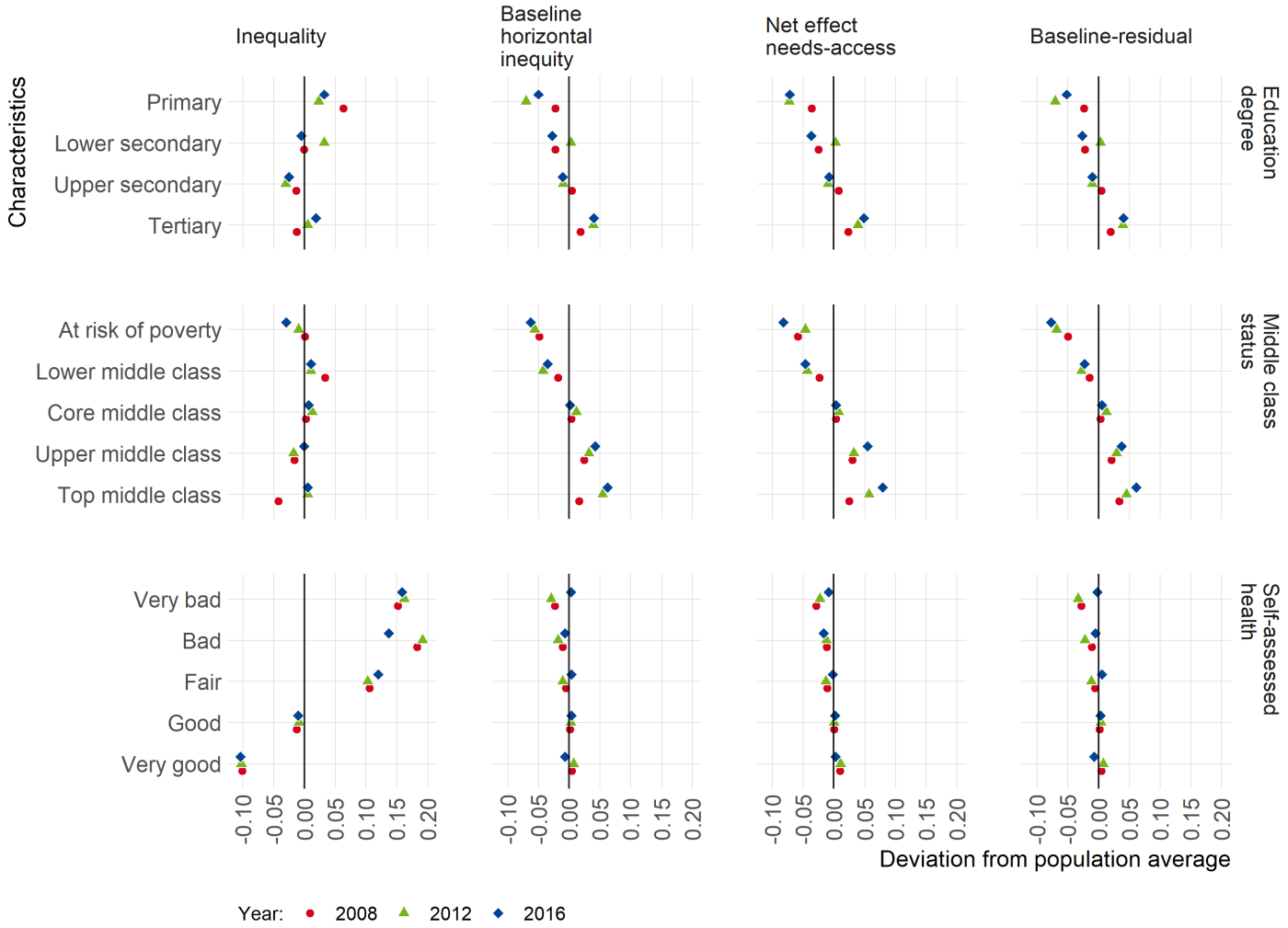


Figure 25 – Deviation in the needs-corrected probability to have at least one specialist consultation from population average for specific vulnerable subgroups, by scenario and year

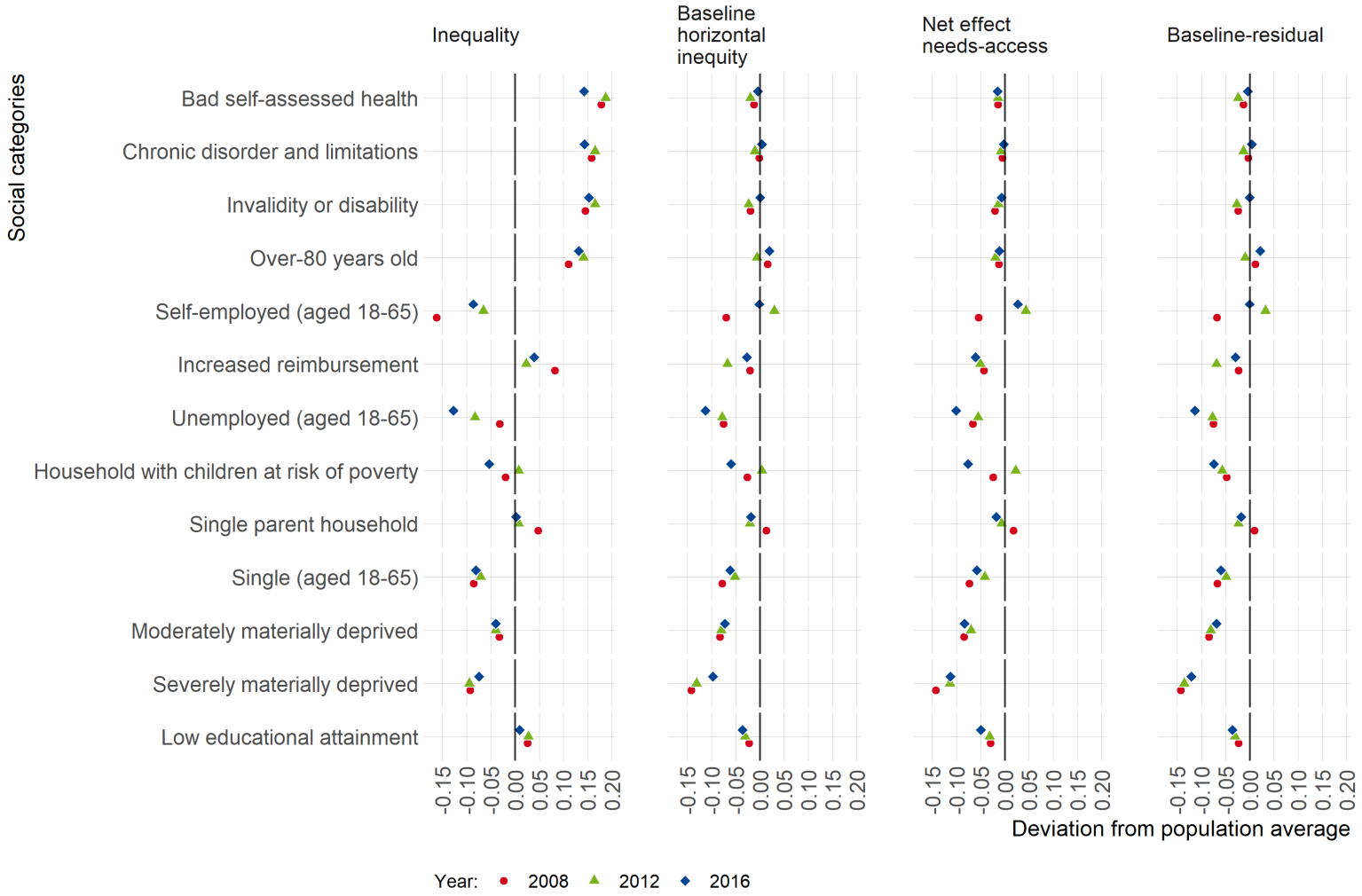
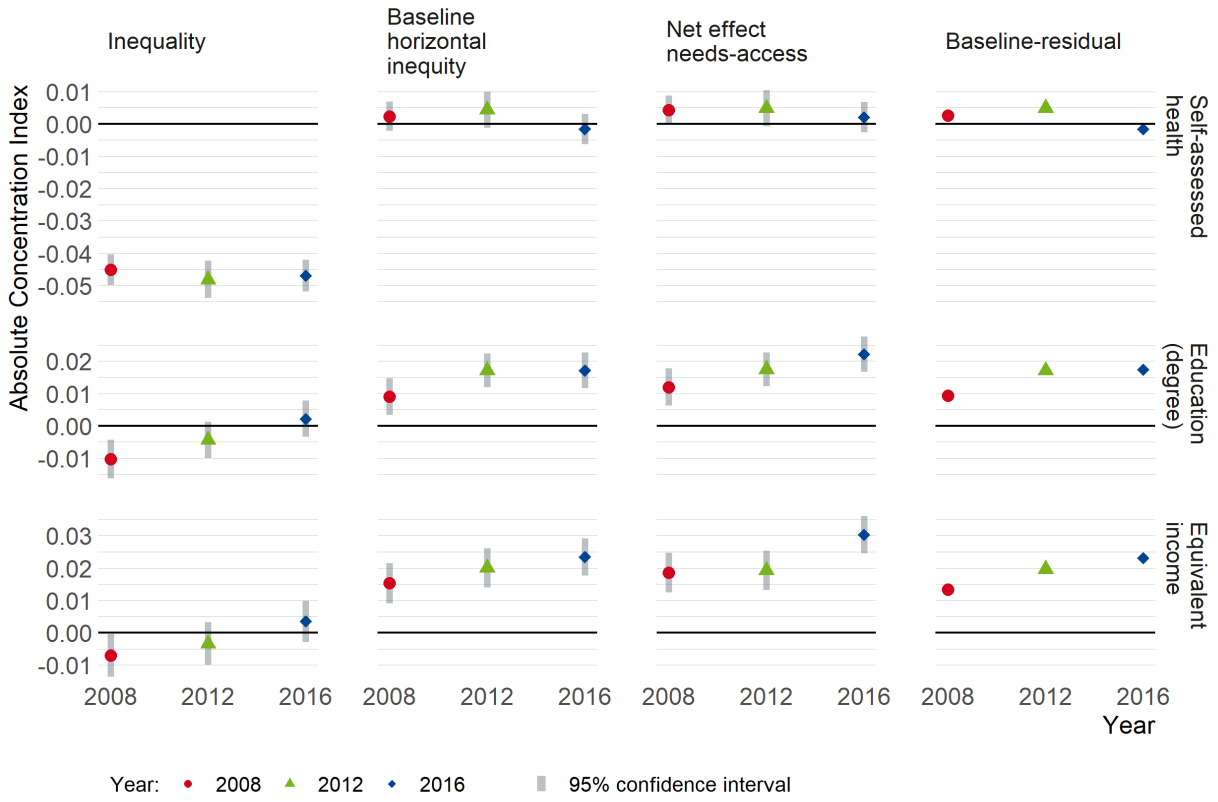


Figure 26 shows the absolute concentration index of the needs-corrected probability to have a specialist consultation to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of consulting a specialist concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 26 show that there are systematic socioeconomic inequalities in the probability to consult a specialist, with a higher use among individuals with a worse self-reported health status. Inequalities with respect to income and education have disappeared over time. After correcting for needs, an analysis of inequity indicates the opposite, there are no inequities based on self-reported health status, while we find significant and growing inequities over time with respect to income and educational attainment. The probability to consult a specialist is systematically higher among more affluent individuals and high educated individuals after needs are taken into account.

Overall, the results of the net effect needs-access scenario and the baseline-residual scenario are in line with the baseline scenario. The results are somewhat more pronounced in the net effect needs-access scenario.

Figure 26 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



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1.4.3. Conditional number of specialist consultations in the past year

1.4.3.1. Evolution over time for the population and population subgroups

Table 22 and Figure 27 show the evolution over time of the number of specialist consultations in the past year for individuals with at least one such consultation. There was no information in the KCE HSPA report of 2019 on the population average number of specialist consultations that can be used as benchmark, hence only the number of specialist consultations in the EU-SILC/IMA-AIM sample is reported.[18] From Table 19 and Figure 22, we concluded that the probability of having at least one specialist consultation was between 63% and 67%, depending on the year and sample. It has increased with a few percentage points between 2008 and 2016. Table 22 and Figure 27 additionally indicate that conditional on going at least once to a specialist in the past year, the average number of specialist consultations per individual has increased slightly over time, from 4.1 consultations in 2008 on average to 4.4 consultations in 2016 in the entire EU-SILC/IMA-AIM sample. The number of consultations is higher when restricting the sample to the adult population, but with the same trend, from 4.2 consultations in 2008 to 4.6 consultations in 2016.

Remark that the number of specialist consultations is about half the conditional average number of doctor consultations (see section 1.2.3.1).

Table 22 – Evolution (2008-2016) of the number of specialist consultations in the past year given at least one consultation

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	4.05	4.34	4.43
Survey (18+)	Indicator	4.20	4.54	4.62

Figure 27 shows the evolution of the number of specialist consultations conditional on having at least one consultation, for a variety of population subgroups (see section 1.1.2).

First, we find that for most population groups the 2016 number of specialist consultations is slightly higher or similar compared to the 2008 value, with the subgroup of unemployed individuals (panel D) and individuals with invalidity or disability (panel F) as exceptions. Second, a higher number of specialist consultations (annually between 6 and 8 on average, see panel F) is observed for individuals with higher care needs, i.e. those in (very) bad health, with chronic disorders and limitations to daily activities, and individuals with invalidity/disability. In Figure 22, we already observed that over-80 year olds had a lower probability to consult a specialist; in Figure 27 we additionally find that the conditional number of consultations is also lower, with an annual average of about 5 consultations (panel F). For GP consultations and doctor consultations in general, over-80 year olds had a similar number of consultations as other high need categories (see sections 1.2.3.1 and 1.3.3.1). Third, individuals who qualify their health status as fair have not only a lower probability to consult a specialist, also the conditional number of specialist consultations is lower (panel E). Fourth, the variability in the conditional number of specialist consultations by income (panel A), financial situation (panel B) and education (panel C) is limited. The subgroup of individuals with increased reimbursement do not have a higher number of specialist consultations compared to other individuals in a difficult financial situation (panel B). This subgroup had a higher conditional number of GP consultations (see section 1.3.3.1).

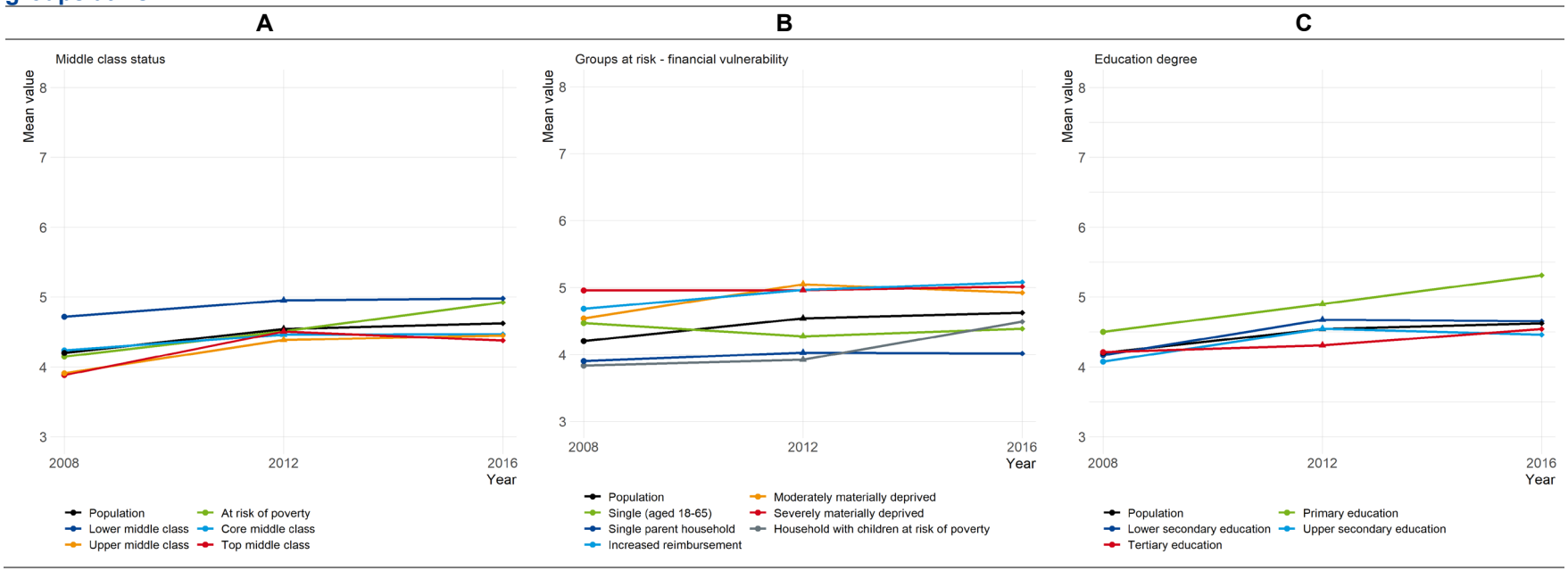
In addition, we have the following findings:

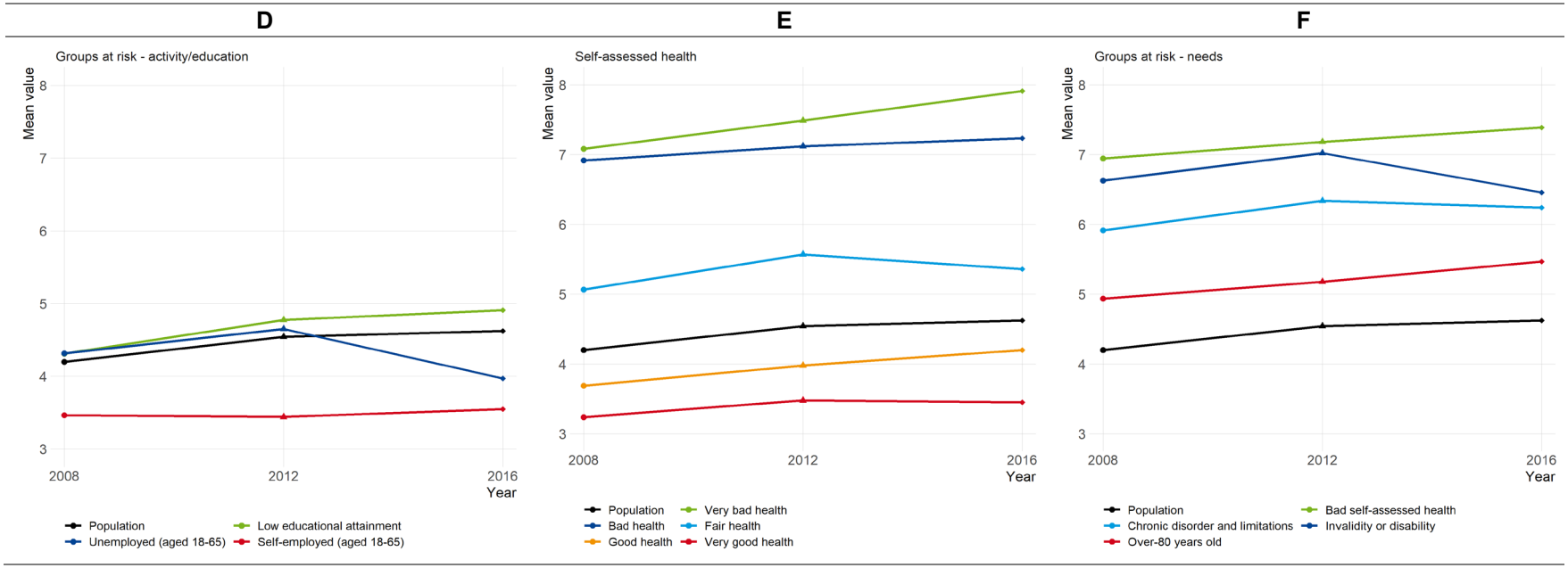
- Panel A: the average number of annual specialist consultations ranges from 4 to 5 for the different income groups. The number is generally higher as income decreases, except that individuals at risk of poverty have a lower number of consultations than individuals in the lower middle class.
- Panel B: Individuals with severe or moderate material deprivation as well as individuals with increased reimbursement status have about 1 specialist consultation per year more compared to the population

average. Remark that there are higher care needs in this population subgroup (see Scientific report section 2.4.1). Contrary to GP consultations, the subgroup of individuals with increased reimbursement status does not have a higher number of consultations than other subgroups. There is an increase in number of specialist consultations for households with children at risk of poverty between 2012 and 2016. In the same period, this subgroup had a decrease in the probability to consult a specialist. Both might be related, as individuals with a lower potential number of consultations might have decided not to consult a specialist, driving up the conditional average of those seeking care.

- Panel C and D: the average number of annual specialist consultations ranges from 4 to 5.5 for subgroups based on educational attainment, with a higher number of consultations for individuals with a lower educational attainment. In addition to a lower probability to consult a specialist, the self-employed are with an annual average of 3.5 specialist consultations clearly below the population average. The group of unemployed is one of the few population subgroup where the number of specialist consultations has decreased over time
- Panel E and F: There is a clear association between the number of specialist consultations and an individual's health status. Individuals in (very) good health have a number of consultations below the average, while those in fair health or with health issues have a higher number of annual consultations.

Figure 27 – Evolution (2008-2016) of the number of specialist consultations given at least one consultation for different subgroups and populations groups at risk





1.4.3.2. Regression output

Table 23 reports the average marginal effects of a truncated negative binomial count model for the sample of individuals with at least one specialist consultation (see section 1.1.3). The results should be interpreted as a change in number of consultations expressed in consultations.

The regression analysis presented in Table 23 indicates that the conditional number of specialist consultations is strongly associated with healthcare needs, i.e. age and sex, self-reported health status, incapacity to work and medication use, but also to socioeconomic and sociodemographic characteristics. We find the following associations:

- **Healthcare needs** are strongly associated with the number of specialist consultations.
    - Age and sex: Except among the over-80 year olds, males have, ceteris paribus, fewer specialist consultations than females. This ranges from 2.3 fewer consultations in the age group 18-34 to 0.4 fewer consultations in the age group 65-79. The gap is decreasing by age. For the over-80 year olds, we find the opposite, with females having fewer consultations than males. For males, we see an increase in the number of specialist consultations by age. For females, there is no linear association by age. Females in the age group 18-34 have the highest number of consultations. Females between 35 and 64 and over-80 have 1.1 to 1.3 fewer specialist

consultations (reduced pooled model) and between 65 and 79, females have about 0.6 fewer consultations.

- Self-reported health status: The effect on the conditional number of specialist consultations is more clearly associated with healthcare needs than the probability to consultation a specialist. When correcting for other characteristics, the number of specialist consultations increases as the self-reported health status deteriorates. Individuals with (very) bad self-assessed who consulted a specialist in the past year have about 2 additional specialist consultations per year. The presence of either a chronic disorder or limitations to daily activities also increase the frequency of specialist contacts with 0.5 to 1 consultation. We find that the effect of limitations to daily activities is more strongly related to the number of specialist consultations than the presence of a chronic disorder. The effect of the latter may, however, also be picked up by the impact of the various disorders identified through medication use.
- Administrative health information: Being incapacitated for work has not only a strong positive association on the probability of consulting a specialist, but also on the number of specialist consultations with an increase of about 2 consultations on average per year. Being incapacitated clearly results in a period of high primary care needs. In addition, invalidity or disability and lump sum chronic illness are both associated with a higher number of specialist consultations.
- Medication use: Medication use for various disorders is strongly associated with the number of specialist consultations. There is however quite some variation depending on the underlying disorder, with increases of 0.3 up to 2 consultations per year, the association is particularly strong for epilepsy, asthma, and other disorders (e.g. multiple sclerosis, cystic fibrosis, pancreas and kidney defections, transplants etc., see section 1.1.1)
- There was no effect on the conditional number of specialist consultations by membership of a community health centre.

- There is more variation in the conditional number of specialist consultations by **socioeconomic profile** than was found for doctor consultations.
  - Individuals with tertiary education have, ceteris paribus, the highest conditional number of specialist consultations. The number of consultations decreases as the obtained educational degree is lower, with about 0.3 to 0.5 fewer consultations for individuals with a primary degree or a lower secondary degree.
  - Activity status: Individuals who are unemployed, retired or self-employed have no significantly different number of specialist consultations than full-time employees. Students have a lower number of consultations, about 1.6, 1 and 1.6 consultations less in 2008, 2012 and 2016; part-time employees also have fewer consultations, about 0.3 consultations less in 2008 and 2016 and a non-significant effect in 2012. Inactive individuals on the other hand have more consultations, i.e. 0.5 and 0.9 more in 2008 and 2012, respectively, and a non-significant effect in 2016.
  - There is positive association between the financial situation and the number of specialist consultations, mediated either through the income variable or the material deprivation variable. The number of specialist consultations is, ceteris paribus, higher for more affluent individuals.
  - Household composition: Single persons and single parents have a lower number of specialist consultations, compared to adults in a couple.
- Individuals who benefit from **increased reimbursement** have a lower number of specialist consultations, about 0.4 to 0.5 fewer consultations per year. This is in stark contrast with the analysis for GP and doctor consultations, where increased reimbursement status was associated with a higher number of consultations (see sections 1.2.3.2 and 1.3.3.2). Although the impact is limited when accounting for various other effects, it suggest that the policy measures taken in the past improve the accessibility for this subgroup have not increased access

to the specialist and possibly substituted specialist care by GP care (which may or may not be appropriate).

- There is a small positive effect of the density of specialist on the number of specialist consultations. Other supply factors are not significant.
- The number of specialist consultations is about the same in Flanders and Wallonia and higher in Brussels. There were 0.8 more consultations in Brussels on average in 2008; this difference with the other regions has decreased over time and is not significant in 2016. There is no effect of urbanization.

Table 23 – Regression output for the conditional number of specialist consultations, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 20 764)		Reduced model (Obs. = 20 764)		Reduced model 2008 (Obs. = 7 029)		Reduced model 2012 (Obs. = 6 823)		Reduced model 2016 (Obs. = 6 912)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-2.297	(0.169)***	-2.303	(0.169)***	-1.987	(0.286)***	-2.759	(0.339)***	-2.357	(0.301)***
Male aged 35-49 years	-2.167	(0.165)***	-2.172	(0.164)***	-2.166	(0.267)***	-2.185	(0.245)***	-2.159	(0.321)***
Female aged 35-49 years	-1.114	(0.175)***	-1.120	(0.175)***	-0.985	(0.187)***	-1.071	(0.224)***	-0.827	(0.257)**
Male aged 50-64 years	-1.777	(0.183)***	-1.781	(0.182)***	-1.555	(0.261)***	-1.699	(0.272)***	-1.741	(0.307)***
Female aged 50-64 years	-1.215	(0.170)***	-1.219	(0.170)***	-1.181	(0.231)***	-1.190	(0.244)***	-0.822	(0.259)**
Male aged 65-79 years	-1.090	(0.220)***	-1.096	(0.220)***	-0.770	(0.308)*	-0.919	(0.344)**	-1.070	(0.345)**
Female aged 65-79 years	-0.620	(0.223)**	-0.628	(0.222)**	-0.691	(0.297)*	-0.598	(0.327)°	-0.283	(0.327)
Male aged 80 years or more	-0.879	(0.291)**	-0.886	(0.290)**	-0.323	(0.423)	-0.818	(0.453)°	-0.989	(0.420)*
Female aged 80 years or more	-1.309	(0.261)***	-1.321	(0.260)***	-1.136	(0.392)**	-1.135	(0.466)*	-1.170	(0.399)**
Self-assessed health (reference = very good)										
Self-assessed health - good	0.302	(0.082)***	0.306	(0.081)***	0.273	(0.145)°	0.382	(0.145)**	0.414	(0.188)*
Self-assessed health - fair	0.953	(0.112)***	0.957	(0.111)***	0.798	(0.193)***	1.344	(0.201)***	0.841	(0.230)***
Self-assessed health - bad	1.896	(0.185)***	1.890	(0.185)***	1.462	(0.265)***	2.047	(0.267)***	1.781	(0.300)***
Self-assessed health - very bad	2.108	(0.351)***	2.102	(0.348)***	1.645	(0.480)***	2.018	(0.476)***	2.068	(0.390)***
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.811	(0.157)***	0.813	(0.156)***	0.809	(0.256)**	0.570	(0.239)*	1.063	(0.255)***
Chronic disorder, no limitations	0.530	(0.110)***	0.533	(0.110)***	0.469	(0.174)**	0.646	(0.200)**	0.504	(0.221)*
Chronic disorder, limitations	0.680	(0.104)***	0.685	(0.104)***	0.679	(0.167)***	0.601	(0.174)***	0.792	(0.183)***
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										

Independent variables	Full model (Obs. = 20 764)		Reduced model (Obs. = 20 764)		Reduced model 2008 (Obs. = 7 029)		Reduced model 2012 (Obs. = 6 823)		Reduced model 2016 (Obs. = 6 912)	
Invalid or disabled	0.458	(0.168)**	0.461	(0.167)**	0.476	(0.257)°	0.564	(0.296)°	0.310	(0.238)
Incapacity to work	2.808	(0.193)***	2.808	(0.194)***	2.151	(0.184)***	2.169	(0.200)***	2.151	(0.211)***
Entitled to lump sum chronic illness	1.180	(0.155)***	1.175	(0.154)***	1.191	(0.191)***	0.901	(0.226)***	1.151	(0.216)***
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.052	(0.221)								
Medication use - other disorder	2.193	(0.310)***	2.195	(0.308)***	1.710	(0.378)***	1.899	(0.363)***	1.749	(0.317)***
Medication use - cardiovascular disorder	0.282	(0.084)***	0.283	(0.084)***	0.396	(0.121)**	0.283	(0.142)*	0.163	(0.138)
Medication use - thrombosis	0.519	(0.103)***	0.517	(0.103)***	0.417	(0.195)*	0.574	(0.153)***	0.537	(0.163)**
Medication use - chronic obstructive pulmonary disease (COPD)	0.309	(0.156)*	0.302	(0.155)°	0.326	(0.250)	0.148	(0.229)	0.314	(0.230)
Medication use - asthma	0.935	(0.242)***	0.946	(0.243)***	1.297	(0.355)***	0.412	(0.333)	0.960	(0.333)**
Medication use - diabetes	0.528	(0.120)***	0.530	(0.120)***	0.651	(0.183)***	0.423	(0.193)*	0.470	(0.201)*
Medication use - epilepsy	0.853	(0.271)**	0.848	(0.270)**	1.262	(0.388)**	0.497	(0.401)	0.649	(0.352)°
Medication use - thyroid disorder	0.497	(0.139)***	0.499	(0.140)***	0.565	(0.220)*	0.722	(0.197)***	0.150	(0.212)
Community health centre										
Registered in community health centre	0.330	(0.264)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.140	(0.103)	-0.114	(0.101)	0.016	(0.146)	-0.099	(0.142)	-0.234	(0.180)
Region of residence - Brussels	0.510	(0.243)*	0.496	(0.232)*	0.823	(0.333)*	0.403	(0.346)	0.191	(0.465)
Urbanization - medium	-0.091	(0.090)	-0.125	(0.090)	-0.279	(0.139)*	-0.009	(0.134)	-0.092	(0.173)
Urbanization - thin	-0.227	(0.136)°	-0.266	(0.138)°	-0.518	(0.199)**	-0.185	(0.223)	-0.138	(0.255)
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.189	(0.105)°	-0.190	(0.106)°	-0.339	(0.188)°	0.120	(0.197)	-0.349	(0.207)°
Occupation - inactive	0.534	(0.138)***	0.534	(0.138)***	0.537	(0.194)**	0.853	(0.240)***	0.142	(0.251)
Occupation - self-employed in 2008	-0.323	(0.254)	-0.333	(0.253)	-0.359	(0.264)				
Occupation - self-employed in 2012	-0.410	(0.256)	-0.417	(0.254)			-0.258	(0.322)		

Independent variables	Full model (Obs. = 20 764)		Reduced model (Obs. = 20 764)		Reduced model 2008 (Obs. = 7 029)		Reduced model 2012 (Obs. = 6 823)		Reduced model 2016 (Obs. = 6 912)	
Occupation - self-employed in 2016	-0.379	(0.253)	-0.393	(0.252)					-0.566	(0.303)°
Occupation - unemployed	0.019	(0.155)	0.018	(0.155)	-0.045	(0.225)	0.510	(0.307)°	-0.516	(0.316)
Occupation - student	-1.192	(0.142)***	-1.182	(0.144)***	-1.649	(0.339)***	-0.980	(0.366)**	-1.644	(0.364)***
Occupation - retired	0.227	(0.140)	0.224	(0.140)	0.087	(0.234)	0.424	(0.271)	0.174	(0.249)
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.428	(0.114)***	-0.439	(0.114)***	-0.536	(0.189)**	-0.479	(0.209)*	-0.273	(0.209)
Education degree - lower secondary	-0.351	(0.096)***	-0.355	(0.095)***	-0.518	(0.174)**	-0.042	(0.169)	-0.484	(0.176)**
Education degree - upper secondary	-0.154	(0.087)°	-0.159	(0.087)°	-0.224	(0.152)	0.028	(0.155)	-0.261	(0.139)°
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.266	(0.085)**	0.263	(0.084)**	0.048	(0.121)	0.680	(0.153)***	-0.072	(0.185)
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.504	(0.299)°	-0.456	(0.298)	-1.127	(0.520)*	0.633	(0.459)	-1.145	(0.563)*
Household composition (reference = couple without children)										
Household composition - single without children	-0.268	(0.101)**	-0.267	(0.101)**	-0.139	(0.194)	-0.445	(0.189)*	-0.264	(0.153)°
Household composition - single with children	-0.502	(0.163)**	-0.500	(0.164)**	-0.354	(0.307)	-0.667	(0.302)*	-0.549	(0.326)°
Household composition - couple with children	-0.133	(0.124)	-0.133	(0.124)	-0.129	(0.191)	-0.093	(0.185)	-0.172	(0.223)
Household composition - other	-0.536	(0.106)***	-0.536	(0.107)***	-0.514	(0.158)**	-0.560	(0.211)**	-0.597	(0.199)**
Country of birth (reference = Belgium)										
Country of birth other than Belgium	0.170	(0.120)	0.175	(0.121)	0.107	(0.203)	0.139	(0.187)	0.217	(0.183)
Insurance status										
Insurance - increased reimbursement in 2008	-0.337	(0.145)*	-0.329	(0.145)*	-0.379	(0.164)*				
Insurance - increased reimbursement in 2012	-0.441	(0.140)**	-0.440	(0.140)**			-0.482	(0.174)**		
Insurance - increased reimbursement in 2016	-0.482	(0.131)***	-0.476	(0.132)***					-0.495	(0.179)**
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.014	(0.016)								

Independent variables	Full model (Obs. = 20 764)	Reduced model (Obs. = 20 764)	Reduced model 2008 (Obs. = 7 029)	Reduced model 2012 (Obs. = 6 823)	Reduced model 2016 (Obs. = 6 912)
Density of GPs in neighbouring municipalities	0.020 (0.030)				
Density of specialists in municipality	0.004 (0.005)	0.007 (0.004)°	0.005 (0.006)	0.002 (0.006)	0.013 (0.007)°
Density of specialists in neighbouring municipalities	0.004 (0.010)	0.008 (0.008)	0.022 (0.009)*	0.007 (0.012)	-0.005 (0.013)
Distance to nearest ED	-0.007 (0.008)				
Number of EDs within 10km radius	0.005 (0.014)	0.007 (0.013)	-0.032 (0.020)	0.033 (0.019)°	0.020 (0.032)
Time (reference = 2008)					
Time: year 2012	0.300 (0.094)**	0.293 (0.093)**			
Time: year 2016	0.302 (0.107)**	0.305 (0.107)**			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.4.3.3. Overview inequity and evolution in the different scenarios

Figure 28 visualizes the absolute Gini coefficient for inequality in the number of specialist consultations in the past year (so without needs correction) as well as inequity in the fairness gap for the conditional number of specialist consultations in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 28 there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower.

If we follow the traditional approach, we observe an increase in inequity in the number of specialist consultations in the past year. Hence, we find that the disparity between individuals in the number of specialist consultations that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 24 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Using the traditional approach, we observe an upward trend in inequity as measured by the absolute Gini index and a constant trend based on the relative Gini index. In the alternative approach, there is a downward trend for the relative Gini coefficient and a constant trend for the absolute Gini coefficient. Hence we cannot unambiguously conclude that inequity has increased or decreased.

Figure 28 – Evolution (2008-2016) of the absolute Gini index by scenario

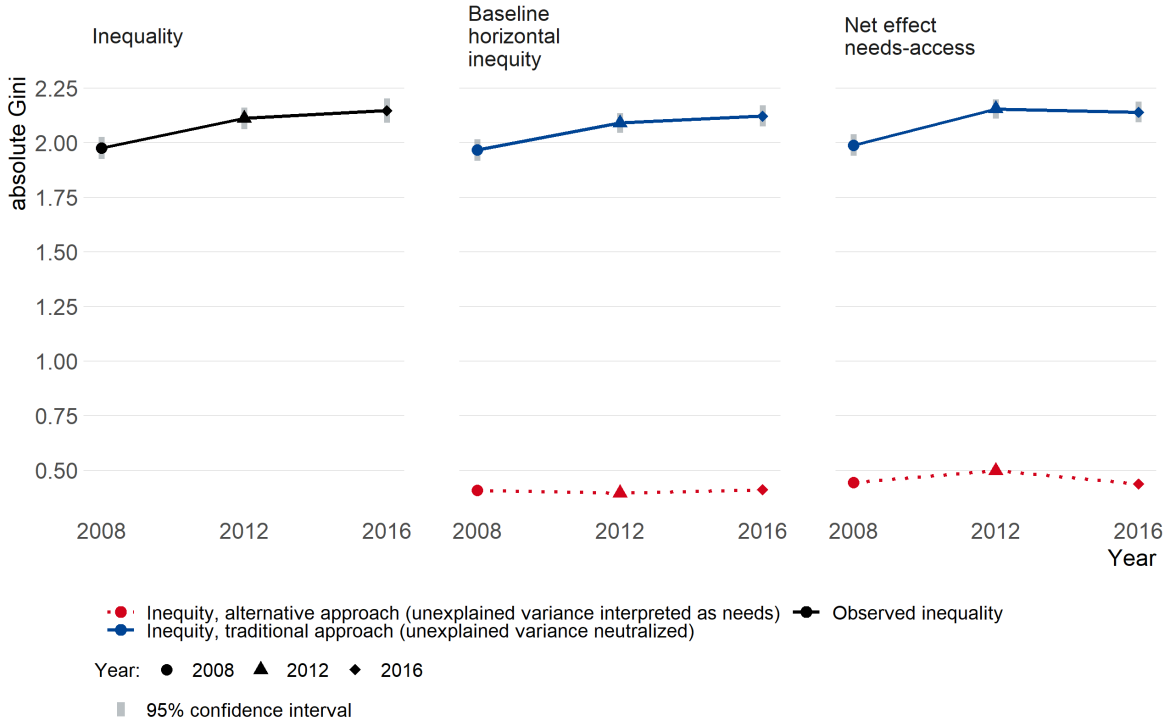


Table 24 – Evolution (2008-2016) of the inequity in the conditional number of specialist consultations for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	1.966	2.090^	2.121^	↑
	Relative	0.468	0.460	0.459	→
Net effect needs-access	Absolute	1.988	2.154^	2.140^	↑
	Relative	0.474	0.474	0.463	→
Baseline-residual	Absolute	0.408	0.396	0.411	→
	Relative	0.097	0.087^	0.089^	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.4.3.4. Overview inequity over time for different population subgroups

Figure 29 and Figure 30 show how care use in various population subgroups differs from the population average when looking at inequality as well as inequity. When analysing inequity, a correction is made for healthcare need and preferences according to the different inequity-scenarios, both for the average population and subgroup value. In Figure 29, population groups are defined based on categories of equivalized income, categories of education degree, and categories of self-assessed health. In Figure 30, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower number of specialist consultations than the population average. Values to the right of the vertical line, on the other hand, indicate a higher number of consultations than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 29 and Figure 30, we find that disparities are much less pronounced once a correction is made for healthcare needs, i.e. the deviations from the population average are generally lower or have even disappeared in the inequity scenario compared to inequality. While inequalities in number of specialist consultations are important (range -2 – 3) and in favour of individuals with worse health status, low educational attainment, material deprivation and increased reimbursement, these disparities are small (range -1 – 1) or even go in the opposite direction once a correction for needs is made.

In the baseline inequity scenario, we find a consistent lower number of specialist consultations in all years for individuals with worse health status, in terms of invalidity, self-assessed health, chronic disorders and high age. There are clear socioeconomic gradients in favour of high income and high educated individuals. We find a lower number of specialist consultations compared to the population mean for population subgroups in a financially vulnerable situation, such as individuals living in households at risk of poverty or material deprivation, individuals benefiting from increased

reimbursement and individuals who are unemployed. There seems to be little improvement over time. Also individuals with low educational attainment and living in single parent households have a lower number of specialist consultations once healthcare needs are taken into account. Self-employed individuals on the contrary do not have a lower number of consultations once a correction is made for healthcare needs.

The results of the baseline horizontal inequity scenario are in correspondence with the results of the net effect needs-access scenario and the baseline-residual scenario, although the results in the net effect needs-access scenario are more pronounced. This is due to the different associations between socioeconomic characteristics and number of specialist consultations, both positive and negative effects are found. In the net effect needs-access scenario, the former are considered justified (as a proxy for increased needs), while the latter are not (as a proxy for accessibility issues).

Figure 29 – Deviation in the needs-corrected conditional number of specialist consultations from population average for subgroups based on income, education and self-assessed health, by scenario and year

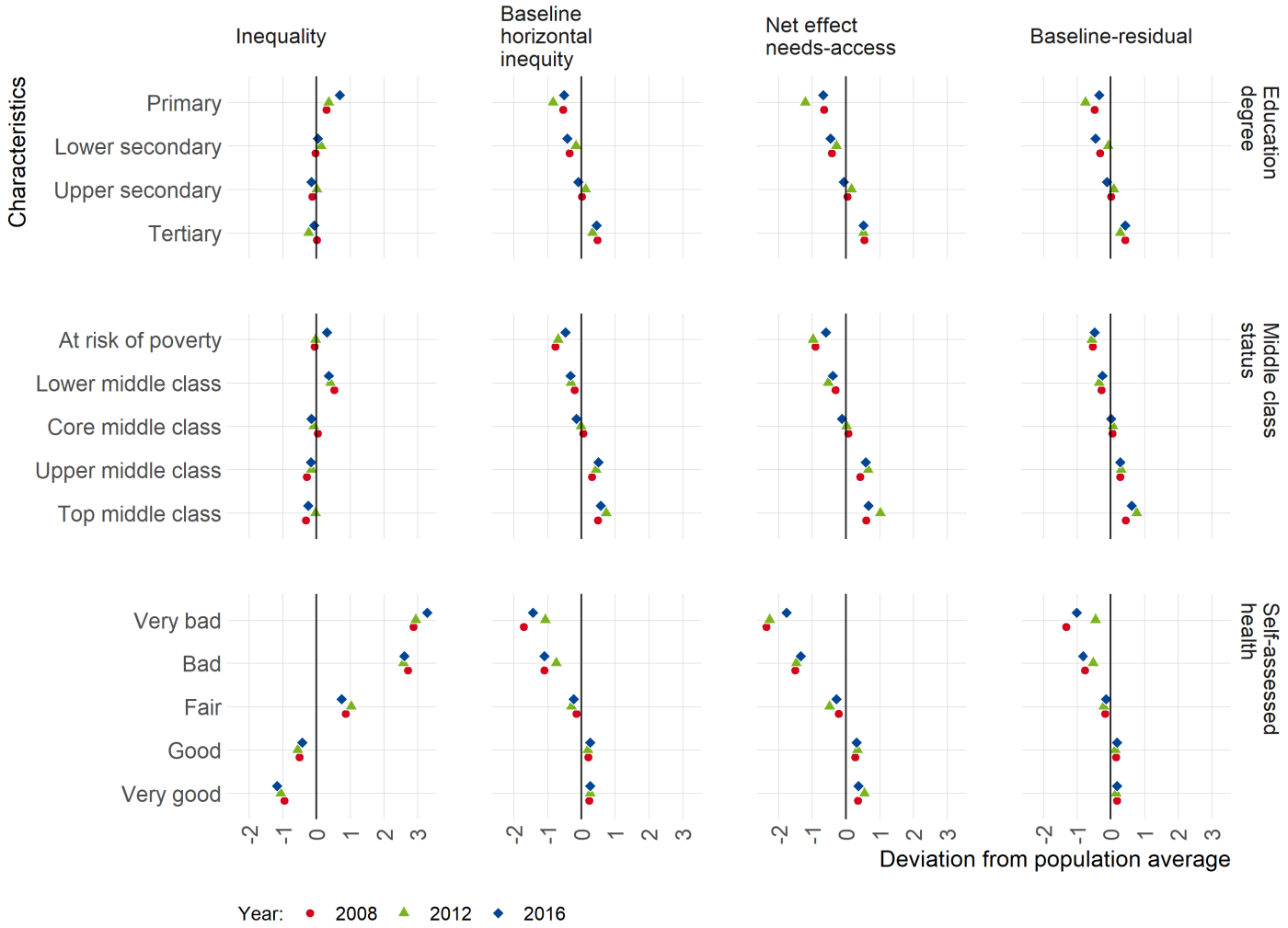


Figure 30 – Deviation in the needs-corrected conditional number of specialist consultations from population average for specific vulnerable subgroups, by scenario and year

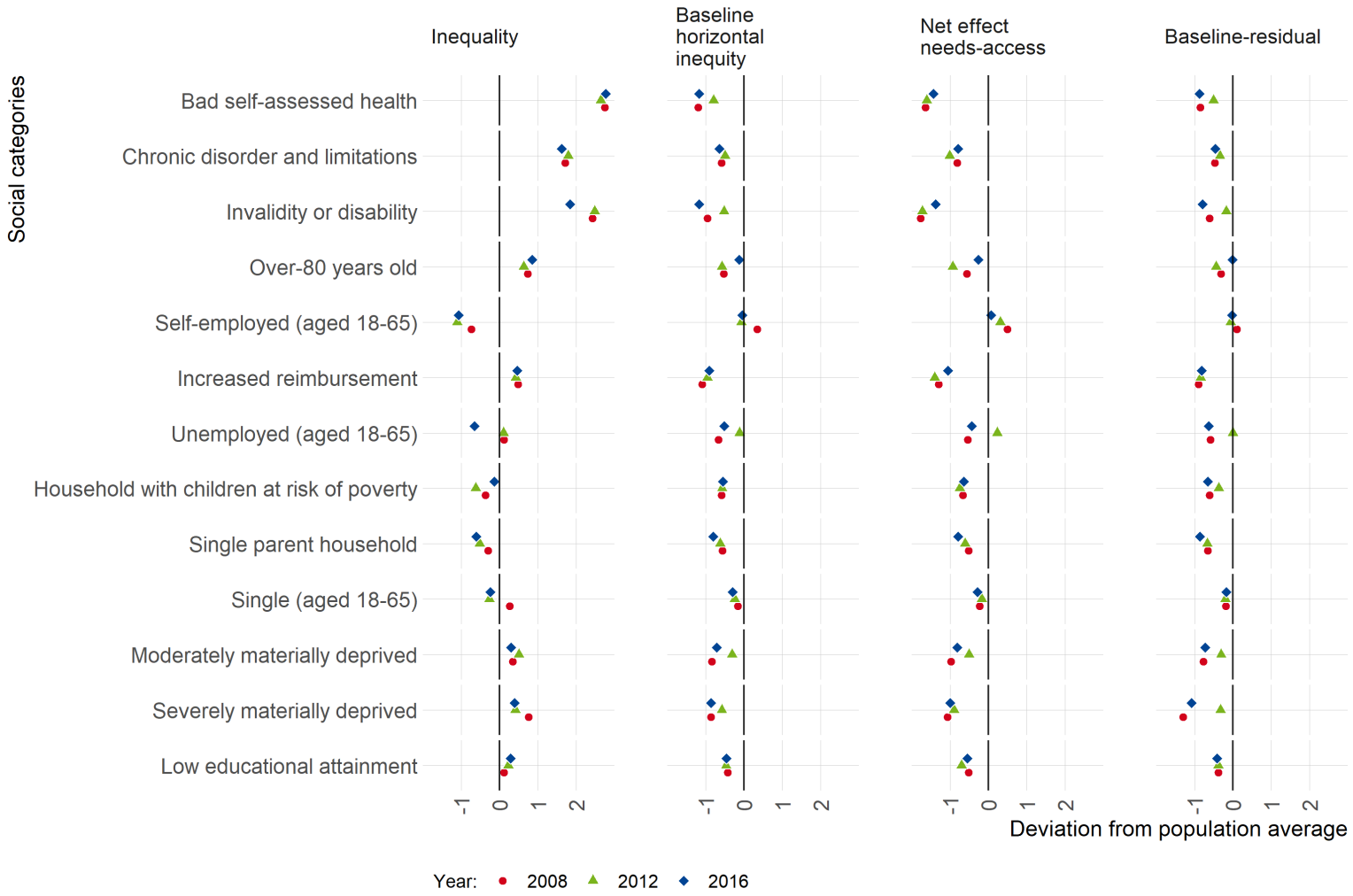
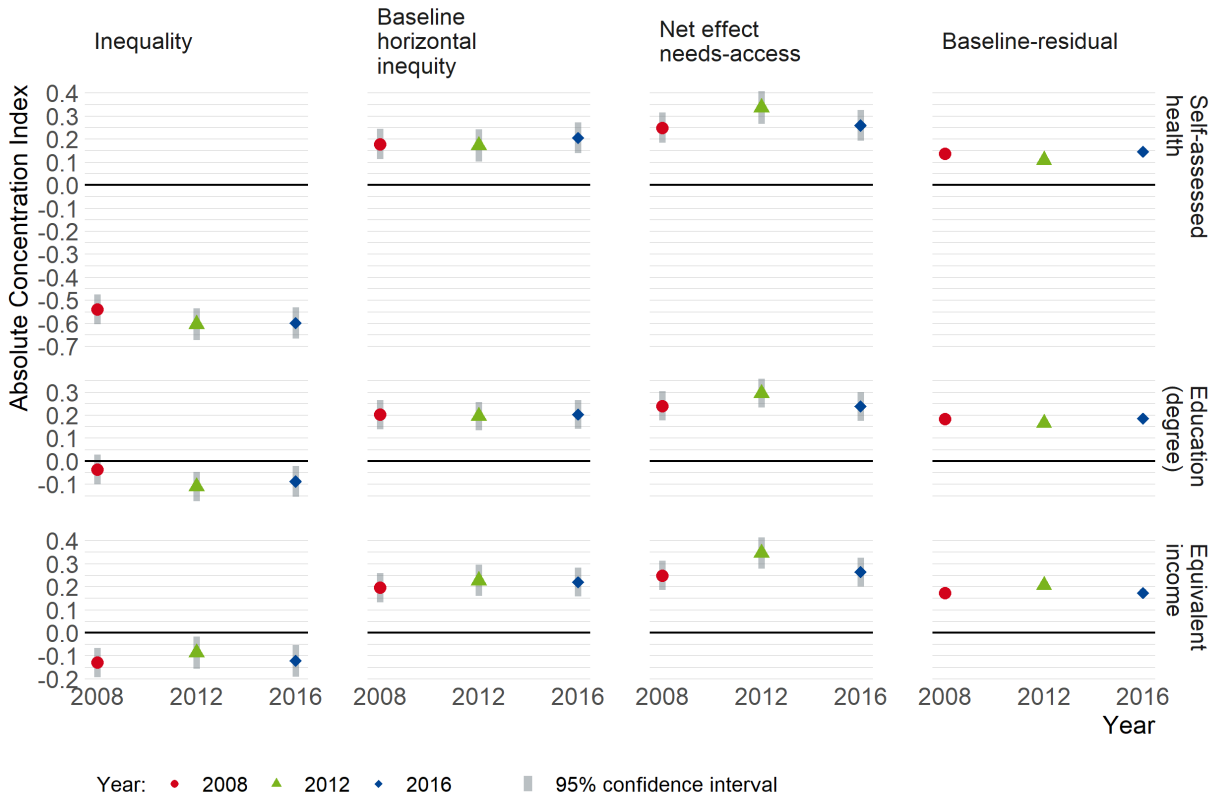


Figure 31 shows the absolute concentration index of the needs-corrected number of specialist consultations to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher needs-corrected number of specialist consultations concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher needs-corrected number of specialist consultations for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 31 reveal systematic inequalities in the number of specialist consultations in all three dimensions (panel inequality), with specialist consultations more concentrated among individuals with a lower educational degree and lower income, but especially among those with worse self-assessed health. After correcting for healthcare needs, we find significant inequities in the other direction with specialist consultations concentrated more among individuals with better self-assessed health, a higher education degree and higher income (panel baseline horizontal inequity, baseline-residual scenario and net effect needs-access scenario). The socioeconomic inequity is worrisome and could not be concluded by looking at mere inequalities.

Figure 31 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.5. Contacts with the emergency department

1.5.1. Summary

We analyse inequity in the use of the emergency department (ED) over the past 12 months. Two types of utilisation are examined consecutively, the probability of a contact and the number of contacts given at least one contact.

Contacts with the emergency department are identified through the following nomenclature codes: 590656, 590671, 590693, 590531, 590516, 590553, 590774, 590730, 590796, 590634, 590612, 590391, 590811, 590752, 590575, 590715, 590450, 590590.

Key points inequity in contacts to the emergency department in the past year

The probability of using ED services in the past year increased from 12% to 16% between 2008 and 2016 in the survey sample (18+); about 15%-25% among individuals in financially vulnerable situations; about 25%-35% among individuals with (very) bad self-assessed health. The average annual number of ED contacts (among those with at least one contact) is about 1.3; about 76%-80% of the individuals had only one ED contact.

Probability of using ED services

- Association with healthcare needs and to a limited extent with socioeconomic status. **Main associations (regression):**
  - Health status: higher probabilities for individuals incapacitated from work; eligible for the lump sum chronic illness; with worse self-assessed health; in the age category 18 to 34; who take medication for chronic obstructive pulmonary disease (COPD), thrombosis and epilepsy. No association with the presence of a chronic disorder or limitations to daily activities.
  - Higher probabilities for individuals with material deprivations; single parents; living in Wallonia and Brussels (in 2008).
  - Lower probabilities among individuals with tertiary degree in Wallonia and Brussels (compared to Flanders), for individuals with increased reimbursement status.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Systematic inequities by self-assessed health and socioeconomic inequities by income and education. There are clear gradients in all three dimensions, with probability to use ED services concentrated among individuals with lower income, lower educational attainment and worse self-assessed health.
  - Among the groups of interest, probabilities above the population mean are found for individuals in financially vulnerable groups (increased reimbursement status, material deprivation, at risk of poverty); groups with higher care needs (over-80 year olds, invalidity/disability, (very) bad self-assessed health); single parents; with primary/lower secondary education. Probabilities are increasing over time for households at risk of poverty, particularly households with children.

Conditional number of ED contacts

- Few significant associations are found. **Main associations (regression):**
  - Health status: more ED contacts for individuals with worse self-reported health (fair, bad or very bad self-assessed health); incapacitated from work; eligible for the lump sum chronic illness; in the age range 18-49.
  - More ED contacts are found for individuals with material deprivation or lower incomes.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - There are small systematic inequities in favour of individuals with lower income.

Below-average number of ED contacts among the self-employed (in 2008 and 2012, in line with population average in 2016); above-average number of ED contacts among the unemployed (in 2008 and 2012, in line with population average in 2016) and other financially vulnerable groups (at risk of poverty, material deprivation, increased reimbursement).

1.5.2. Probability of going to an ED in the past year

1.5.2.1. Evolution over time for the population and population subgroups

Table 25 shows the evolution over time of the probability of having at least one ED contact in the past 12 months. There was no information in the KCE HSPA report of 2019 on the population value of this indicator, hence only the propensity in the EU-SILC/IMA-AIM sample is reported.[18] We find an increasing use of the ED over time, with a probability of 12.9% in 2008 of having at least one ED contact over the past year up to 17.4% of the population in 2016. This value is slightly lower when restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, going from 11.7% in 2008 to 16.0% in 2016.

The reversed value is given as well, i.e. the probability of not visiting an ED in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 25 – Evolution (2008-2016) of the probability to have at least one ED contact in the past year

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	12.9%	15.6%	17.4%
	Reverse	87.1%	84.4%	82.6%
Survey (18+)	Indicator	11.7%	14.9%	16.0%
	Reverse	88.3%	85.1%	84.0%

Figure 32 shows the evolution of the probability of having an ED contact for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.5.2.2.

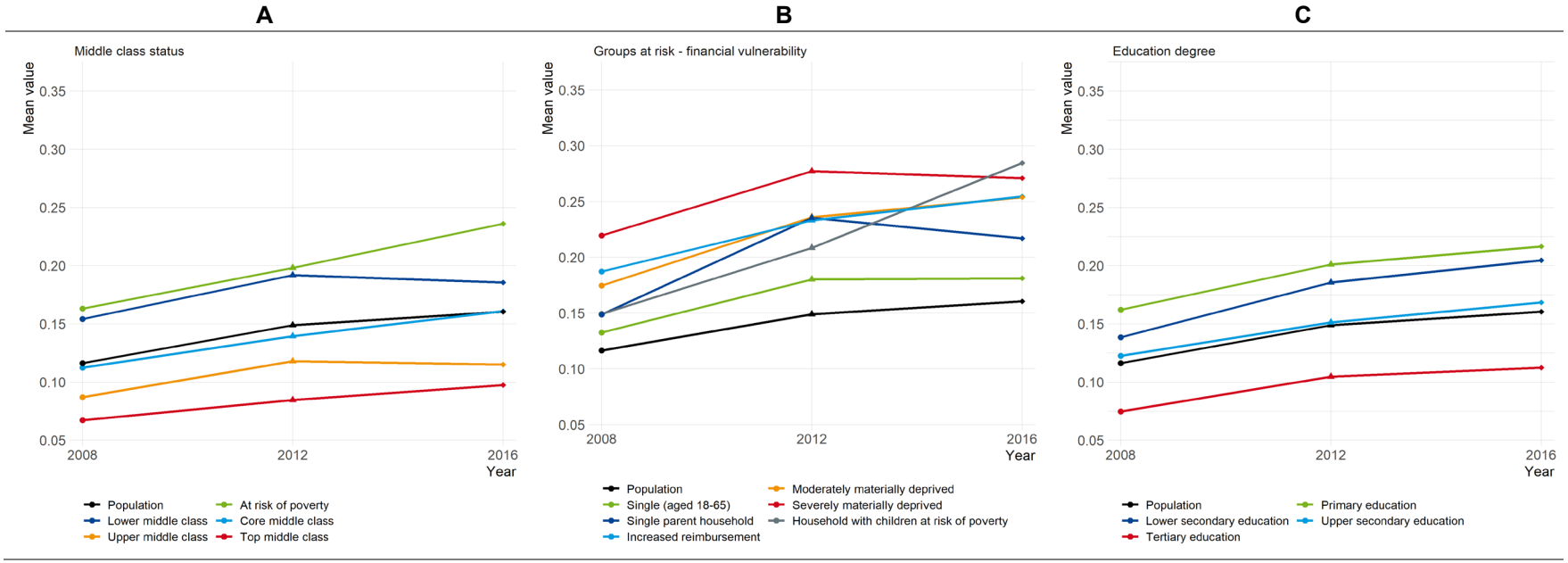
Figure 32 indicates that the probability of having an ED contact has increased between 2008 and 2016 for nearly all population subgroups, the unemployed (aged 18-65) are a notable exception (see panel D). The highest probabilities are observed for individuals with bad or very bad self-assessed health (with a probability of an ED contact that is about twice as large as the population average) (panel E), for individuals at high age (aged 80 years or above) (panel F) and for individuals with low income (panel A) or severe material deprivation (panel B). The probability to have an ED contact increases with the intensity of the material deprivation. Material deprivation appears to be more strongly associated with the probability of an ED contact than being at risk of poverty.

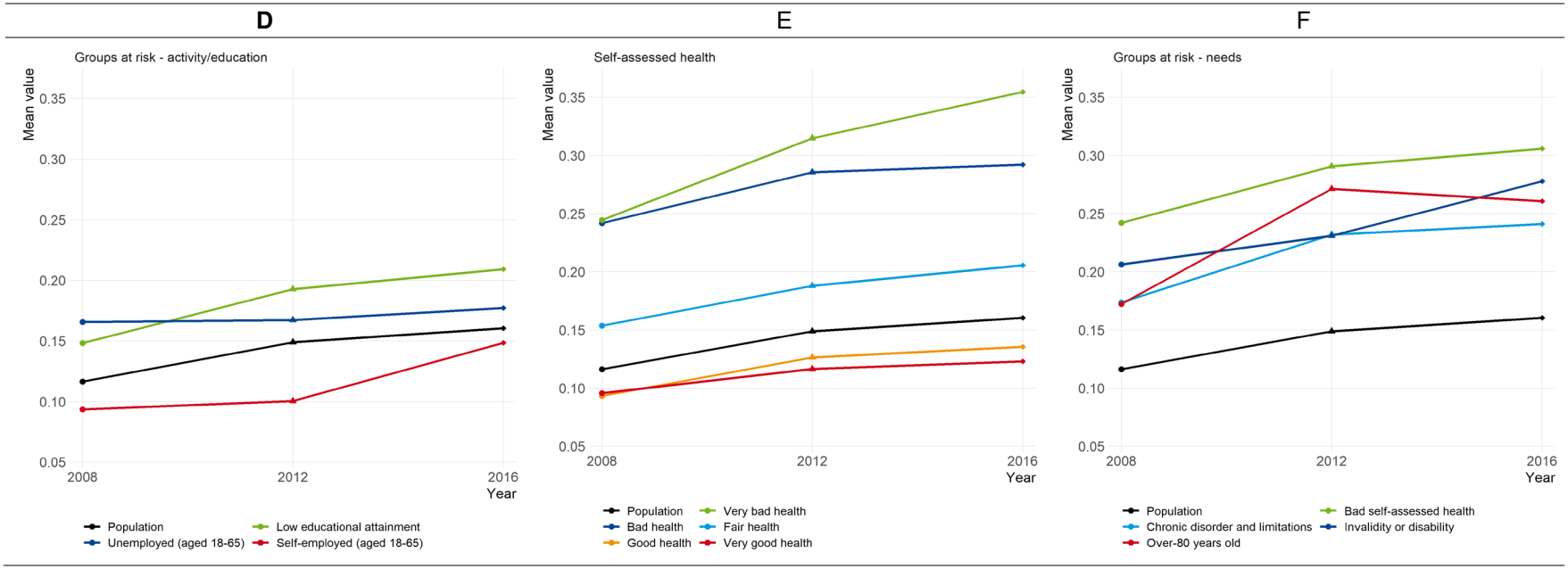
In addition, we have the following findings:

- Panel A: There is some variation in the probability to have one or more ED contacts by income level (range 2016: 0.12 – 0.24). Individuals at risk of poverty and in the lower middle class have a probability of an ED contact above the population average. While their trend is the same between 2008 and 2012, they seem to diverge between 2012 and 2016. High income groups have a lower probability to visit the ED.

- Panel B: All subgroups with potential financial difficulties have a probability to visit an ED above the population average. Individuals with severe material deprivation or who benefit from increased reimbursement, have probabilities to visit an ED that are not only above the population average, but also above the probability for individuals at risk of poverty. The probability to go to the ED has doubled for (adult) individuals in households at risk of poverty with children. While single parent households had a similar or even stronger upward trend between 2008 and 2012, the trend has reversed between 2012 and 2016.
- Panel C: There is some variation in the probability to have one or more ED contacts by educational attainment (range 2016: 0.11 – 0.22). Individuals with low educational attainment have probabilities above the population average, while individuals with tertiary education have a probability below the population average.
- Panel D: With respect to labour market position, there is a constant trend in the probability to use ED services over time for the unemployed, which is in contrast with the upward trend for other population subgroups. A lower, but increasing probability is observed for the self-employed.
- Panel E and F: Differences in self-assessed health lead to strong variation in the probability to go to an ED (range 2016: 0.12 – 0.35). Very bad, bad and fair health are associated with probabilities above the population average, whereas individuals with good or very good health have a probability to visit an ED below the population average. Other individuals with higher care needs – such as individuals aged 80 or more, individuals with invalidity or disability and individuals with a chronic disorder and limitations to daily activities – have a probability to visit an ED that is about as high as for individuals with bad or very bad health irrespective of age.

Figure 32 – Evolution (2008-2016) of the probability of having at least one ED contact for different subgroups and population groups at risk





1.5.2.2. Regression output

Table 26 reports the average marginal effects of a probit regression of the indicator of having at least one visit to an ED in the past year (value = 1) or no visit (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 26):

- There is a positive time the probability to have one or more ED contacts, indicating a general increase of 3 percentage points in the probability to have one or more ED contacts between 2008 and 2012.
- **Healthcare needs** are clearly associated with the probability to use ED services. Higher probabilities are found for individuals reporting fair, bad or very bad self-assessed health, who are incapacitated to work, who are eligible to the lump sum chronic illness, or who are in the age category 18 to 34 years are associated with higher probability.
    - Age and sex: The probabilty of using ED services is highest in the age category 18 to 34. In comparison to the 18 to 34 year olds, the probability is about 7 to 10 percentage points lower in the age groups 35-79 and 4 percentage points lower among the over-80 year olds. Hence, the regression analysis indicates that while individuals aged 80 or more have a higher probability of going to an ED (see Figure 32, panel F), there is no positive association

anymore when controlling for healthcare needs and a broad range of individual, household and environmental characteristics

- Self-reported health status: There is a gradient in the probability to use ED services by self-assessed health. When correcting for other characteristics, individuals with fair health have a probability to go the ED in the past year that is 4 to 5 percentage points higher than individuals in good and very good self-assessed health, while individuals with bad or very bad health have a 5 to 9 percentage points higher probability. No association is found between the probability to use ED services and the presence of a chronic disorder or limitations to daily activities
- Administrative health information: Being incapacity to work is strongly associated with the probability of visiting the ED (increase of 10 to 15 percentage points). This should not be surprising as the incident causing the incapacity may well result in an ED contact. Individuals who are eligible to the lump sum chronic illness have a 6 to 7 percentage points higher probability to use ED services.
- Medication use: There are some assiciation between the probability to have at least one ED contact and the presence of specific disorders (as defined on the use of prescribed medication). There is an increase in probability in the range of 0 to 9 percentage points, with quite some variation between years and disorders. The strongest association is found for chronic obstructive pulmonary disease (COPD), thrombosis and epilepsy.
- There was no effect on the probability to have an ED contact by membership of a community health centre.

- There is some variation in the probability to use ED services by **socioeconomic profile**, in particular lower probabilities for individuals with tertiary education and higher probabilities for individuals with material deprivation and single parents.
  - Education degree: There is a systematic lower probability (3 to 6 percentage points) to use ED services by individuals with a degree in tertiary education. There is no clear gradient for the other levels of educational attainment.
  - Activity status: there is no systematic association between the probability to use ED servcies and activity status. There are, however, small, year-specific significant effects.
  - Income level and material deprivation: Individuals who are materially deprived have a higher probability to use ED services. We find no association between equivalized household income and the probability to have an ED contact.
  - Household composition: Higher probabilities are observed for individuals in single parent households.
- After correcting for healthcare needs, there is no effect of increased reimbursement status on the probability to use ED services.
- The further individuals live from a hospital site with an emergency department, the lower the probability to have one or more ED contacts.
- The probability to have one or more ED contacts is about 3 to 5 percentage points higher for individuals living in Wallonia compared to individuals living in Flanders; in Brussels, there was a 5 percentage points higher probability in 2008, compared to Flanders. There is a small effect of urbanisation, with a lower probability to have an ED contact for individuals living in moderately urbanized regions.

Table 26 – Regression output for having an ED contact in the past year (Y/N), average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	0.006	(0.011)	0.006	(0.011)	0.014	(0.014)	0.006	(0.015)	-0.006	(0.015)
Male aged 35-49 years	-0.038	(0.011)***	-0.038	(0.011)***	-0.022	(0.014)	-0.045	(0.016)**	-0.034	(0.016)*
Female aged 35-49 years	-0.066	(0.009)***	-0.067	(0.009)***	-0.087	(0.015)***	-0.061	(0.016)***	-0.041	(0.017)*
Male aged 50-64 years	-0.083	(0.010)***	-0.084	(0.010)***	-0.068	(0.016)***	-0.090	(0.018)***	-0.086	(0.018)***
Female aged 50-64 years	-0.077	(0.010)***	-0.078	(0.010)***	-0.073	(0.015)***	-0.075	(0.017)***	-0.076	(0.017)***
Male aged 65-79 years	-0.082	(0.013)***	-0.082	(0.014)***	-0.065	(0.022)**	-0.100	(0.024)***	-0.071	(0.025)**
Female aged 65-79 years	-0.095	(0.012)***	-0.095	(0.012)***	-0.070	(0.021)**	-0.098	(0.023)***	-0.114	(0.023)***
Male aged 80 years or more	-0.047	(0.019)*	-0.045	(0.019)*	-0.066	(0.028)*	-0.041	(0.032)	-0.026	(0.032)
Female aged 80 years or more	-0.046	(0.018)*	-0.043	(0.018)*	-0.037	(0.027)	-0.018	(0.029)	-0.054	(0.031)°
Self-assessed health (reference = very good)										
Self-assessed health - good	0.009	(0.005)*	0.010	(0.005)*	0.004	(0.008)	0.015	(0.009)°	0.013	(0.010)
Self-assessed health - fair	0.041	(0.009)***	0.045	(0.008)***	0.041	(0.012)***	0.049	(0.013)***	0.043	(0.014)**
Self-assessed health - bad	0.076	(0.013)***	0.079	(0.011)***	0.068	(0.015)***	0.090	(0.016)***	0.061	(0.017)***
Self-assessed health - very bad	0.083	(0.021)***	0.085	(0.020)***	0.045	(0.024)°	0.093	(0.031)**	0.090	(0.028)**
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.022	(0.011)*								
Chronic disorder, no limitations	0.005	(0.009)								
Chronic disorder, limitations	0.005	(0.008)								
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	-0.009	(0.011)								
Incapacity to work	0.164	(0.014)***	0.165	(0.014)***	0.104	(0.013)***	0.128	(0.016)***	0.149	(0.017)***
Entitled to lump sum chronic illness	0.076	(0.012)***	0.074	(0.012)***	0.062	(0.014)***	0.063	(0.018)***	0.072	(0.015)***
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.028	(0.017)	0.026	(0.017)	0.025	(0.023)	0.056	(0.028)*	0.002	(0.026)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Medication use - other disorder	0.010	(0.021)								
Medication use - cardiovascular disorder	0.015	(0.006)*	0.014	(0.006)*	0.011	(0.008)	0.002	(0.011)	0.028	(0.010)**
Medication use - thrombosis	0.046	(0.009)***	0.045	(0.009)***	0.057	(0.013)***	0.043	(0.014)**	0.032	(0.013)*
Medication use - chronic obstructive pulmonary disease (COPD)	0.051	(0.013)***	0.054	(0.013)***	0.015	(0.017)	0.027	(0.020)	0.092	(0.019)***
Medication use - asthma	0.016	(0.015)								
Medication use - diabetes	-0.007	(0.009)								
Medication use - epilepsy	0.057	(0.018)**	0.057	(0.018)**	0.075	(0.025)**	0.069	(0.028)*	0.013	(0.026)
Medication use - thyroid disorder	-0.001	(0.009)								
Community health centre										
Registered in community health centre	0.013	(0.015)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	0.039	(0.007)***	0.040	(0.006)***	0.030	(0.008)***	0.031	(0.010)**	0.054	(0.010)***
Region of residence - Brussels	0.012	(0.018)	0.021	(0.009)*	0.051	(0.012)***	-0.007	(0.014)	0.025	(0.014)°
Urbanization - medium	-0.015	(0.007)*	-0.016	(0.007)*	0.000	(0.010)	-0.023	(0.011)*	-0.023	(0.010)*
Urbanization - thin	-0.002	(0.010)	-0.005	(0.010)	0.013	(0.012)	-0.003	(0.016)	-0.021	(0.013)
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.016	(0.008)*	-0.015	(0.008)*	-0.025	(0.012)*	-0.013	(0.015)	-0.010	(0.016)
Occupation - inactive	-0.002	(0.010)	-0.001	(0.009)	0.009	(0.014)	-0.017	(0.015)	0.007	(0.015)
Occupation - self-employed in 2008	0.003	(0.016)	0.004	(0.016)	-0.002	(0.014)				
Occupation - self-employed in 2012	-0.013	(0.017)	-0.012	(0.017)			-0.011	(0.019)		
Occupation - self-employed in 2016	0.032	(0.018)°	0.034	(0.018)°					0.037	(0.018)*
Occupation - unemployed	-0.021	(0.010)*	-0.019	(0.010)*	-0.003	(0.014)	-0.036	(0.017)*	-0.015	(0.020)
Occupation - student	-0.014	(0.010)	-0.013	(0.010)	-0.034	(0.017)*	-0.001	(0.018)	-0.009	(0.018)
Occupation - retired	0.017	(0.011)	0.018	(0.011)°	0.007	(0.015)	0.022	(0.017)	0.025	(0.019)
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	0.037	(0.008)***	0.038	(0.008)***	0.057	(0.012)***	0.033	(0.014)*	0.030	(0.015)*

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Education degree - lower secondary	0.043	(0.006)***	0.044	(0.006)***	0.043	(0.009)***	0.043	(0.012)***	0.050	(0.012)***
Education degree - upper secondary	0.033	(0.006)***	0.033	(0.006)***	0.041	(0.009)***	0.026	(0.010)*	0.039	(0.010)***
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	-0.006	(0.006)								
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	0.081	(0.021)***	0.089	(0.021)***	0.044	(0.028)	0.122	(0.037)**	0.098	(0.035)**
Household composition (reference = couple without children)										
Household composition - single without children	0.010	(0.007)	0.011	(0.007)	-0.005	(0.010)	0.024	(0.013)°	0.011	(0.012)
Household composition - single with children	0.041	(0.013)**	0.043	(0.013)**	0.035	(0.017)*	0.055	(0.020)**	0.031	(0.021)
Household composition - couple with children	0.010	(0.007)	0.010	(0.007)	0.022	(0.011)*	0.001	(0.011)	0.008	(0.012)
Household composition - other	0.003	(0.007)	0.003	(0.007)	0.009	(0.011)	-0.005	(0.013)	0.004	(0.013)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	0.011	(0.008)	0.013	(0.008)°	-0.013	(0.012)	0.032	(0.013)*	0.013	(0.012)
Insurance status										
Insurance - increased reimbursement in 2008	0.008	(0.012)	0.011	(0.011)	0.013	(0.011)				
Insurance - increased reimbursement in 2012	0.006	(0.011)	0.008	(0.011)			-0.001	(0.012)		
Insurance - increased reimbursement in 2016	0.009	(0.010)	0.010	(0.010)					0.012	(0.012)
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	-0.001	(0.001)°								
Density of GPs in neighbouring municipalities	0.003	(0.002)								
Density of specialists in municipality	0.000	(0.000)								
Density of specialists in neighbouring municipalities	-0.000	(0.000)								
Distance to nearest ED	-0.001	(0.001)*	-0.002	(0.001)**	-0.002	(0.001)°	-0.001	(0.001)	-0.002	(0.001)*
Number of EDs within 10km radius	0.001	(0.001)								
Time (reference = 2008)										
Time: year 2012	0.030	(0.006)***	0.030	(0.006)***						

Independent variables	Full model (Obs. = 31 473)	Reduced model (Obs. = 31 473)	Reduced model 2008 (Obs. = 10 847)	Reduced model 2012 (Obs. = 10 349)	Reduced model 2016 (Obs. = 10 277)
Time: year 2016	0.039 (0.006)***	0.038 (0.006)***			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.5.2.3. Overview inequity and evolution in the different scenarios

Figure 33 visualizes the absolute Gini coefficient for inequality in the probability of at least one ED contact in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of at least one ED contact in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 33, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe an increase in inequity in the probability of having an ED contact in the past year. Hence, we find that the disparity between individuals in the probability of going at least once to an ED in the past year that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 27 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not going to an ED in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test. Based on the trends, we conclude that there was a growing inequity over time in the probability of having one or more ED contacts.

Figure 33 – Evolution of absolute Gini index by scenario

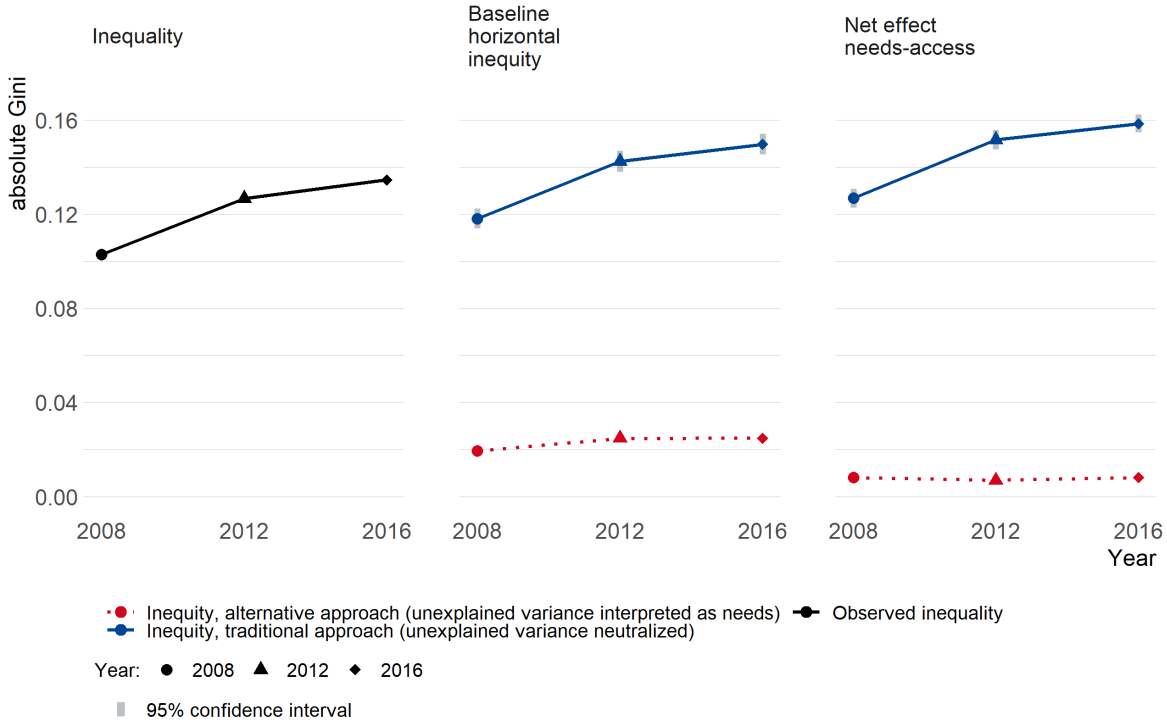


Table 27 – Evolution (2008-2016) of inequity in the probability of ED contacts for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity (traditional approach)	Absolute	0.118	0.143^	0.150^	↑
	Relative	0.824	0.798	0.788	→
	Reversed relative	0.133	0.167^	0.178^*	↑
Net effect needs-access (traditional approach)	Absolute	0.127	0.152^	0.159^	↑
	Relative	0.795	0.766	0.760	→
	Reversed relative	0.143	0.177^	0.187^*	↑
Baseline-residual (alternative approach)	Absolute	0.019	0.025^	0.025^	↑
	Relative	0.167	0.166	0.155^*	↓
	Reversed relative	0.022	0.029^	0.030^	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.5.2.4. Overview inequity over time for different population subgroups

Figure 34 and Figure 35 show how the probability to go to an ED in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. When analysing inequity, a correction is made for healthcare needs and preferences according to the different inequity-scenarios, both for the average population and subgroup value. In Figure 34, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 35, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability of going to an ED than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 34 and Figure 35, we find that disparities are less pronounced once a correction is made for healthcare needs, i.e. the deviations from the population average are lower in the inequity scenario compared to inequality. This is especially true for subgroups based on age and self-assessed health. Moreover, when applying a broader definition of healthcare needs (net effect needs-access scenario), nearly all inequities between population subgroups disappear.

A first conclusion is that we find gradients in the probability to use ED services by educational attainment, income and self-assessed health, with probabilities above [below] the population average (inequality scenario as well as baseline inequity scenario) for individuals with lower [higher] educational attainment and income. Moreover, higher probabilities are found for individuals with worse self-reported health. In addition, we find that the gap relative to the population mean increase for individuals at risk of poverty and in particular for households with children at risk of poverty.

Second, other individuals with higher care needs (over-80 year olds, individuals with invalidity/disability, individuals with chronic disorder and limitations to daily activities) also have higher probabilities in both the inequality and baseline inequity scenario.

Third, other individuals in financially vulnerable situations (individuals with increased reimbursement, individuals in households that are at risk of poverty and/or materially deprived) also have higher probabilities in both the inequality and baseline inequity scenario. The probability of ED use increases with the intensity of material deprivation.

Fourth, the reason that we find above-average probabilities for individuals with higher care needs, even after controlling for health status (baseline inequity scenario) is related to the strong association between the probability to use ED services and specific socioeconomic features (such as educational attainment and sever material deprivation). This becomes clear when comparing the different scenarios: the positive gap relative to the population mean disappears in the net effect needs-access scenario which more broadly neutralize the effects of socioeconomic characteristics (as proxy for healthcare needs); this in contrast to the baseline-residual scenario where the positive gap remains.

Finally, a higher probability of ED use is also observed for adults in single parent households and in households with children at risk of poverty. Especially the latter group shows an important increase in probability of going to an ED over time that cannot be explained by (observed) healthcare needs.

Figure 34 – Deviation in needs-corrected probability of ED contacts from population average for subgroups based on income, education and self-assessed health, by scenario and year

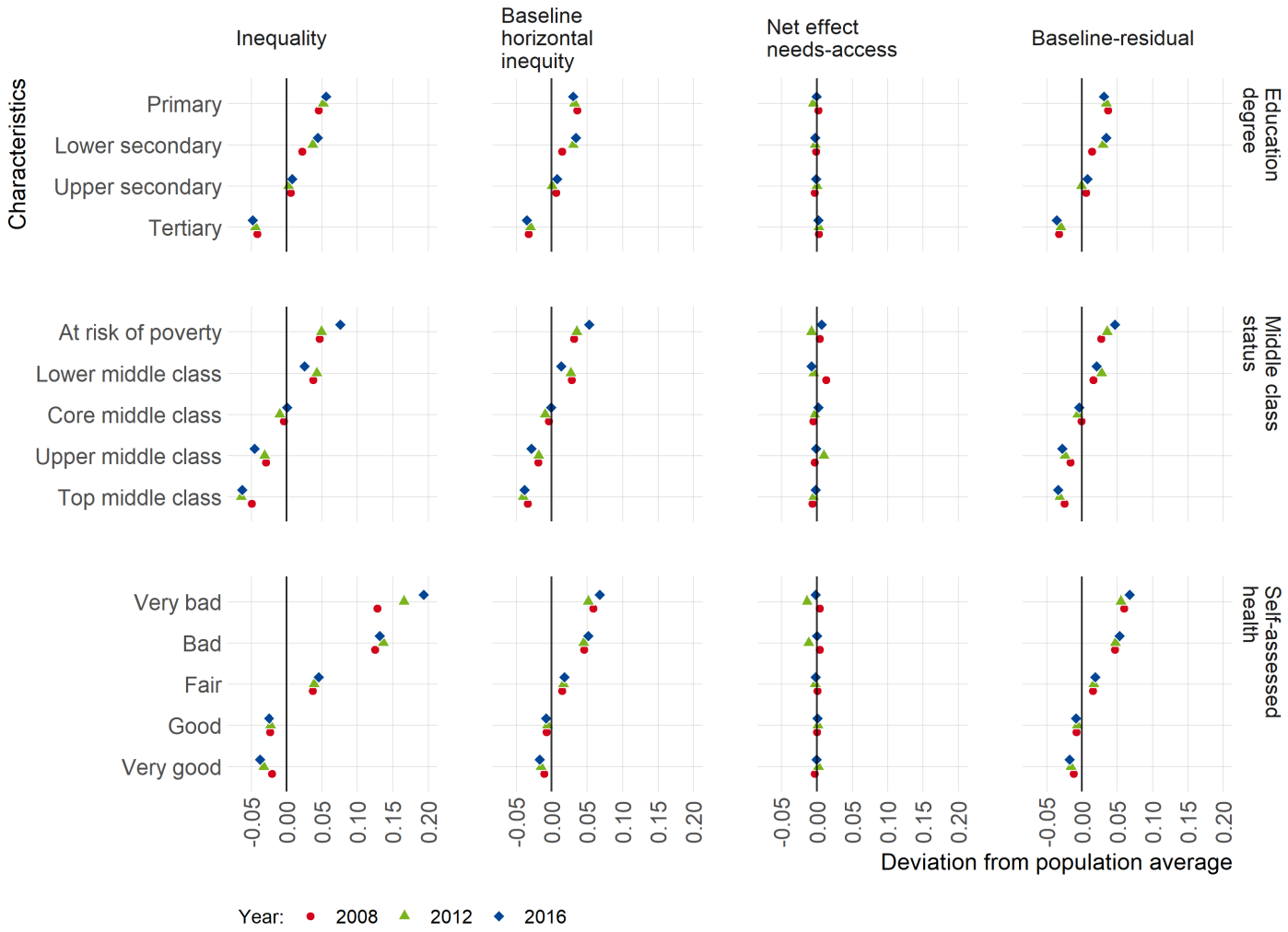


Figure 35 – Deviation in needs-corrected probability of ED contacts from population average for specific vulnerable subgroups, by scenario and year

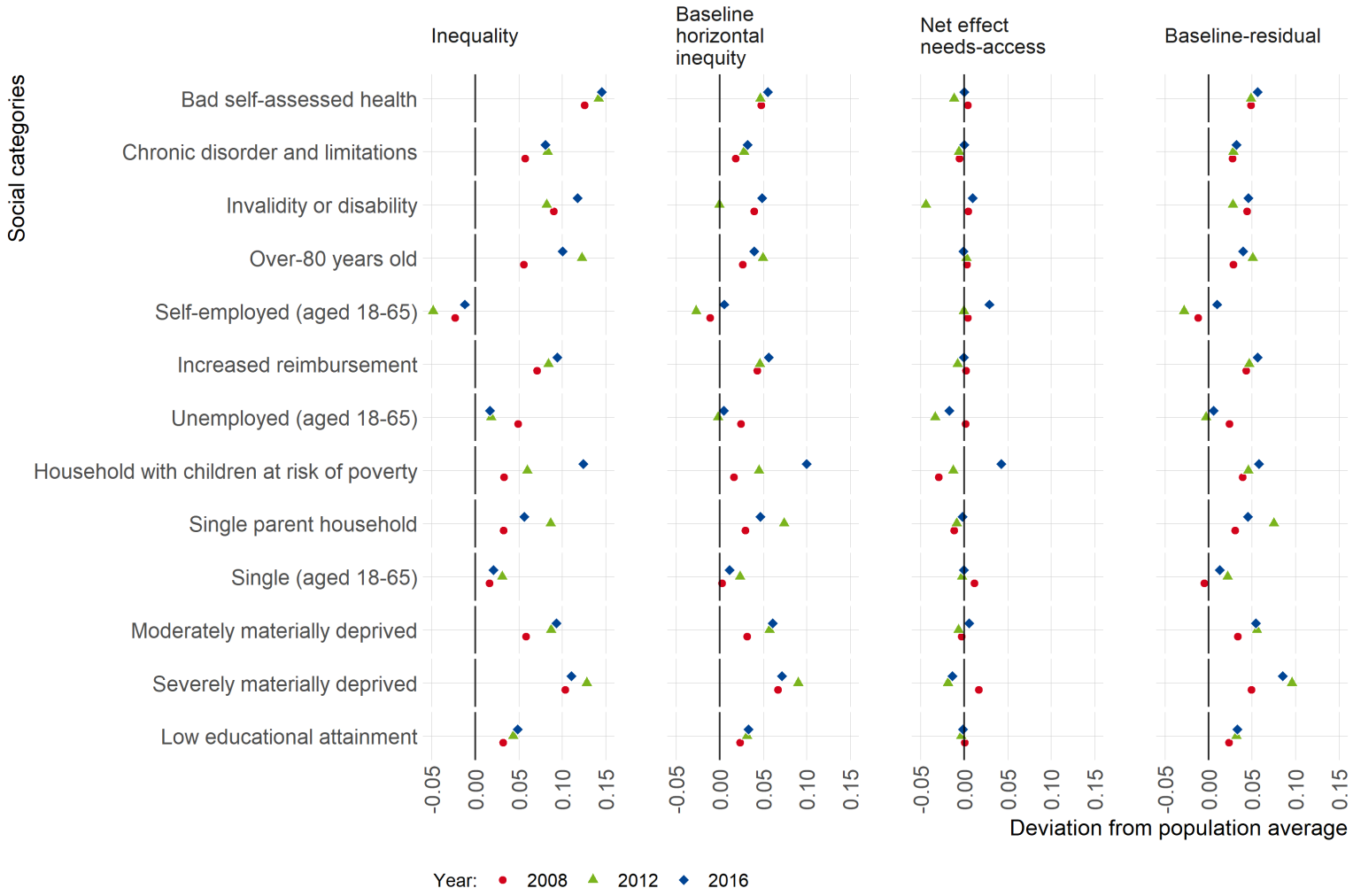
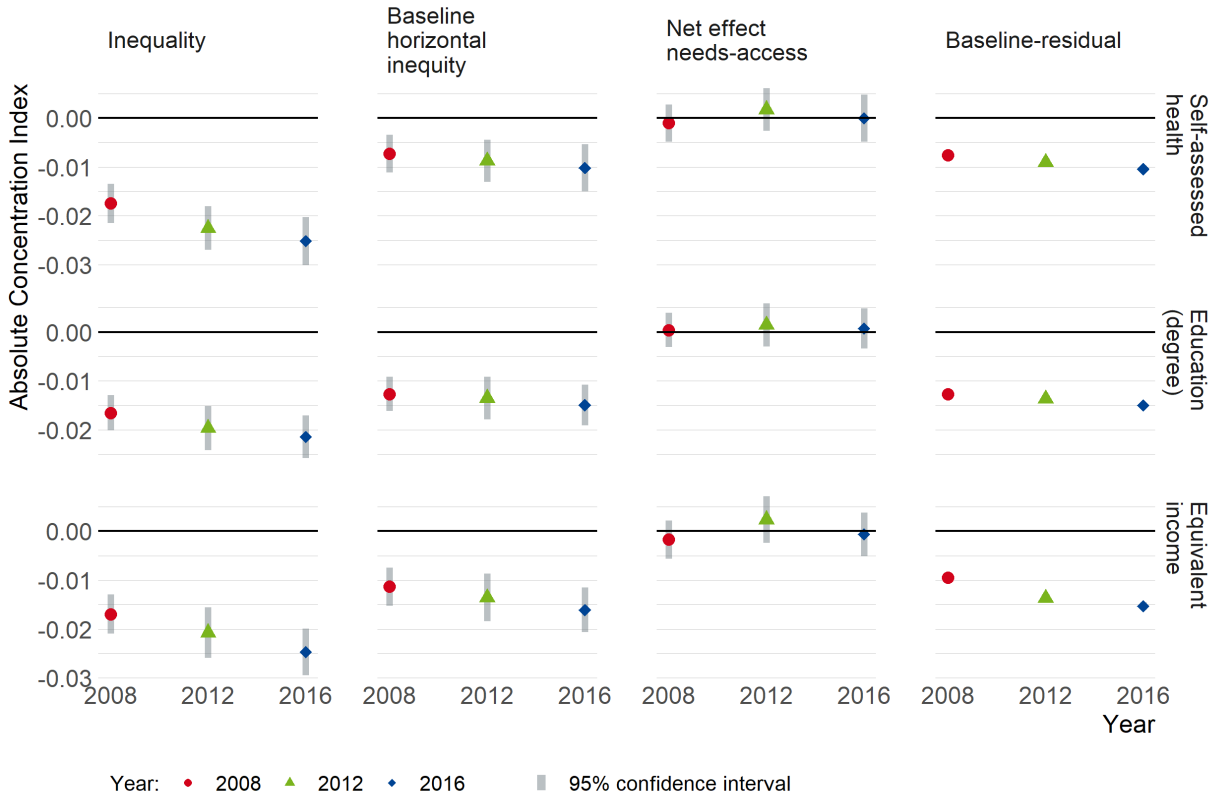


Figure 36 shows the absolute concentration index of the needs-corrected probability to have an ED contact to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of going to an ED concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 36 confirm again that individuals with worse self-assessed health, lower educational attainment and lower income have higher probabilities of going to an ED. The socioeconomic inequalities are partly mitigated when correcting for healthcare needs, nonetheless disparities remain in the baseline inequity scenario and the baseline-residual scenario. No socioeconomic disparities are found in the net effect needs-access scenario, the scenarios that more broadly neutralize the effects of socioeconomic characteristics (as proxy for healthcare needs).

Figure 36 – Evolution (2008-2016) of absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.5.3. Conditional number of ED contacts in the past year

1.5.3.1. Evolution over time for the population and population subgroups

Table 28 and Figure 37 show the evolution over time of the number of ED contacts in the past year for individuals with at least one contact. There was no information in the KCE HSPA report of 2019 on the population average number of ED contacts that can be used as benchmark, hence only the number of ED contacts in the EU-SILC/IMA-AIM sample is reported.[18] Table 25 and Figure 32 showed that the probability of having at least one ED contact increased over time; Table 28 and Figure 37 additionally indicate that conditional on going at least once to an ED in the past year, the average number of contacts per individual has also increased over time from 1.29 contacts on average in 2008 to 1.38 contacts in 2016. The value is similar when restricting the sample to the adult population.

Table 28 – Evolution (2008-2016) of the number of ED contacts in the past year given at least one contact

Sample	2008	2012	2016
Survey (all)	1.29	1.33	1.38
Survey (18+)	1.28	1.32	1.36

Figure 37 shows the evolution of the number of ED contacts conditional on having at least one contact, for a variety of population subgroups (see section 1.1.2).

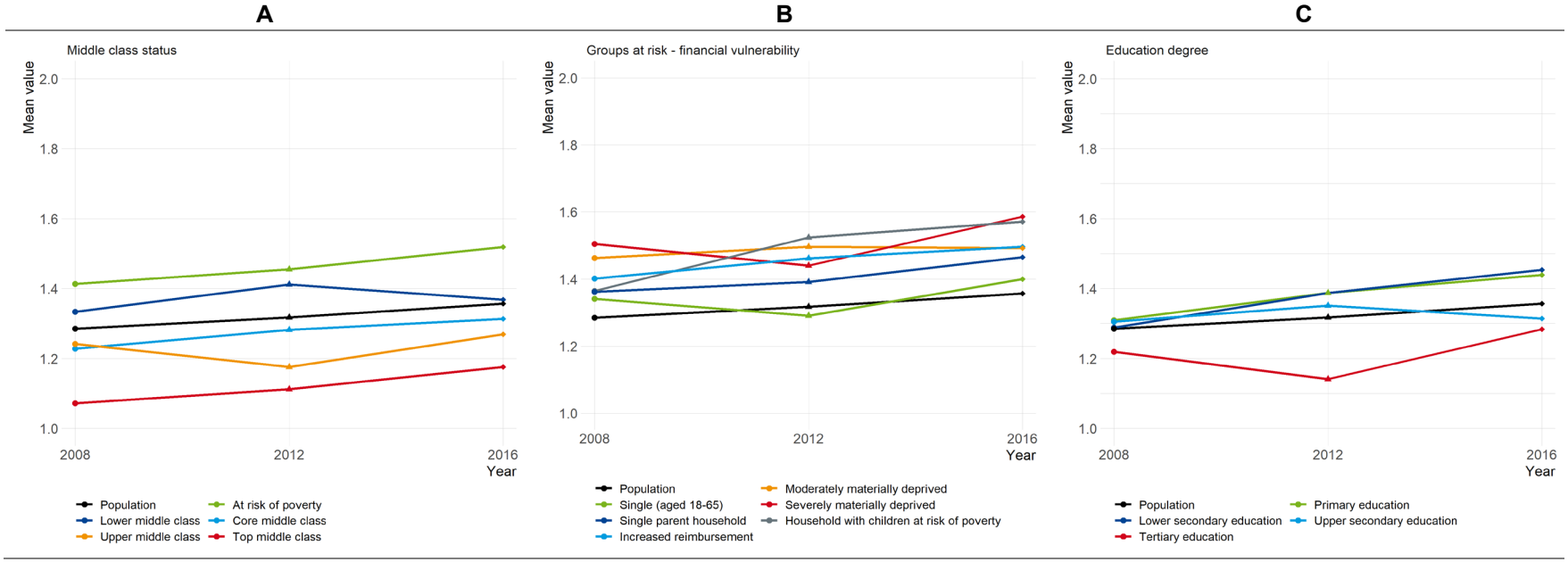
We find that for most population groups the 2016 number of ED contacts is slightly higher or similar compared to the 2008 value, with again the subgroup of unemployed individuals as an exception with a clear decreasing trend from one of the highest number of contacts in 2008 relative to other population subgroups to an average slightly above the population average in 2016 (see panel D). The population groups which have a higher probability of going to an ED (Figure 32) generally also have a higher number of ED contacts. A higher number of ED contacts is observed for individuals with (very) bad self-assessed health (panel E), individuals at risk of poverty (panel A) and material deprivation (panel B), individuals with low educational attainment (panel D) and individuals in households with children at risk of poverty (panel B). Individuals aged 80 or more had a higher probability of going to an ED, but do not have a higher number of ED contacts on average (panel F).

In addition, we have the following findings:

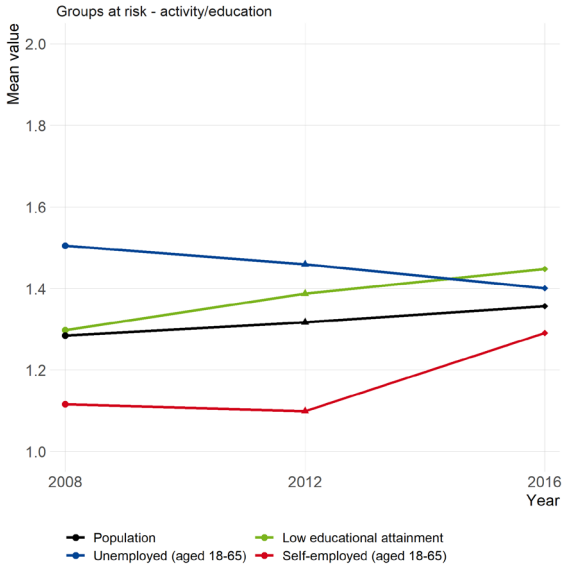
- Panel A: Individuals at risk of poverty and in the lower middle class have a higher number of ED contacts than the population average. While their trend is similar between 2008 and 2012, they seem to diverge between 2012 and 2016. Higher income groups have a below average number of ED contacts.
- Panel B: Individuals with material deprivation, with increased reimbursement status or in households with children at risk of poverty have a similar average number of ED contacts, clearly above the population average. Moreover, adult individuals in households at risk of poverty with children show one of the largest increases over time in the number of ED contacts. This group also had the strongest upward trend in the probability of going to an ED. Individuals in single parent households have a number of ED contacts above the population average, while adult singles have a probability in line with the population average.
- Panel C: Individuals with low educational attainment have more ED contacts than the population average, while individuals with tertiary education have fewer contacts.
- Panel D: With respect to labour market position, there is a downward trend in ED contacts for the unemployed, which is in contrast with the upward or stable trend for other population subgroups. A lower, but increasing trend is observed for the self-employed.
- Panel E and F: Very bad, bad and fair self- assessed health, invalidity/disability and the presence of a chronic disorder and limitation to daily activities are associated with an average number of ED contacts above the population average, whereas individuals with good or very good health have fewer ED contacts than the population average0 The

over-80 year olds have a conditional number of contacts in line with the population average.

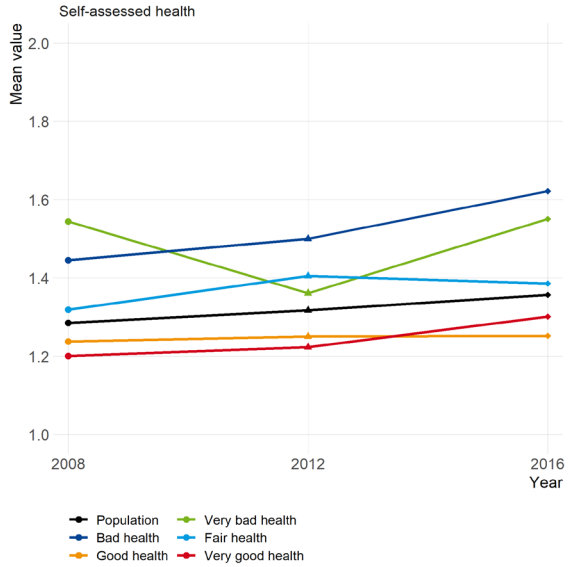
Figure 37 – Evolution (2008-2016) of the number of ED contacts given at least one contact, for different subgroups and population groups at risk



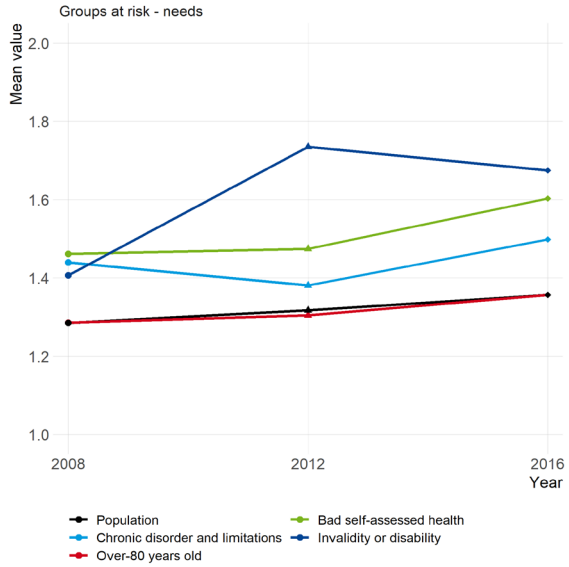
D


Groups at risk - activity/education
Mean value
2.0
1.8
1.6
1.4
1.2
1.0
2008
2012
2016
Year
Population
Unemployed (aged 18-65)
Low educational attainment
Self-employed (aged 18-65)

E


Self-assessed health
Mean value
2.0
1.8
1.6
1.4
1.2
1.0
2008
2012
2016
Year
Population
Bad health
Good health
Very bad health
Fair health
Very good health

F


Groups at risk - needs
Mean value
2.0
1.8
1.6
1.4
1.2
1.0
2008
2012
2016
Year
Population
Chronic disorder and limitations
Over-80 years old
Bad self-assessed health
Invalidity or disability

1.5.3.2. Regression output

Table 29 reports the average marginal effects of a generalized negative binomial count model[d] for the sample of individuals with at least one ED contact (see section 1.1.3). The results should be interpreted as a change in number of contacts expressed in contacts.

There are few significant associations in the regression analysis, especially in the year specific models. This is at least partly related to the small sample size (n = 1 275 / 1 495 / 1 632), but might also indicate relatively little variation in number of ED contacts explained by the characteristics in the model. In fact most individuals go only once to the ED in the past year. We find the following associations:

- **Healthcare needs** are associated with the number of inpatient hospitalizations.
  - Individuals aged 50 or more have 0.10 to 0.18 fewer ED contacts on average (reduced pooled model). There are no systematic differences by sex.
  - There is some variation by self-reported health status, with an additional number of 0.05 to 0.21 hospitalizations for individuals reporting fair, bad or very bad health.
  - Administrative health information: The strongest associations are found for being incapacitated for work and eligibility for the lump sum chronic illness, with an increase of 0.13 to 0.28 and 0.18 to 0.36 contacts, respectively.
  - The presence of a specific disorder, identified through medication use, only has a limited impact on the number of ED contacts.
- There is some variation in the conditional number of inpatient hospitalizations by **socioeconomic profile**.
  - No association is found between the conditional number of ED contacts and obtained education degree.
  - Activity status: Self-employed individuals have a lower number of ED contacts in 2008 and 2012 (only significant in the pooled model).
  - Income and material deprivation: The number of ED contacts is higher for individuals with lower income or with material deprivation.
- No difference in the conditional number of ED contacts is found by **increased reimbursement** status.
- We find a higher number of ED contacts when the distance to a hospital site with ED decreases or the density of specialists in the neighbouring municipalities is higher. On the other hand, there is a minor indication in 2016 that a higher density of GPs in the neighbouring municipalities is associated with a lower number of ED contacts.
- Individuals living in moderately urbanized regions have fewer ED contacts. No regional differences are found with respect to the number of ED contacts.

[d] A truncated negative binomial model was the preferred choice, but did not converge.

Table 29 – Regression output for the conditional number of ED contacts, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 4 402)	Reduced model (Obs. = 4 402)	Reduced model 2008 (Obs. = 1 275)	Reduced model 2012 (Obs. = 1 495)	Reduced model 2016 (Obs. = 1 632)
Age and Sex (reference = female aged 18-34 years)					
Male aged 18-34 years	-0.031 (0.078)	-0.003 (0.053)	0.151 (1.966)	-0.128 (0.344)	0.020 (0.073)
Male aged 35-49 years	-0.128 (0.084)	-0.090 (0.054)°	0.018 (4.941)	-0.027 (0.471)	-0.147 (0.083)°
Female aged 35-49 years	-0.083 (0.071)	-0.014 (0.058)	0.090 (1.174)	-0.040 (0.229)	-0.010 (0.078)
Male aged 50-64 years	-0.190 (0.094)*	-0.129 (0.066)*	-0.102 (1.327)	-0.047 (0.124)	-0.188 (0.122)
Female aged 50-64 years	-0.228 (0.092)*	-0.140 (0.053)**	0.063 (0.816)	-0.003 (0.430)	-0.336 (0.087)***
Male aged 65-79 years	-0.183 (0.116)	-0.098 (0.092)	0.069 (0.890)	-0.218 (0.674)	-0.209 (0.165)
Female aged 65-79 years	-0.220 (0.099)*	-0.175 (0.074)*	0.070 (3.745)	-0.373 (0.321)	-0.388 (0.170)*
Male aged 80 years or more	-0.254 (0.111)*	-0.176 (0.092)°	0.079 (3.005)	-0.351 (1.007)	-0.289 (0.180)
Female aged 80 years or more	-0.187 (0.122)	-0.135 (0.097)	0.028 (0.358)	-0.209 (0.409)	-0.233 (0.178)
Self-assessed health (reference = very good)					
Self-assessed health - good	0.017 (0.046)	0.002 (0.031)	0.082 (1.062)	-0.020 (0.130)	-0.070 (0.066)
Self-assessed health - fair	0.147 (0.055)**	0.110 (0.042)**	0.048 (0.629)	0.212 (0.290)	0.071 (0.079)
Self-assessed health - bad	0.219 (0.086)*	0.166 (0.054)**	0.087 (1.133)	0.209 (0.449)	0.176 (0.081)*
Self-assessed health - very bad	0.134 (0.096)	0.092 (0.073)	0.100 (1.293)	0.060 (0.504)	0.153 (0.109)
Self-reported chronic disorders and limitations daily activities (reference = none)					
No chronic disorder, limitations	0.040 (0.086)				
Chronic disorder, no limitations	0.130 (0.082)				
Chronic disorder, limitations	-0.054 (0.051)				
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)					
Invalid or disabled	0.055 (0.066)				
Incapacity to work	0.144 (0.075)°	0.174 (0.063)**	0.131 (0.803)	0.279 (0.126)*	0.098 (0.066)
Entitled to lump sum chronic illness	0.325 (0.093)***	0.297 (0.064)***	0.235 (3.056)	0.176 (0.214)	0.364 (0.064)***
Clinical profile based on medication use (reference = no disorder)					

Independent variables	Full model (Obs. = 4 402)		Reduced model (Obs. = 4 402)		Reduced model 2008 (Obs. = 1 275)		Reduced model 2012 (Obs. = 1 495)		Reduced model 2016 (Obs. = 1 632)	
Medication use - neurological disorder	0.067	(0.066)								
Medication use - other disorder	0.084	(0.130)								
Medication use - cardiovascular disorder	0.035	(0.048)								
Medication use - thrombosis	0.071	(0.052)	0.089	(0.049)°	0.161	(2.086)	-0.052	(0.340)	0.095	(0.061)
Medication use - chronic obstructive pulmonary disease (COPD)	0.063	(0.063)								
Medication use - asthma	0.069	(0.081)	0.195	(0.093)*	0.099	(1.281)	0.081	(0.567)	0.221	(0.090)*
Medication use - diabetes	-0.091	(0.041)*	-0.074	(0.035)*	0.025	(0.322)	-0.171	(0.777)	-0.087	(0.078)
Medication use - epilepsy	-0.036	(0.068)								
Medication use - thyroid disorder	0.114	(0.083)								
Community health centre										
Registered in community health centre	0.048	(0.089)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	0.048	(0.047)								
Region of residence - Brussels	-0.146	(0.117)								
Urbanization - medium	-0.098	(0.038)**	-0.106	(0.036)**	-0.038	(0.492)	-0.069	(0.235)	-0.247	(0.063)***
Urbanization - thin	0.029	(0.063)	0.036	(0.059)	0.145	(1.888)	0.094	(0.148)	-0.113	(0.074)
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.092	(0.050)°	-0.063	(0.039)	-0.077	(1.006)	-0.270	(0.518)	0.020	(0.092)
Occupation - inactive	0.045	(0.064)	0.042	(0.048)	-0.041	(0.537)	-0.032	(0.503)	0.074	(0.089)
Occupation - self-employed in 2008	0.014	(0.250)	-0.145	(0.064)*	-0.056	(2.190)				
Occupation - self-employed in 2012	-0.209	(0.010)***	-0.180	(0.069)**			-0.327	(0.355)		
Occupation - self-employed in 2016	0.096	(0.116)	0.062	(0.096)					0.173	(0.259)
Occupation - unemployed	0.164	(0.090)°	0.032	(0.054)	0.105	(0.422)	-0.045	(0.939)	0.049	(0.111)
Occupation - student	0.008	(0.111)	0.037	(0.062)	0.025	(0.324)	0.122	(0.555)	-0.091	(0.116)
Occupation - retired	0.021	(0.088)	0.003	(0.069)	-0.081	(1.057)	0.193	(0.129)	0.005	(0.143)

Independent variables	Full model (Obs. = 4 402)	Reduced model (Obs. = 4 402)	Reduced model 2008 (Obs. = 1 275)	Reduced model 2012 (Obs. = 1 495)	Reduced model 2016 (Obs. = 1 632)
Highest obtained educational degree (reference = tertiary education)					
Education degree - primary	0.065 (0.049)				
Education degree - lower secondary	0.109 (0.048)*				
Education degree - upper secondary	0.044 (0.049)				
Equivalized disposable household income					
Income (natural logarithm - linear & squared)	-0.088 (0.044)*	-0.081 (0.047)°	-0.055 (1.167)	-0.143 (0.175)	-0.050 (0.068)
Socioeconomic status (reference = not materially deprived)					
Severe material deprivation index	0.140 (0.092)	0.246 (0.092)**	0.324 (4.209)	0.076 (0.178)	0.064 (0.158)
Household composition (reference = couple without children)					
Household composition - single without children	0.066 (0.044)				
Household composition - single with children	0.006 (0.061)				
Household composition - couple with children	0.074 (0.048)				
Household composition - other	0.115 (0.051)*				
Country of birth (reference = Belgium)					
Country of birth other than Belgium	0.014 (0.042)				
Insurance status					
Insurance - increased reimbursement in 2008	-0.023 (0.067)	-0.046 (0.054)	-0.025 (0.329)		
Insurance - increased reimbursement in 2012	0.017 (0.059)	0.023 (0.062)		0.090 (0.182)	
Insurance - increased reimbursement in 2016	-0.054 (0.047)	-0.057 (0.041)			0.004 (0.060)
Healthcare supply (density per 10 000 population, distance in km)					
Density of GPs in municipality	0.001 (0.006)	-0.004 (0.005)	-0.004 (0.051)	-0.026 (0.038)	-0.003 (0.010)
Density of GPs in neighbouring municipalities	-0.019 (0.017)	-0.017 (0.012)	0.005 (0.059)	-0.003 (0.041)	-0.032 (0.019)°
Density of specialists in municipality	-0.003 (0.003)	-0.002 (0.002)	-0.001 (0.011)	-0.002 (0.009)	-0.001 (0.004)
Density of specialists in neighbouring municipalities	0.014 (0.007)*	0.013 (0.004)***	0.008 (0.102)	0.012 (0.021)	0.015 (0.006)**
Distance to nearest ED	-0.007 (0.004)°	-0.007 (0.003)*	-0.013 (1.337)	-0.009 (0.018)	-0.010 (0.005)*

Independent variables	Full model (Obs. = 4 402)	Reduced model (Obs. = 4 402)	Reduced model 2008 (Obs. = 1 275)	Reduced model 2012 (Obs. = 1 495)	Reduced model 2016 (Obs. = 1 632)
Number of EDs within 10km radius	0.012 (0.009)	-0.001 (0.003)	-0.003 (0.160)	0.000 (0.010)	-0.004 (0.005)
Time (reference = 2008)					
Time: year 2012	0.022 (0.046)	-0.003 (0.039)			
Time: year 2016	0.073 (0.060)	0.053 (0.040)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.5.3.3. Overview inequity and evolution in the different scenarios

Figure 38 visualizes the absolute Gini coefficient for inequality in the probability of at least one ED contact in the past year (so without needs correction) as well as inequity in the fairness gap for the conditional number of ED contacts in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 38, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower.

If we follow the traditional approach, we observe an increase in inequity in the number of ED contacts in the past year. Hence, we find that the disparity between individuals in the number of ED contacts that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 30 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Based on the trends, we conclude that there was a growing inequity over time in the number of ED contacts when using the traditional approach, there was an upward and downward trend when using the alternative approach. In the latter case, the inequity values of 2008 and 2016 were not significantly different.

Figure 38 – Evolution of the absolute Gini index by scenario

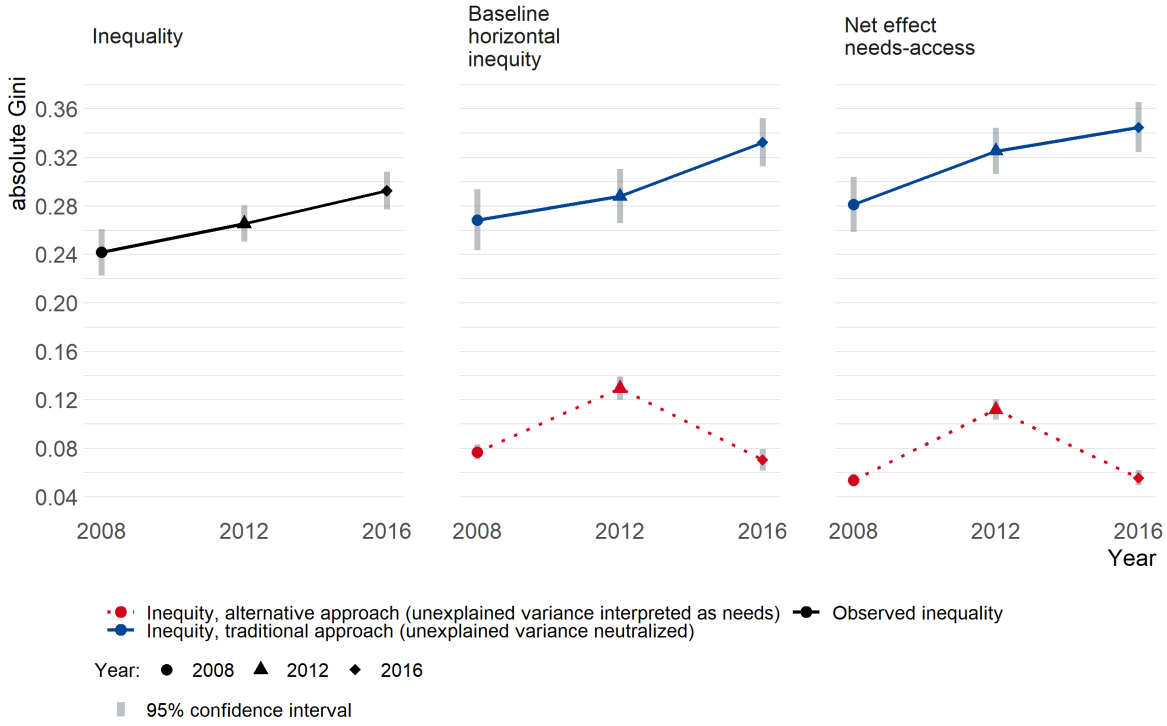


Table 30 – Evolution (2008-2016) of inequity in the number of ED contacts for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity (traditional approach)	Absolute	0.268	0.288	0.332^*	↑
	Relative	0.209	0.218	0.245^	↑
Net effect needs-access (traditional approach)	Absolute	0.281	0.325^	0.345^	↑
	Relative	0.219	0.247	0.254^	↑
Baseline-residual (alternative approach)	Absolute	0.077	0.129^	0.070 *	→
	Relative	0.060	0.098^	0.052 *	→

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.5.3.4. Overview inequity over time for different population subgroups

Figure 39 and Figure 40 show how care use in various population subgroups differs from the population average when looking at inequality as well as inequity. When analysing inequity, a correction is made for healthcare needs and preferences according to the different inequity-scenarios, both for the average population and subgroup value. In Figure 39, population groups are defined based on categories of equivalized income, categories of education degree, and categories of self-assessed health. In Figure 40, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower number of ED contacts than the population average. Values to the right of the vertical line, on the other hand, indicate a higher number of contacts than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 39 and Figure 40, we find that disparities are less pronounced once a correction is made for healthcare needs, i.e. the deviations from the population average are generally lower in the inequity scenario compared to inequality. This is especially true for subgroups based on self-assessed health.

Remark that all effects are small and range between -0.3 and +0.3 ED contacts. Our main findings are:

- Disparities between educational groups are limited both before correction for healthcare need (inequality) as after correcting for needs (inequity).
- Individuals at risk of poverty have a higher number of ED contacts, whereas individuals in the top middle class have a lower number of ED contacts. This effect disappears in the net effect needs-access scenario.
- Individuals in bad and very bad self-reported health have a higher number of ED contacts than the population average (inequality).

However, once we correct for needs, the baseline results show that there are little disparities between categories of self-assessed health. When extending the definition of healthcare needs to socioeconomic characteristics, we find that individuals in very bad health, in fact, have a lower number of ED contacts than could be expected based on their needs profile.

- Among the vulnerable groups, we find that once a correction is made for healthcare needs (baseline scenario), proxies for low income are associated with a higher number of contacts to the ED, i.e. individuals at risk of poverty, individuals in households with children at risk of poverty and individuals living in severe material deprivation (unable to afford at least 4 items out of a list of 9 items). The number of ED contacts for individuals with moderate material deprivation (unable to afford at least 2 items out of a list of 9 items) seems to have evolved towards the population average. A similar effect is found for unemployed individuals whose number of ED contacts in 2008 was higher than could be explained by their (observable) health status. It has, however, evolved towards the population average in 2016. For increased reimbursement, we do not find a higher number of ED contacts. Individuals aged 80 or more seem to have a slightly lower number of ED contacts than one would expect based on their health status (baseline scenario).
- We find that in the baseline-residual scenario, an important number of vulnerable groups have a higher number of contacts than the population average, but generally, the 2016 value has a smaller deviation from the population average as the 2008 and 2012 value.

Figure 39 – Deviation in needs-corrected number of ED contacts from population average for subgroups based on income, education and self-assessed health, by scenario and year

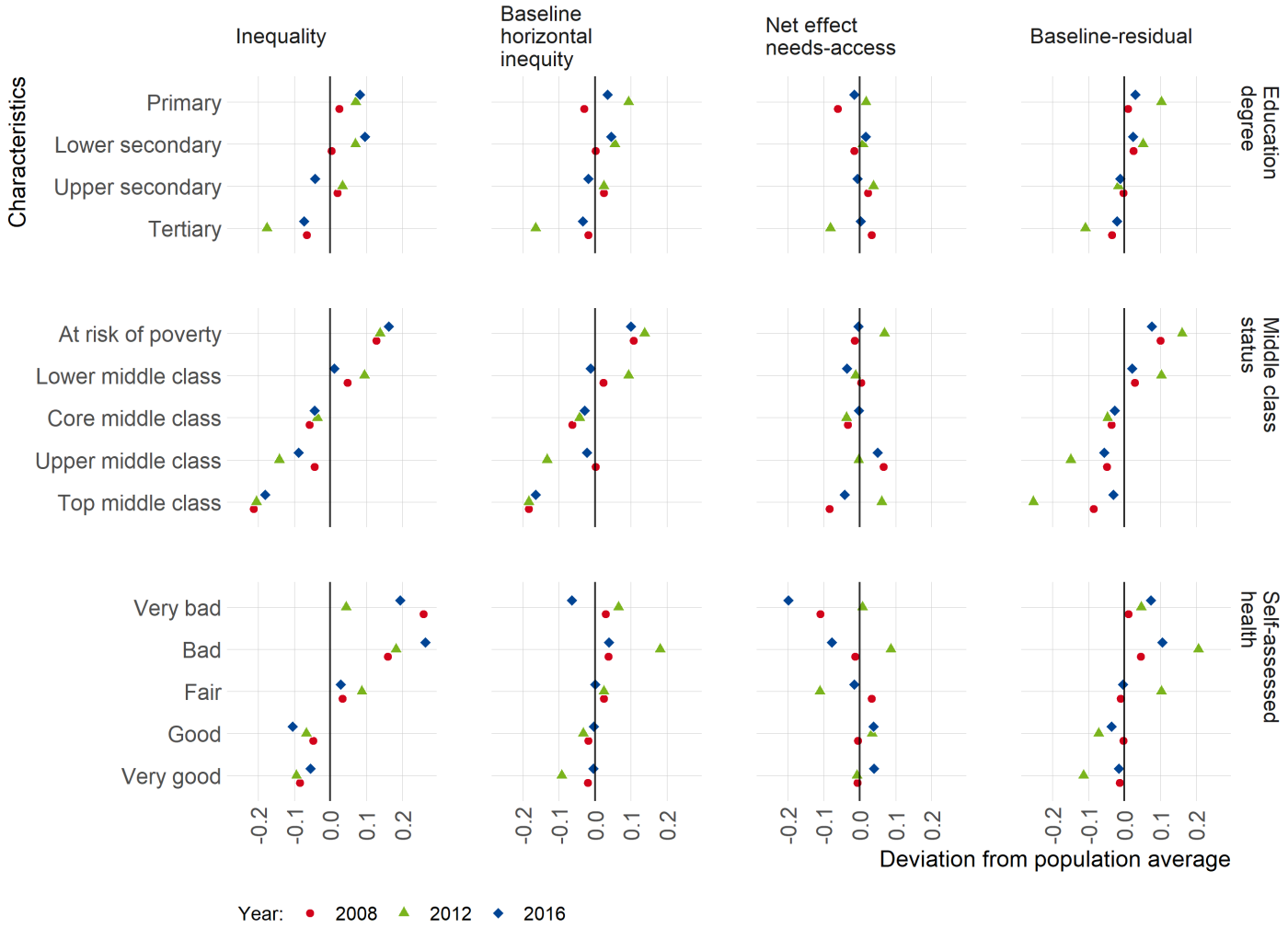


Figure 40 – Deviation in needs-corrected number of ED contacts from population average for specific vulnerable subgroups, by scenario and year

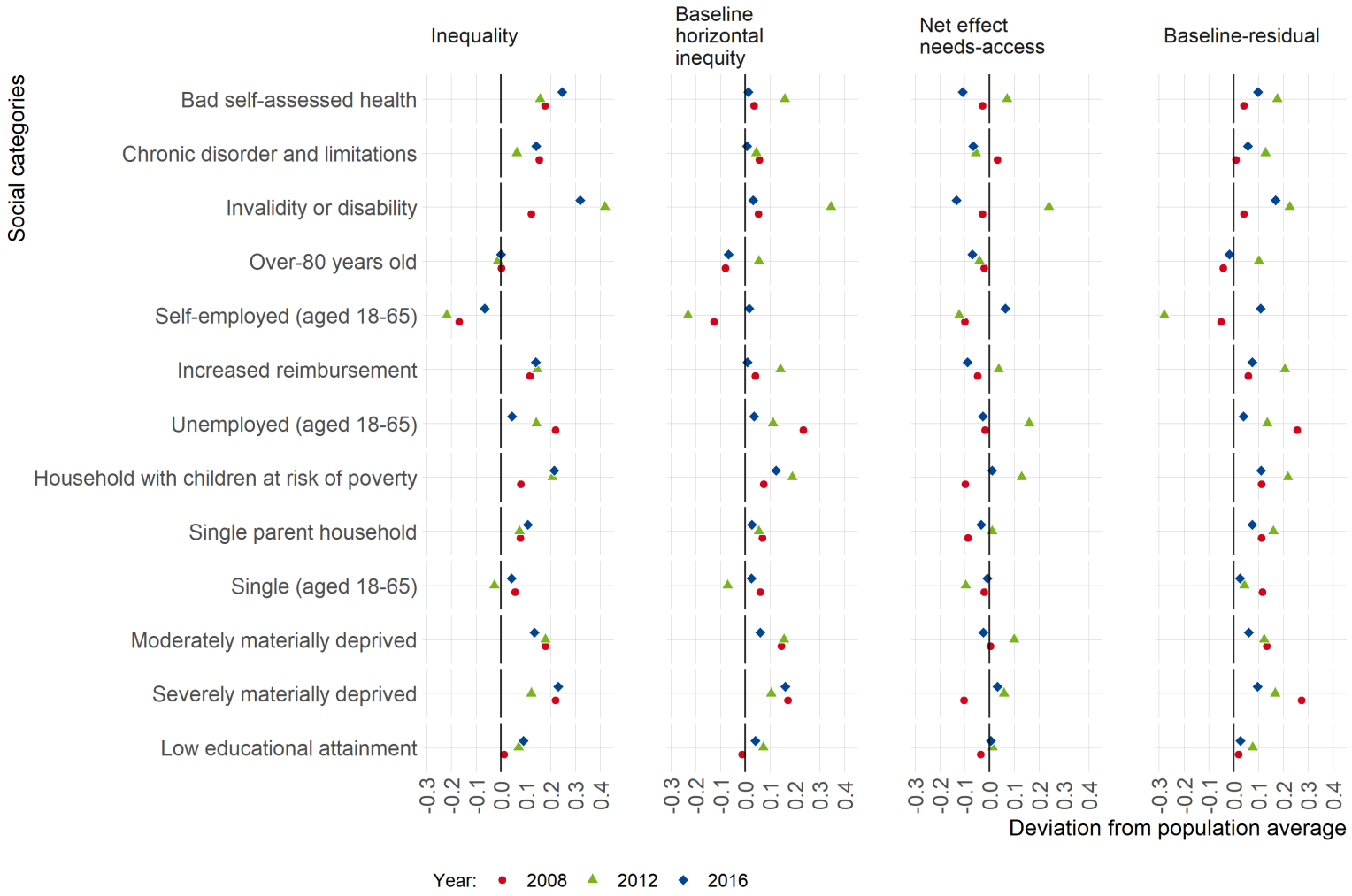
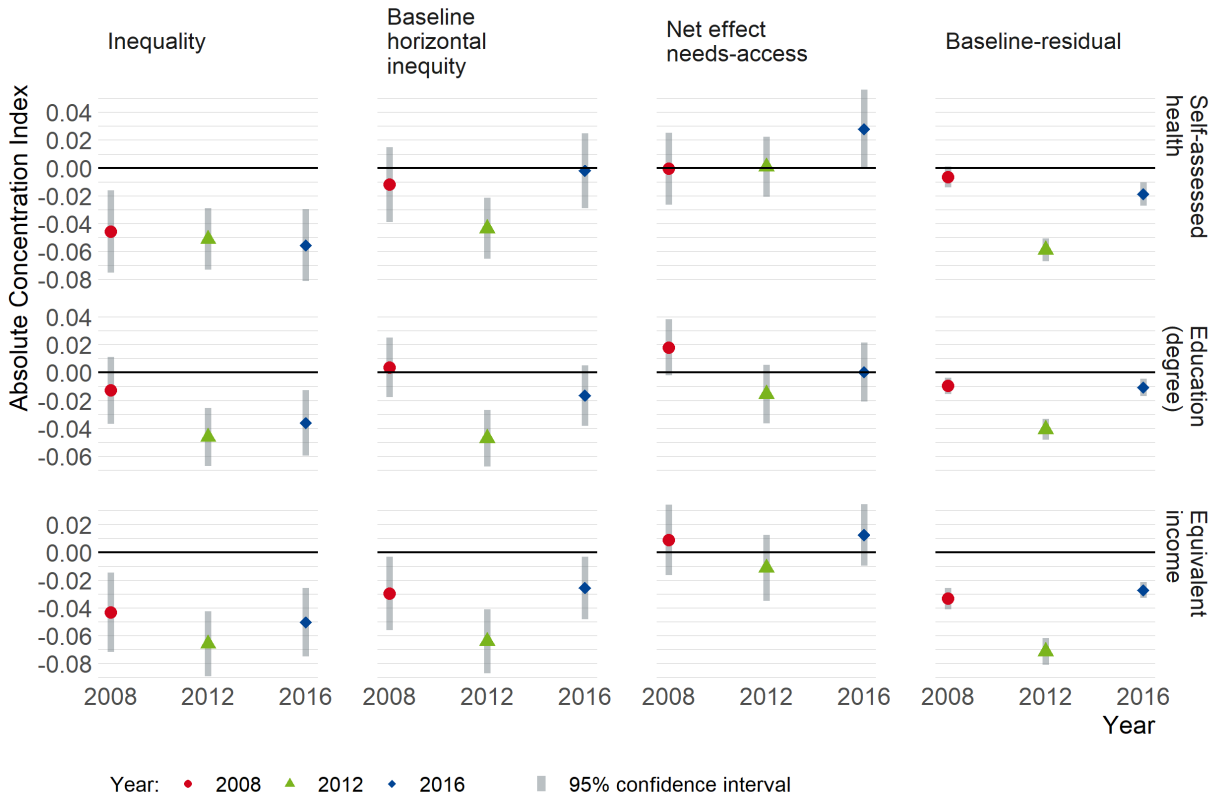


Figure 41 shows the absolute concentration index of the needs-corrected number of ED contacts to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher needs-corrected number of ED contacts concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher needs-corrected number of ED contacts for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 41 reveal systematic inequalities in the number of ED contacts by income and self-assessed health and to a lesser extent for education (inequality). After correcting for healthcare needs, significant disparities only persist with respect to income, indicating a higher number of ED contacts among individuals with lower income (baseline scenario). No socioeconomic disparities are found in the net effect needs-access scenario, that more broadly neutralize the effects of socioeconomic characteristics (as proxy for healthcare needs).

Figure 41 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.6. Inpatient admissions

1.6.1. Summary

We analyse inequity in inpatient admissions over the past 12 months. Two types of utilisation are examined consecutively, the probability of an admission and the number of admissions given at least one admission. The key points are summarized in the box below.

Inpatient admissions are defined as a hospital stay (it has received a stay_nr in IMA-AIM GZSS database), classified as an inpatient admission or as revalidation care (variable stay_cat in IMA-AIM HOSP database equals ("ADM, "JF", "SP")).

Key points inequity in inpatient admissions in the past year

- About 10% of the population had an inpatient admission in the past year; about 20% to 40% among higher care groups. The average annual number of admissions (among those with at least one admission) has remained stable at about 1.4 among the survey sample (18+); 75% of the individuals had only one admission.

Probability to have an inpatient admission

- Strong association with healthcare needs and only to a limited extent with socioeconomic status. **Main associations (regression):**
  - Health status: higher probabilities for individuals incapacitated from work; with worse self-assessed health; eligible for the lump sum chronic illness; in higher age categories; with limitations to daily activities; for females (in the age category 18-34). Weak association with disease profiles based on prescribed medication use.
  - Lower probabilities for students.
  - No association with income, material deprivation, educational attainment, increased reimbursement status, or region. This is a positive finding.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic inequities by educational attainment or income, nor systematic inequities by self-assessed health.
  - Among the groups of interest, probabilities below the population mean are found for the unemployed and single parents; probabilities above the population mean for subgroups with higher care needs (i.e. (very) bad self-assessed health, with chronic disorder and limitations, over-80 years old, with invalidity/disability) in 2008 and 2012, which evolved towards the population mean in 2016.

Conditional number of inpatient admissions

- Few significant associations are found. **Main associations (regression):**
  - Health status: more admissions as self-assessed health deteriorates (fair, bad or very bad self-assessed health); for individuals incapacitated from work; for individuals eligible for the lump sum chronic illness.
  - Fewer admissions are found for individuals who benefit from increased reimbursement.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic inequities by educational attainment or income, nor systematic inequities by self-assessed health.

1.6.2. Probability of an inpatient admission in the past year

1.6.2.1. Evolution over time for the population and population subgroups

Table 31 shows the evolution over time of the probability to have one or more inpatient admissions in the past year. There was no information in the KCE HSPA report of 2019 on the population value of this indicator, hence only the propensity in the EU-SILC/IMA-AIM sample is reported.[18] About 10% of the population has had one or more inpatient admissions in the past year. The fraction of the population who received inpatient care is nearly constant over time and increased with 1.3 percentage points between 2008 and 2016, going from 9.9% in 2008 to 11.2% in 2016. When restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, we find that the probability is slightly higher, but follows the same trend with 11.0%, 11.6% and 12.4% in 2008, 2012 and 2016, respectively

The reversed value is given as well, i.e. the probability of not having had an inpatient admission in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 31 – Evolution (2008-2016) of the probability to have at least one inpatient admission

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	9.9%	10.4%	11.2%
	Reverse	90.1%	89.6%	88.8%
Survey (18+)	Indicator	11.0%	11.6%	12.4%
	Reverse	89.0%	88.4%	87.6%

Figure 42 shows the evolution of the probability to have at least one inpatient admission in the past year for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.6.2.2.

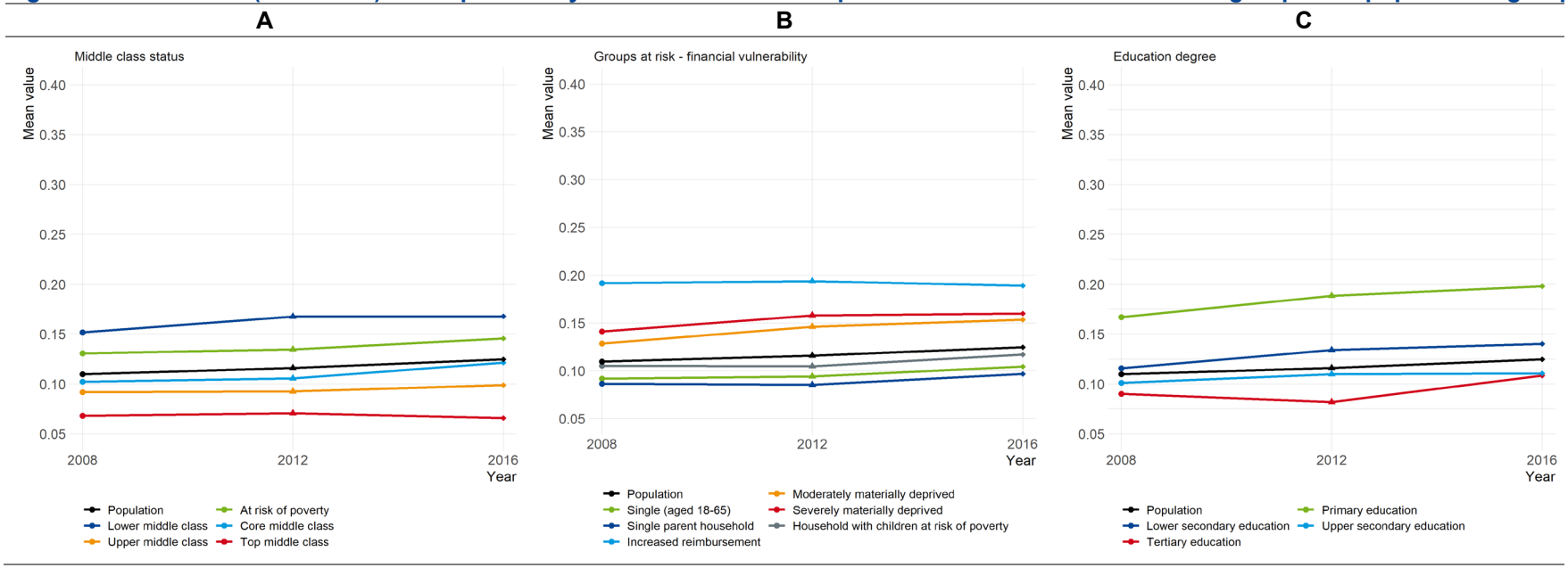
With about 10% of the population, the group of individuals with at least one inpatient admission is limited. When zooming in on particular subgroups, there might be some random variation that interferes with the observed trends. This should be borne in mind when analysing the results in Figure 42, e.g. the evolution of the over-80 year olds (panel F).

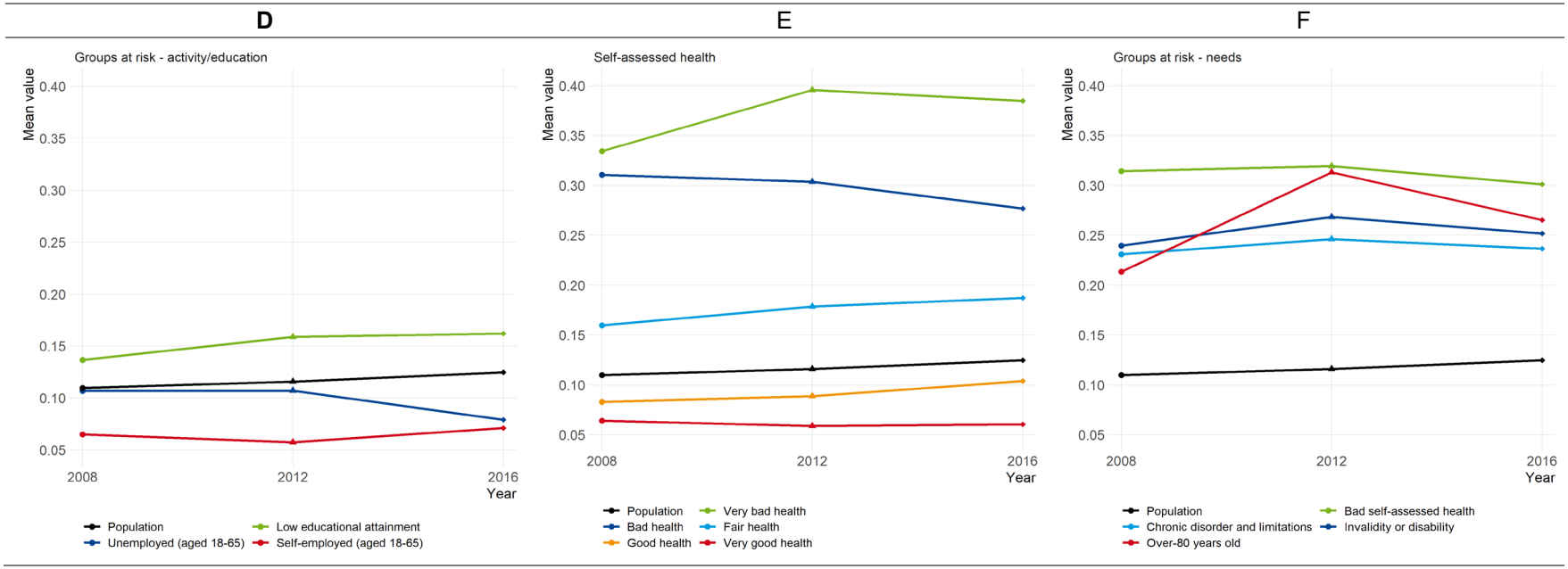
The results indicate that for most population subgroups, there is a stable trend over time, but with important variation between population subgroups. A first conclusion is that the probability to have an inpatient admission is strongly associated with (self-assessed) health status. We find probabilities of 30% to 40% of individuals with bad and very bad self-assessed health (panel E) and around 25% for individuals reporting chronic disorders and limitations or receiving an invalidity or disability allowance (panel F). Second, we find differences related to the financial situation of individuals. While it makes sense that low income individuals have a higher probability to have an inpatient admission, as low income is associated with higher care needs (see Scientific report section 2.4.1), it is striking that individuals in the lower middle class have a higher probability to receive inpatient care than individuals at risk of poverty (panel A). Moreover, the subgroup of individuals who benefit from increased reimbursement has a higher probability of inpatient admissions (panel B). Third, there is a gradation in probability to have an inpatient admission by educational attainment with higher probabilities for individuals with lower educational attainment (panel C and D). Fourth, individuals who are unemployed and self-employed have a lower probability to have an inpatient admission (panel D). These subgroups also had lower probabilities to consult a doctor (see section 1.2.2.1).

In addition, we have the following findings:

- Panel A: There is variation in the probability to have an inpatient admission by income level (range 2016: 0.07 – 0.17). There is gradient by income with higher probabilities associated with lower income. Nonetheless, the probability is lower for individuals at risk of poverty compared to individuals in the lower middle class.
- Panel B: individuals with material deprivation have a probability to have an inpatient admission above the population in general, although the difference is limited (13% to 15% in the different subgroups versus 10% in the population). For the subgroup with increased reimbursement, the probability is clearly higher at about 20%. For single adults and adults in single parent households or households with children at risk of poverty, the probability to have an inpatient admission is lower than the population average.
- Panel C: There is variation in the probability to have an inpatient admission by obtained education degree (range 2016: 0.11 – 0.20). There is gradient by education with higher probabilities associated with lower educational attainment. There is an important gap in probability between individuals with primary education (about 20% in 2016) and individuals with lower secondary education (about 14% in 2016)
- Panel D: The probability to have an inpatient admission of individuals who are unemployed or self-employed is below the population average. For unemployed individuals, we observe a decrease in probability over time, especially between 2012 and 2016.
- Panel E and F: There is quite some variation in the probability to have an inpatient admission by self-assessed health status (range 2016: 0.06 – 0.39). Individuals in (very) good health have a lower probability than individuals in fair or (very) bad health. Probabilities of about 25% are found for individuals over 80 years old, individuals with disability or in invalidity, and individuals reporting chronic disorders in combination with limitation to daily activities.

Figure 42 – Evolution (2008-2016) of the probability to have at least one inpatient admission for different subgroups and populations groups at risk





1.6.2.2. Regression output

Table 32 reports the average marginal effects of a probit regression of the indicator of having at least one inpatient admission in the past year (value = 1) or no admission (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 32):

- The probability to have an inpatient admission is strongly associated with **healthcare needs**:
  - Age and sex: there are no systematic differences by sex, except in the age category 18 to 34 where women are much more frequently hospitalized (related to childbirth). Females between 18 and 34 have the highest probability to be hospitalized in the past year. Leaving aside this age-sex category, we observe an increase in the probability of an inpatient admission by age, with a 6 percentage point higher probability for over-80 year olds than for individuals aged between 35 and 49.
  - Self-reported health status: There is a clear gradient in the fraction of individuals with an inpatient admission by subgroup of self-assessed health. When correcting for other characteristics, the probability of one or more admissions increases as the self-reported health status deteriorates. Individuals with (very) bad self-assessed have a 6 to 10 percentage points higher probability

depending on the year. The presence of limitations to daily activities also increase the probability of an admission. No clear association was found for the presence of a chronic disorder. Possibly the effect of a chronic disorder is taken up by the various disease profiles based on medication use.

- Administrative health information: From the indicator on doctor visits, we concluded that being incapacitated results in a period of high primary care needs (see sections 1.2.2.2, 1.3.2.2 and 1.4.2.2). The same is, however, true with respect to inpatient care. Being incapacitated for work has a strong positive association on the probability of receiving inpatient care, with an increase of about 14 to 17 percentage points in the year-specific models. In addition, individuals eligible for the lump sum chronic illness have a higher probability of inpatient care. There is of course a possibility of reverse causality here as eligibility can be granted based on a high number of inpatient spells.
- Medication use: Medication use for various disorders is associated with the probability to have an inpatient admission, with an increase of about 2 to 8 percentage points when the effect is significant. There is of course a degree of reversed causality that explains this variation. Profiles of disorders related to medication use are based on medication prescribed by a doctor.

- There was no effect on the probability to have an inpatient admission by membership of a community health centre.
- There is little variation in the probability to have an inpatient admission by **socioeconomic profile**.
  - There is no association between the probability to receive inpatient care in the past year and educational attainment, income, material deprivation or country of birth.
  - Activity status: the only important association that was found is that students have a 6 to 9 percentage points lower probability to be hospitalized than full-time employees. Other associations are only weakly significant and small in magnitude. We find a weakly significant small increase for individuals who are inactive and a weakly significant small decrease for unemployed individuals.
  - Household composition: there are only weakly significant and small association by household composition.
- After correcting for healthcare needs, there is no effect of increased reimbursement status on the probability to receive inpatient care. Hence the higher probability observed in the univariate analysis (see section 1.6.2.1) should be explained by other variables in the multivariate analysis, reflecting healthcare needs or socioeconomic characteristics.
- There is no effect of the included variables on healthcare supply on the probability to receive inpatient care.
- There are no important regional differences nor is there any effect of urbanization.

Table 32 – Regression output for the probability to have at least one inpatient admission in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 485)		Reduced model 2008 (Obs. = 10 856)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.125	(0.010)***	-0.126	(0.010)***	-0.107	(0.014)***	-0.097	(0.015)***	-0.123	(0.016)***
Male aged 35-49 years	-0.130	(0.010)***	-0.130	(0.010)***	-0.116	(0.014)***	-0.116	(0.015)***	-0.114	(0.014)***
Female aged 35-49 years	-0.102	(0.010)***	-0.102	(0.010)***	-0.092	(0.013)***	-0.082	(0.013)***	-0.076	(0.014)***
Male aged 50-64 years	-0.105	(0.011)***	-0.105	(0.011)***	-0.089	(0.014)***	-0.072	(0.014)***	-0.097	(0.014)***
Female aged 50-64 years	-0.119	(0.010)***	-0.118	(0.010)***	-0.113	(0.014)***	-0.086	(0.014)***	-0.104	(0.015)***
Male aged 65-79 years	-0.074	(0.016)***	-0.074	(0.015)***	-0.060	(0.019)**	-0.053	(0.020)*	-0.055	(0.020)**
Female aged 65-79 years	-0.101	(0.014)***	-0.100	(0.014)***	-0.080	(0.019)***	-0.080	(0.019)***	-0.083	(0.020)***
Male aged 80 years or more	-0.066	(0.020)**	-0.065	(0.020)**	-0.068	(0.025)**	-0.025	(0.026)	-0.054	(0.025)*
Female aged 80 years or more	-0.068	(0.019)***	-0.067	(0.019)***	-0.077	(0.025)**	-0.014	(0.024)	-0.064	(0.024)**
Self-assessed health (reference = very good)										
Self-assessed health - good	0.014	(0.005)**	0.014	(0.005)**	0.003	(0.008)	0.017	(0.008)*	0.024	(0.009)**
Self-assessed health - fair	0.034	(0.008)***	0.033	(0.008)***	0.019	(0.012)	0.040	(0.012)**	0.039	(0.012)**
Self-assessed health - bad	0.082	(0.012)***	0.079	(0.011)***	0.064	(0.015)***	0.083	(0.016)***	0.065	(0.016)***
Self-assessed health - very bad	0.111	(0.021)***	0.106	(0.020)***	0.069	(0.025)**	0.101	(0.024)***	0.100	(0.021)***
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.058	(0.010)***	0.059	(0.010)***	0.053	(0.013)***	0.061	(0.014)***	0.042	(0.014)**
Chronic disorder, no limitations	0.006	(0.007)	0.006	(0.007)	0.017	(0.011)	-0.000	(0.011)	0.003	(0.015)
Chronic disorder, limitations	0.026	(0.007)***	0.027	(0.007)***	0.033	(0.011)**	0.022	(0.012)°	0.022	(0.010)*
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.002	(0.010)								
Incapacity to work	0.239	(0.015)***	0.239	(0.015)***	0.144	(0.012)***	0.164	(0.014)***	0.176	(0.013)***
Entitled to lump sum chronic illness	0.086	(0.010)***	0.086	(0.010)***	0.069	(0.012)***	0.071	(0.013)***	0.074	(0.012)***
Clinical profile based on medication use (reference = no disorder)										

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 485)		Reduced model 2008 (Obs. = 10 856)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Medication use - neurological disorder	0.025	(0.014)°	0.025	(0.014)°	-0.007	(0.021)	0.037	(0.018)*	0.034	(0.020)°
Medication use - other disorder	0.071	(0.023)**	0.072	(0.023)**	0.042	(0.032)	0.085	(0.027)**	0.045	(0.023)°
Medication use - cardiovascular disorder	0.030	(0.005)***	0.030	(0.005)***	0.043	(0.008)***	0.010	(0.008)	0.035	(0.009)***
Medication use - thrombosis	0.062	(0.007)***	0.062	(0.007)***	0.056	(0.010)***	0.052	(0.009)***	0.061	(0.010)***
Medication use - chronic obstructive pulmonary disease (COPD)	0.034	(0.010)**	0.034	(0.010)**	0.008	(0.016)	0.032	(0.014)*	0.047	(0.015)**
Medication use - asthma	0.001	(0.012)								
Medication use - diabetes	0.019	(0.008)*	0.019	(0.008)*	0.026	(0.012)*	0.022	(0.012)°	0.009	(0.014)
Medication use - epilepsy	0.037	(0.015)*	0.038	(0.015)**	0.072	(0.021)***	0.031	(0.022)	0.012	(0.019)
Medication use - thyroid disorder	0.020	(0.010)*	0.020	(0.010)*	0.029	(0.015)*	0.041	(0.014)**	-0.014	(0.015)
Community health centre										
Registered in community health centre	0.004	(0.014)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.012	(0.005)*	-0.008	(0.004)°	-0.014	(0.006)*	-0.003	(0.007)	-0.008	(0.008)
Region of residence - Brussels	0.020	(0.015)	0.006	(0.006)	0.010	(0.009)	0.015	(0.010)	-0.006	(0.010)
Urbanization - medium	-0.004	(0.005)								
Urbanization - thin	0.004	(0.007)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.012	(0.007)°	-0.012	(0.007)°	-0.021	(0.011)°	-0.007	(0.013)	-0.009	(0.012)
Occupation - inactive	0.023	(0.010)*	0.022	(0.009)*	0.024	(0.013)°	0.031	(0.014)*	0.007	(0.013)
Occupation - self-employed in 2008	-0.005	(0.015)	-0.005	(0.015)	-0.004	(0.016)				
Occupation - self-employed in 2012	-0.016	(0.013)	-0.016	(0.013)			-0.008	(0.016)		
Occupation - self-employed in 2016	-0.008	(0.014)	-0.008	(0.014)					-0.016	(0.016)
Occupation - unemployed	-0.018	(0.009)*	-0.020	(0.009)*	-0.023	(0.014)	0.003	(0.016)	-0.045	(0.019)*
Occupation - student	-0.062	(0.008)***	-0.062	(0.008)***	-0.093	(0.021)***	-0.059	(0.020)**	-0.085	(0.021)***
Occupation - retired	0.020	(0.010)*	0.019	(0.010)*	0.012	(0.014)	0.040	(0.014)**	0.004	(0.016)
Highest obtained educational degree (reference = tertiary education)										

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 485)		Reduced model 2008 (Obs. = 10 856)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Education degree - primary	0.001	(0.007)								
Education degree - lower secondary	-0.002	(0.006)								
Education degree - upper secondary	0.000	(0.005)								
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.001	(0.005)								
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.018	(0.019)								
Household composition (reference = couple without children)										
Household composition - single without children	-0.009	(0.006)	-0.009	(0.006)°	-0.020	(0.009)*	0.001	(0.010)	-0.011	(0.009)
Household composition - single with children	-0.010	(0.011)	-0.012	(0.010)	-0.019	(0.016)	-0.001	(0.018)	-0.013	(0.019)
Household composition - couple with children	0.017	(0.006)**	0.017	(0.006)**	0.003	(0.010)	0.037	(0.010)***	0.007	(0.010)
Household composition - other	-0.022	(0.006)***	-0.021	(0.006)***	-0.021	(0.010)*	-0.011	(0.010)	-0.035	(0.012)**
Country of birth (reference = Belgium)										
Country of birth other than Belgium	0.004	(0.006)								
Insurance status										
Insurance - increased reimbursement in 2008	0.012	(0.010)	0.011	(0.010)	0.011	(0.010)				
Insurance - increased reimbursement in 2012	0.007	(0.010)	0.006	(0.009)			-0.005	(0.010)		
Insurance - increased reimbursement in 2016	-0.001	(0.009)	-0.003	(0.008)					0.008	(0.010)
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	-0.000	(0.001)								
Density of GPs in neighbouring municipalities	0.003	(0.002)								
Density of specialists in municipality	-0.000	(0.000)								
Density of specialists in neighbouring municipalities	-0.000	(0.000)								
Distance to nearest ED	-0.001	(0.000)								
Number of EDs within 10km radius	-0.001	(0.001)								
Time (reference = 2008)										
Time: year 2012	-0.003	(0.005)	-0.003	(0.005)						

Independent variables	Full model (Obs. = 31 473)	Reduced model (Obs. = 31 485)	Reduced model 2008 (Obs. = 10 856)	Reduced model 2012 (Obs. = 10 352)	Reduced model 2016 (Obs. = 10 277)
Time: year 2016	0.002 (0.006)	0.003 (0.006)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.6.2.3. Overview inequity and evolution in the different scenarios

Figure 43 visualizes the absolute Gini coefficient for inequality in the probability of having at least one inpatient admission in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of having at least one inpatient admission in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 43, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a small increase in inequity in the probability to have received inpatient care in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient increased from about 0.12 in 2008 to about 0.13 in 2016. Hence, we find that the disparity between individuals in the probability of having at least one admission in the past year that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 33 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not having received inpatient care in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Based on the trends of the baseline scenario and the net effect needs-access scenario, we conclude that inequity in the probability to receive inpatient care has increased over time when measured by the absolute Gini coefficient or the reversed relative Gini coefficient; and remained stable over time when measured by the relative Gini coefficient. The increase in inequity is small, but nonetheless, this is a negative finding. Following the alternative approach (the baseline-residual scenario), we find different picture with a decrease in inequity for all three Gini coefficients. This underlines the importance to better understand the unexplained variability in the multivariate analysis.

Figure 43 – Evolution (2008-2016) of the absolute Gini index by scenario

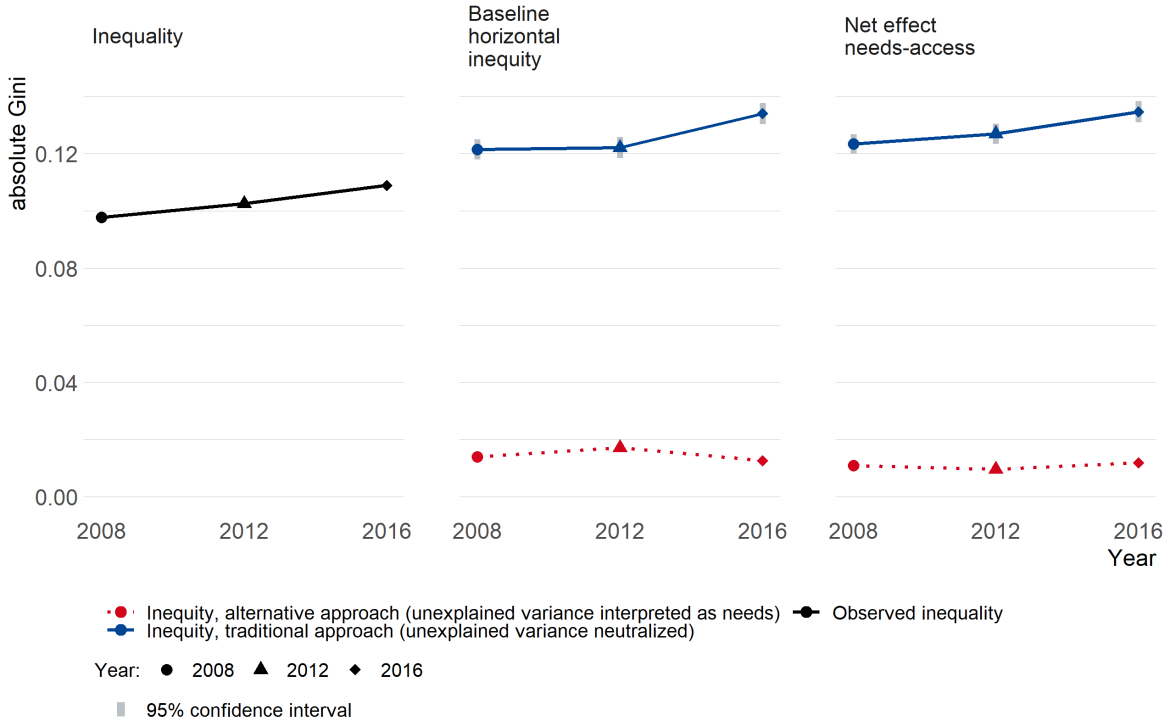


Table 33 – Evolution (2008-2016) of the inequity in the probability to have at least one inpatient admission in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.122	0.122	0.134^*	↑
	Relative	0.760	0.762	0.751	→
	Reversed relative	0.136	0.138	0.152^*	↑
Net effect needs-access	Absolute	0.123	0.127	0.135^*	↑
	Relative	0.756	0.742	0.749	→
	Reversed relative	0.138	0.143	0.153^*	↑
Baseline-residual	Absolute	0.014	0.017^	0.013^*	↓
	Relative	0.127	0.147^	0.101^*	↓
	Reversed relative	0.016	0.019^	0.014^*	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.6.2.4. Overview inequity over time for different population subgroups

Figure 44 and Figure 45 show how the probability to have an inpatient admission in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 44, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 45, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability of having an inpatient admission than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 44 and Figure 45 indicate that the inequalities with respect to the probability of receiving inpatient care in the past year are more pronounced than the inequities, i.e. the deviations from the population average are lower in the inequity scenario compared to inequality. This implies that most of the explained variation is related to healthcare needs. This is a positive finding and means that access barriers to inpatient care are limited.

The inequalities depicted in Figure 44 and Figure 45 show higher probabilities for individuals with higher healthcare needs, individuals with lower educational attainment and individuals in a financial vulnerable situation (at risk of poverty or material deprivation), with the exception of unemployed individuals who have a lower probability. After correcting for needs, almost no inequities are found. The lower probability to receive inpatient care among the unemployed remains and hence cannot be explained by lower care needs. In addition, individuals in single parent households also have a reduced probability to receive inpatient care.

The results are consistent in the baseline scenario, the baseline-residual scenario and the net effect needs-access scenario. In the baseline and baseline-residual scenario, there is a somewhat higher probability to receive inpatient care among high-need individuals compared to the net effect needs-access scenario, where no deviations from the populations mean are found for population subgroups with high healthcare needs.

Figure 44 – Deviation in the needs-corrected probability to have at least one inpatient admission from population average for subgroups based on income, education and self-assessed health, by scenario and year

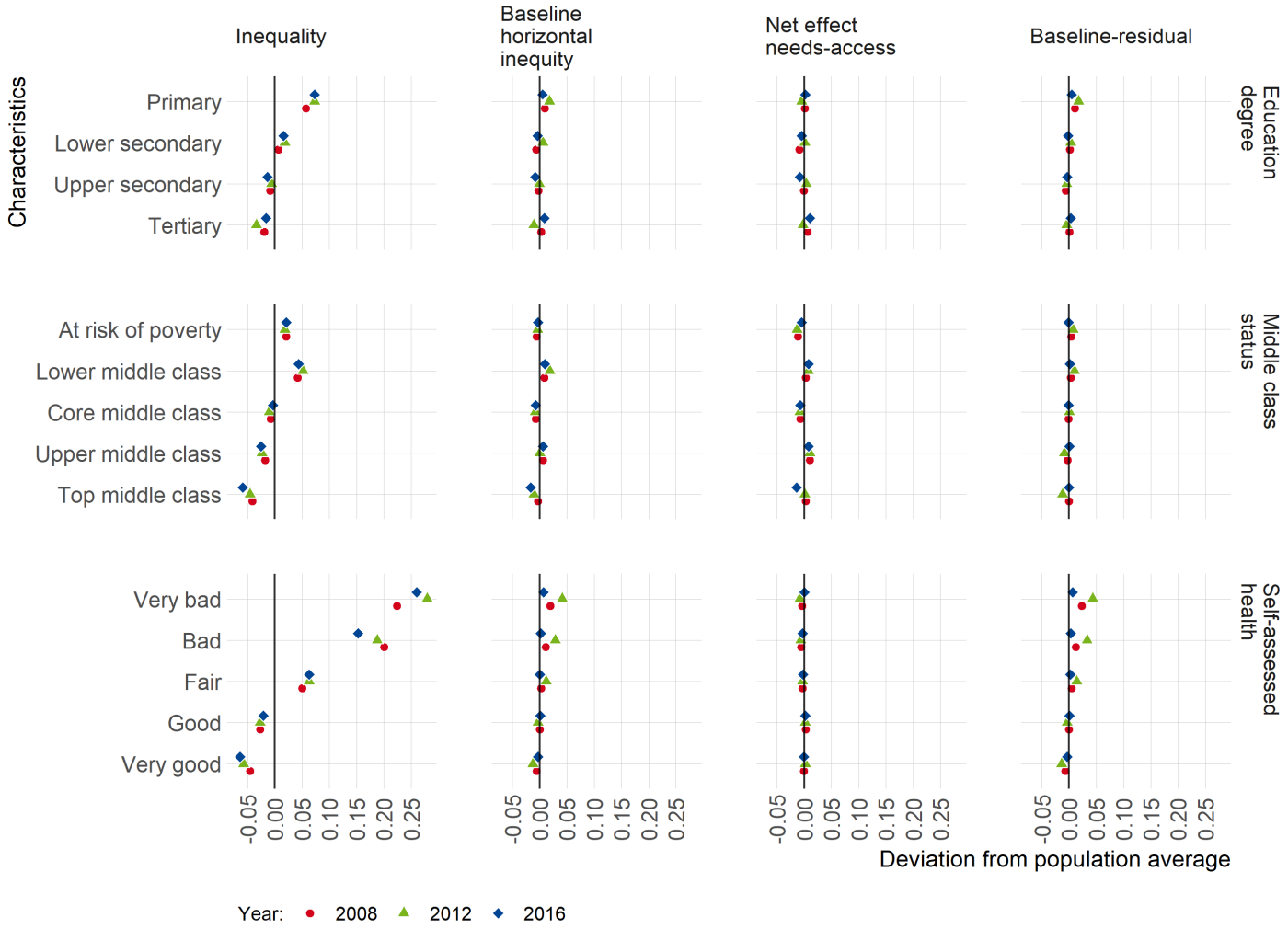


Figure 45 – Deviation in the needs-corrected probability to have at least one inpatient admission from population average for specific vulnerable subgroups, by scenario and year

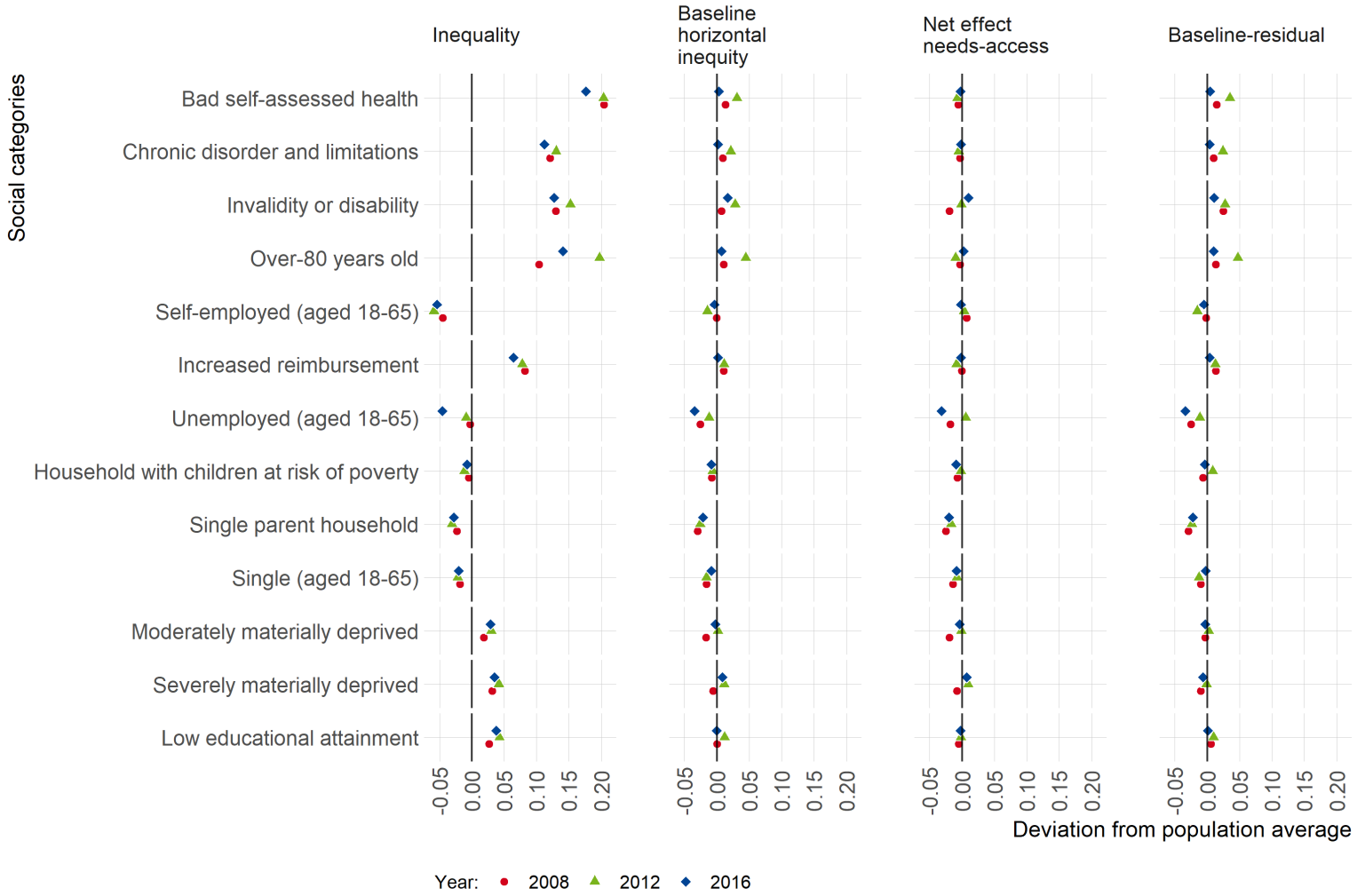
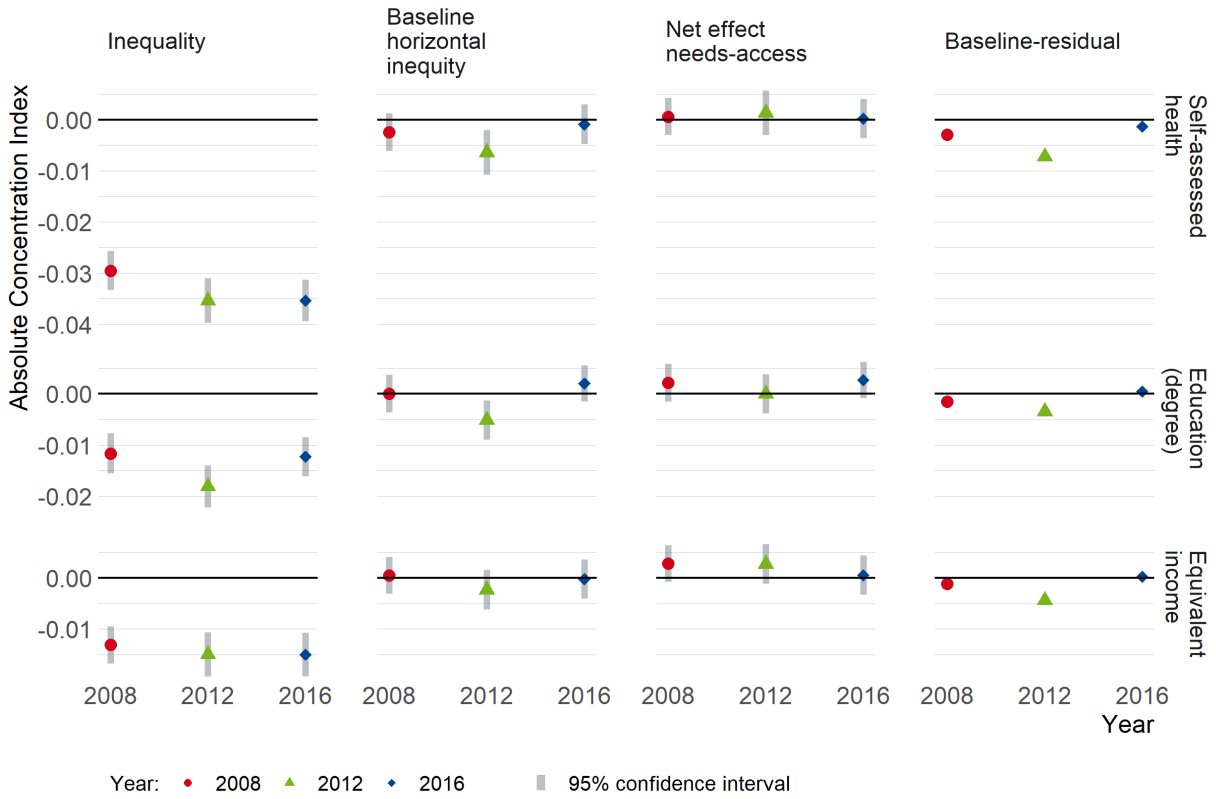


Figure 46 shows the absolute concentration index of the needs-corrected probability to have at least one inpatient admission in the past year to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of receiving inpatient care concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 46 show that there are systematic socioeconomic inequalities in the probability to have at least one inpatient admission in the past year in all three dimensions, with a higher probability among individuals with worse self-assessed health, a lower educational degree or lower income. However, after correcting for needs, the concentration index indicates that there are no systematic socioeconomic inequities. The absence of socioeconomic inequity is found in all inequity scenarios.

Figure 46 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.6.3. Conditional number of inpatient admissions in the past year

1.6.3.1. Evolution over time for the population and population subgroups

Table 34 and Figure 47 show the evolution over time of the average annual number of inpatient admissions for individuals with at least one admission. There was no information in the KCE HSPA report of 2019 on the population average number of inpatient admissions, hence only the number of inpatient admissions in the EU-SILC/IMA-AIM sample is reported.[18] Table 31 and Figure 42 showed that the probability of having at least one inpatient admissions was about 10% and saw a minor increase over time with 9.9% in 2008, 10.4% in 2012 and 11.2% in 2016. Table 34 and Figure 47 indicate that conditional on having at least one inpatient admission in the past year, the average number of admissions per individual has remained constant over time at about 1.38 admissions and this both in full sample as the sample restricted to the adult population. The majority of the individuals with an inpatient admission has only 1 admission, about 75% in each of the assessed years; 15% to 16% has two admissions, 4% to 5% has three admissions and the remaining 4% to 5% has more than three admissions.

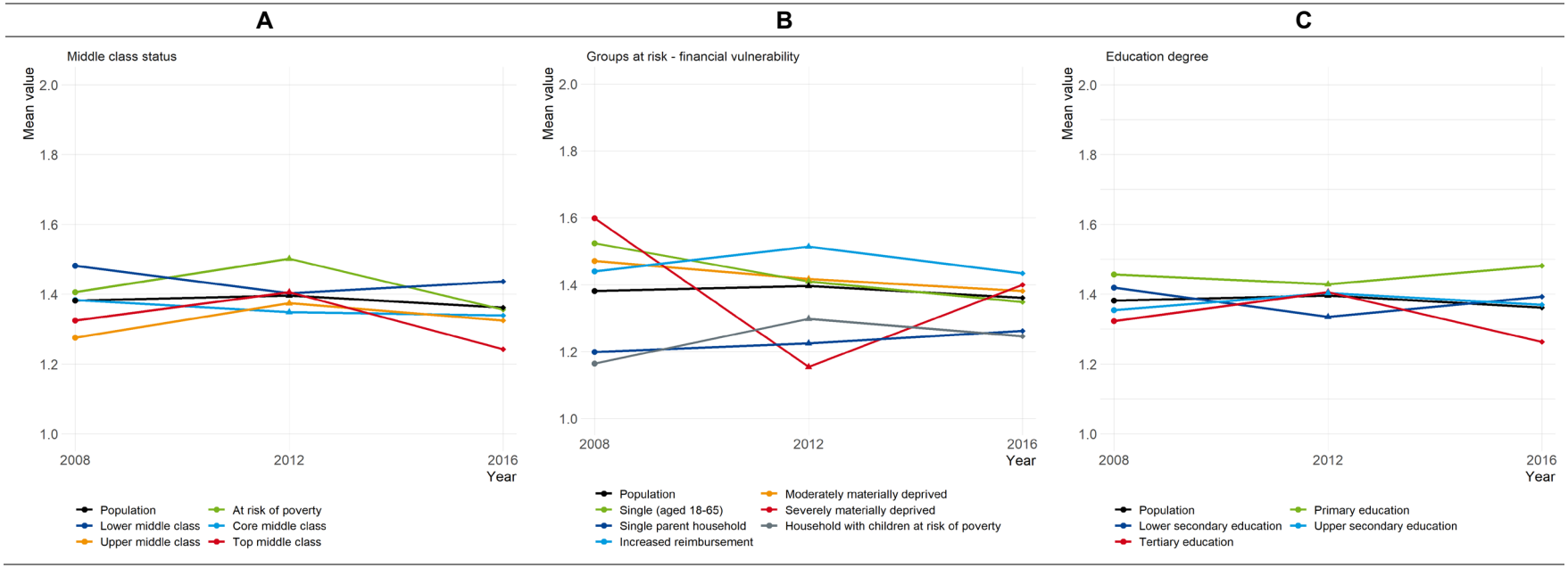
Table 34 – Evolution (2008-2016) of the number of inpatient admissions in the past year given at least one admission

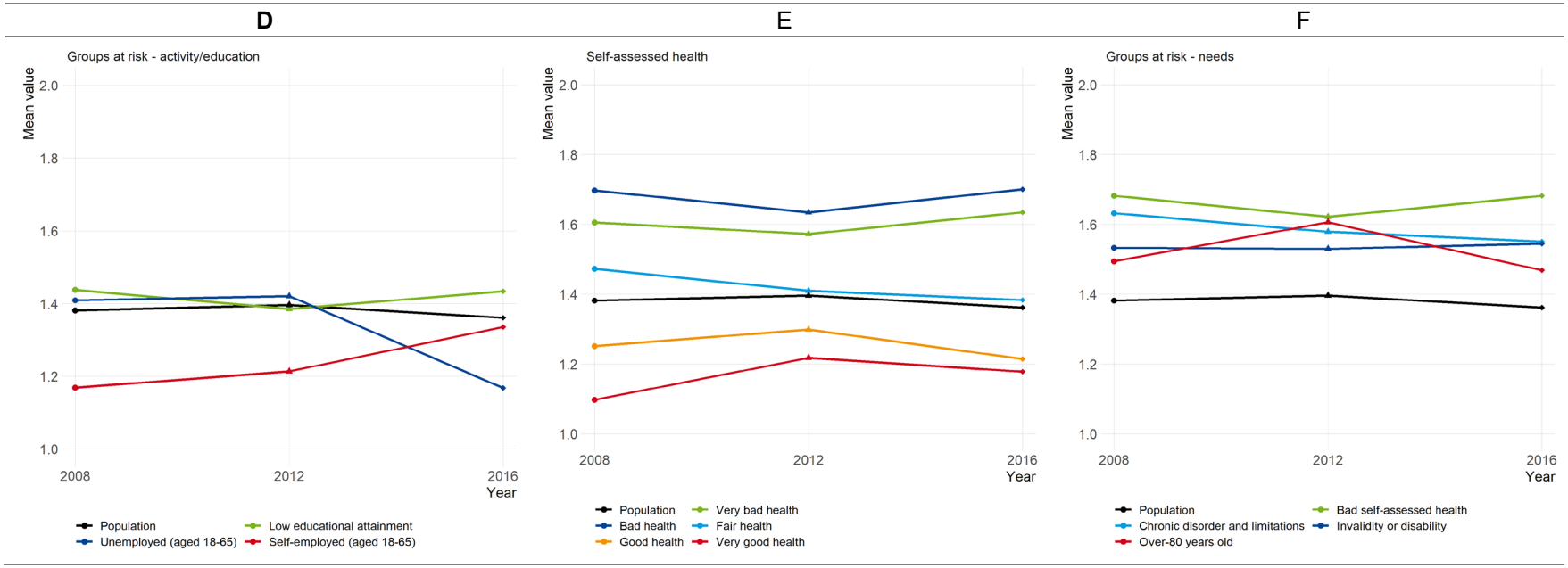
Sample	Definition	2008	2012	2016
Survey (all)	Indicator	1.38	1.40	1.36
Survey (18+)	Indicator	1.38	1.40	1.36

Figure 47 shows the evolution of the number of inpatient admissions conditional on having at least one admission, for a variety of population subgroups (see section 1.1.2).

First, we find little variation over time for most population subgroups. We do find a decrease in number of admissions for the unemployed in 2016 (panel D) and for individuals with severe material deprivation in 2012 (panel B). This may equally be random variation given the small size of the population subgroup conditional on receiving inpatient care. Second, we find little variation in the conditional annual average number of inpatient admissions by income (panel A), educational attainment (panel C), activity status (panel D) and among financially vulnerable subgroups (panel B). Self-employed individuals, however, have a lower conditional number of inpatient admissions (panel D). There is no difference in the number of admission for individuals who benefit from increased reimbursement (panel B). Third, a higher number of admissions (annually between 1.5 and 1.8 on average compared to the population average of 1.4, see panel E and F) is observed for individuals with higher care needs, i.e. those in (very) bad health, with chronic disorders and limitations to daily activities, over-80 year olds and individuals with invalidity/disability. Fourth, there is a lower number of admissions for singles and individuals in single parent households (panel B).

Figure 47 – Evolution (2008-2016) of the number of inpatient admissions given at least one admission for different subgroups and populations groups at risk





1.6.3.2. Regression output

Table 35 reports the average marginal effects of a generalized negative binomial count model[e] for the sample of individuals with at least one inpatient admission (see section 1.1.3). The results should be interpreted as a change in number of admissions expressed in admissions.

There are few significant associations in the regression analysis, especially in the year specific models. This is at least partly related to the small sample size, but might also indicate relatively little variation in number of inpatient admissions explained by the characteristics in the model. In fact most individuals with an admission in the past year only have one (see section 1.6.3.1). We find the following associations:

- **Healthcare needs** are associated with the number of inpatient admissions.

[e] A truncated negative binomial model was the preferred choice, but did not converge.

- There is some variation by self-reported health status, with an additional number of 0.2 to 0.5 admissions for individuals reporting fair, bad or very bad health.
- Administrative health information: The strongest association is found for being incapacitated for work, with an increase of 0.15 to 0.25 admissions.
- Medication use: only 2 disease profiles that are defined based on the use of specific medication show an association with the conditional number of inpatient admissions, i.e. medication for COPD and for thrombosis. The effects are positive in both cases, but not always significant.
- There is little variations by age and sex (with the exception of a lower number of admissions for males in the age category 18-34), and other health status variables are not associated with the number of inpatient admissions.

- There is no variation in the conditional number of inpatient admissions by **socioeconomic profile**.
- Individuals who benefit from **increased reimbursement** have a lower number of inpatient admissions.
- There is no effect of the included health supply variables.
- There are no differences found between the regions or related to urbanization.

Table 35 – Regression output for the conditional number of inpatient admissions, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 3 651)	Reduced model (Obs. = 3 652)	Reduced model 2008 (Obs. = 1 208)	Reduced model 2012 (Obs. = 1 198)	Reduced model 2016 (Obs. = 1 246)
Age and Sex (reference = female aged 18-34 years)					
Male aged 18-34 years	-0.130 (0.252)	-0.137 (0.066)*	-0.060 (0.198)	-0.283 (0.350)	0.033 (0.171)
Male aged 35-49 years	0.099 (0.123)	0.081 (0.063)	0.268 (0.222)	0.088 (0.120)	-0.022 (0.099)
Female aged 35-49 years	0.062 (0.118)	0.019 (0.066)	0.246 (0.174)	-0.057 (0.180)	0.040 (0.102)
Male aged 50-64 years	-0.062 (0.402)	0.081 (0.055)	0.278 (0.174)	0.107 (0.124)	-0.071 (0.103)
Female aged 50-64 years	-0.122 (0.357)	-0.032 (0.056)	0.081 (0.182)	0.032 (0.134)	-0.160 (0.109)
Male aged 65-79 years	-0.005 (0.711)	0.173 (0.064)**	0.342 (0.153)*	0.194 (0.164)	0.023 (0.096)
Female aged 65-79 years	-0.188 (0.499)	0.031 (0.054)	0.295 (0.214)	-0.059 (0.158)	-0.126 (0.100)
Male aged 80 years or more	-0.130 (0.831)	0.097 (0.080)	0.267 (0.210)	0.100 (0.147)	-0.006 (0.143)
Female aged 80 years or more	-0.137 (0.634)	0.071 (0.066)	0.219 (0.208)	0.147 (0.166)	-0.120 (0.120)

Independent variables	Full model (Obs. = 3 651)	Reduced model (Obs. = 3 652)	Reduced model 2008 (Obs. = 1 208)	Reduced model 2012 (Obs. = 1 198)	Reduced model 2016 (Obs. = 1 246)
Self-assessed health (reference = very good)					
Self-assessed health - good	0.128 (0.265)	0.068 (0.036)°	0.238 (0.215)	0.024 (0.128)	0.058 (0.100)
Self-assessed health - fair	0.182 (0.150)	0.177 (0.046)***	0.411 (0.266)	0.025 (0.153)	0.222 (0.103)*
Self-assessed health - bad	0.295 (0.106)**	0.298 (0.050)***	0.446 (0.274)	0.151 (0.149)	0.347 (0.095)***
Self-assessed health - very bad	0.134 (0.347)	0.195 (0.067)**	0.387 (0.256)	0.028 (0.183)	0.295 (0.123)*
Self-reported chronic disorders and limitations daily activities (reference = none)					
No chronic disorder, limitations	0.066 (0.155)				
Chronic disorder, no limitations	0.039 (0.087)				
Chronic disorder, limitations	0.183 (0.188)				
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)					
Invalid or disabled	-0.078 (0.170)				
Incapacity to work	0.268 (0.107)*	0.211 (0.060)***	0.158 (0.075)*	0.253 (0.102)*	0.125 (0.070)°
Entitled to lump sum chronic illness	0.564 (0.127)***	0.477 (0.059)***	0.388 (0.063)***	0.442 (0.091)***	0.425 (0.083)***
Clinical profile based on medication use (reference = no disorder)					
Medication use - neurological disorder	-0.063 (0.168)				
Medication use - other disorder	-0.078 (0.081)				
Medication use - cardiovascular disorder	-0.008 (0.296)				
Medication use - thrombosis	0.126 (0.075)°	0.120 (0.035)***	0.048 (0.100)	0.195 (0.066)**	0.167 (0.061)**
Medication use - chronic obstructive pulmonary disease (COPD)	0.076 (0.509)	0.083 (0.054)	0.077 (0.130)	0.009 (0.094)	0.173 (0.073)*
Medication use - asthma	-0.018 (0.194)				
Medication use - diabetes	0.104 (0.278)				
Medication use - epilepsy	0.022 (0.341)				
Medication use - thyroid disorder	0.088 (0.448)				
Community health centre					

Independent variables	Full model (Obs. = 3 651)		Reduced model (Obs. = 3 652)	Reduced model 2008 (Obs. = 1 208)	Reduced model 2012 (Obs. = 1 198)	Reduced model 2016 (Obs. = 1 246)
Registered in community health centre	0.006	(0.471)				
Place of residence (reference = Flanders, dense)						
Region of residence - Wallonia	-0.024	(0.274)				
Region of residence - Brussels	-0.009	(0.219)				
Urbanization - medium	0.010	(0.074)				
Urbanization - thin	0.028	(0.205)				
Self-reported current occupation (reference = full-time employee)						
Occupation - part-time employee	-0.079	(0.268)				
Occupation - inactive	0.001	(0.201)				
Occupation - self-employed in 2008	-0.192	(0.210)				
Occupation - self-employed in 2012	-0.139	(0.120)				
Occupation - self-employed in 2016	0.122	(0.365)				
Occupation - unemployed	-0.085	(0.092)				
Occupation - student	0.118	(0.437)				
Occupation - retired	0.025	(0.714)				
Highest obtained educational degree (reference = tertiary education)						
Education degree - primary	-0.041	(0.292)				
Education degree - lower secondary	-0.051	(0.127)				
Education degree - upper secondary	0.008	(0.085)				
Equivalized disposable household income						
Income (natural logarithm - linear & squared)	-0.079	(0.255)				
Socioeconomic status (reference = not materially deprived)						
Severe material deprivation index	-0.083	(0.196)				
Household composition (reference = couple without children)						
Household composition - single without children	0.126	(0.102)				

Independent variables	Full model (Obs. = 3 651)	Reduced model (Obs. = 3 652)	Reduced model 2008 (Obs. = 1 208)	Reduced model 2012 (Obs. = 1 198)	Reduced model 2016 (Obs. = 1 246)
Household composition - single with children	-0.162 (0.134)				
Household composition - couple with children	-0.115 (0.057)*				
Household composition - other	-0.095 (0.069)				
Country of birth (reference = Belgium)					
Country of birth other than Belgium	-0.034 (0.623)				
Insurance status					
Insurance - increased reimbursement in 2008	-0.176 (0.093)°	-0.087 (0.054)	-0.136 (0.067)*		
Insurance - increased reimbursement in 2012	-0.085 (0.215)	-0.034 (0.061)		-0.027 (0.088)	
Insurance - increased reimbursement in 2016	-0.080 (0.125)	-0.100 (0.040)*			-0.160 (0.061)**
Healthcare supply (density per 10 000 population, distance in km)					
Density of GPs in municipality	0.018 (0.028)				
Density of GPs in neighbouring municipalities	-0.001 (0.019)				
Density of specialists in municipality	-0.004 (0.017)				
Density of specialists in neighbouring municipalities	0.003 (0.005)				
Distance to nearest ED	-0.005 (0.008)	-0.003 (0.003)	-0.005 (0.006)	-0.000 (0.006)	-0.001 (0.005)
Number of EDs within 10km radius	-0.005 (0.010)				
Time (reference = 2008)					
Time: year 2012	-0.044 (0.232)	-0.036 (0.045)			
Time: year 2016	-0.103 (0.096)	-0.050 (0.036)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.6.3.3. Overview inequity and evolution in the different scenarios

Figure 48 visualizes the absolute Gini coefficient for inequality in the conditional number of inpatient admissions in the past year (so without needs correction) as well as inequity in the fairness gap for the conditional number of inpatient admissions in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and neutralized. This situation is represented by the blue solid line
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 48, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower or even close to zero, indicating the absence of inequity.

If we follow the traditional approach, we observe a stable trend in inequity in the number of inpatient admissions in the past year. Hence, we find that that the disparity between individuals in the number of admissions that cannot be explained and justified by (observable) healthcare needs has not changed significantly over time.

Table 36 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test. Using the traditional approach, we observe a constant trend in inequity as measured by both the absolute and relative Gini index. In the alternative approach, there is an upward trend for the relative Gini coefficient and a constant trend for the absolute Gini coefficient.

Figure 48 – Evolution (2008-2016) of the absolute Gini index by scenario

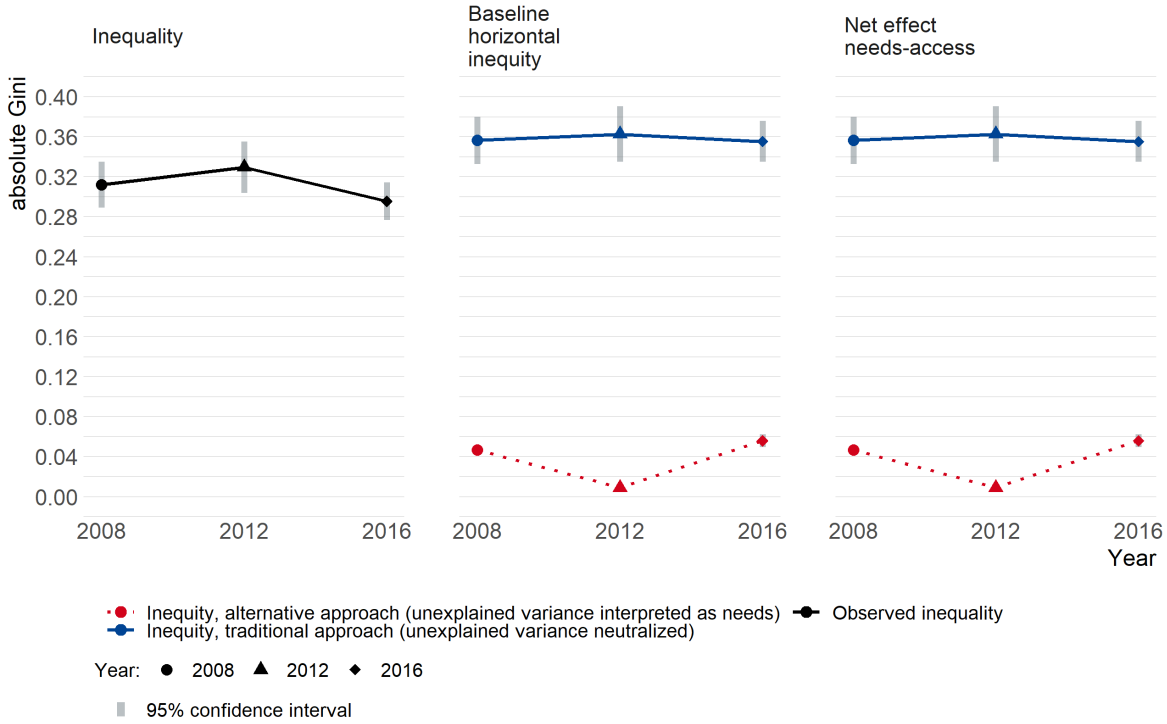


Table 36 – Evolution (2008-2016) of the inequity in the conditional number of inpatient admissions for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.356	0.362	0.355	→
	Relative	0.258	0.260	0.261	→
Net effect needs-access	Absolute	0.312	0.330	0.295	→
	Relative	0.226	0.236	0.217	→
Baseline-residual	Absolute	0.046	0.009^	0.056 *	→
	Relative	0.034	0.006^	0.041^*	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).

**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*

§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.6.3.4. Overview inequity over time for different population subgroups

Figure 49 and Figure 50 show how care use in various population subgroups differs from the population average when looking at inequality as well as inequity. When analysing inequity, a correction is made for healthcare needs and preferences according to the different inequity-scenarios, both for the average population and subgroup value. In Figure 49, population groups are defined based on categories of equivalized income, categories of education degree, and categories of self-assessed health. In Figure 50, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower number of inpatient admissions than the population average. Values to the right of the vertical line, on the other hand, indicate a higher number of admissions than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 49 and Figure 50, we find that disparities are less pronounced once a correction is made for healthcare needs, i.e. the deviations from the population average are generally lower in the inequity scenario compared to inequality. Moreover, with respect to subgroups based on healthcare needs, such as individuals with bad health, invalidity, high age or presence of a chronic disorder, we find that inequalities indicate an above-average number of admissions for individuals with worse health, whereas inequities indicate the opposite. The found inequities also appear to increase for these subgroups between 2012 and 2016. This is likely related to the negative relation between increased reimbursement status and the number of admissions (there are not many significant associations in the regression model (see section 1.6.3.2)). The negative association presents itself in Figure 50 through the below-average number of admission for individuals with increased reimbursement status. It spills over to other groups with an important fraction of individuals who benefit from increased reimbursement (e.g. individuals at risk of poverty, or with higher care needs).

Remark that all effects are small and range between -0.2 and +0.2 inpatient admissions, they might be partly related to random variation. Our main findings are:

- Disparities between educational groups are limited both before correction for healthcare need (inequality) as after correcting for needs

(inequity). However, they go in opposite directions with inequalities [inequities] indicating a conditional number of admission above [below] the population average for individuals with primary education and below [above] the population average for individuals with tertiary education.

- The conditional number of admissions is above the average for individuals in the upper and top middle class. It is slightly below the average for individuals at risk of poverty.
- There is an important discrepancy in the results for inequality and inequity with respect to self-assessed health. The finding for inequality indicate a below-average number of admissions for individuals reporting (very) good health and above-average for individuals reporting (very) bad health. The findings for inequity, on the other hand, show a below-average number of admissions for individuals reporting (very) bad health, and an above-average number of admissions for individuals reporting (very) good health.
- Among the vulnerable groups, we find that once a correction is made for healthcare needs (baseline scenario), subgroups with high care needs have a number of inpatient admissions that is below the population average. Subgroups related to the financial situation of individuals (at risk of poverty, increased reimbursement, unemployment, material deprivation) generally have a lower number of admissions with especially a decrease between 2012 and 2016. This likely reflects the same effect as for the population groups with high care needs as there is an overlap between population subgroups with low income and population subgroups with high care needs.
- The results in the different inequity scenarios are generally in line with each other.

Figure 49 – Deviation in the needs-corrected conditional number of inpatient admissions from population average for subgroups based on income, education and self-assessed health, by scenario and year

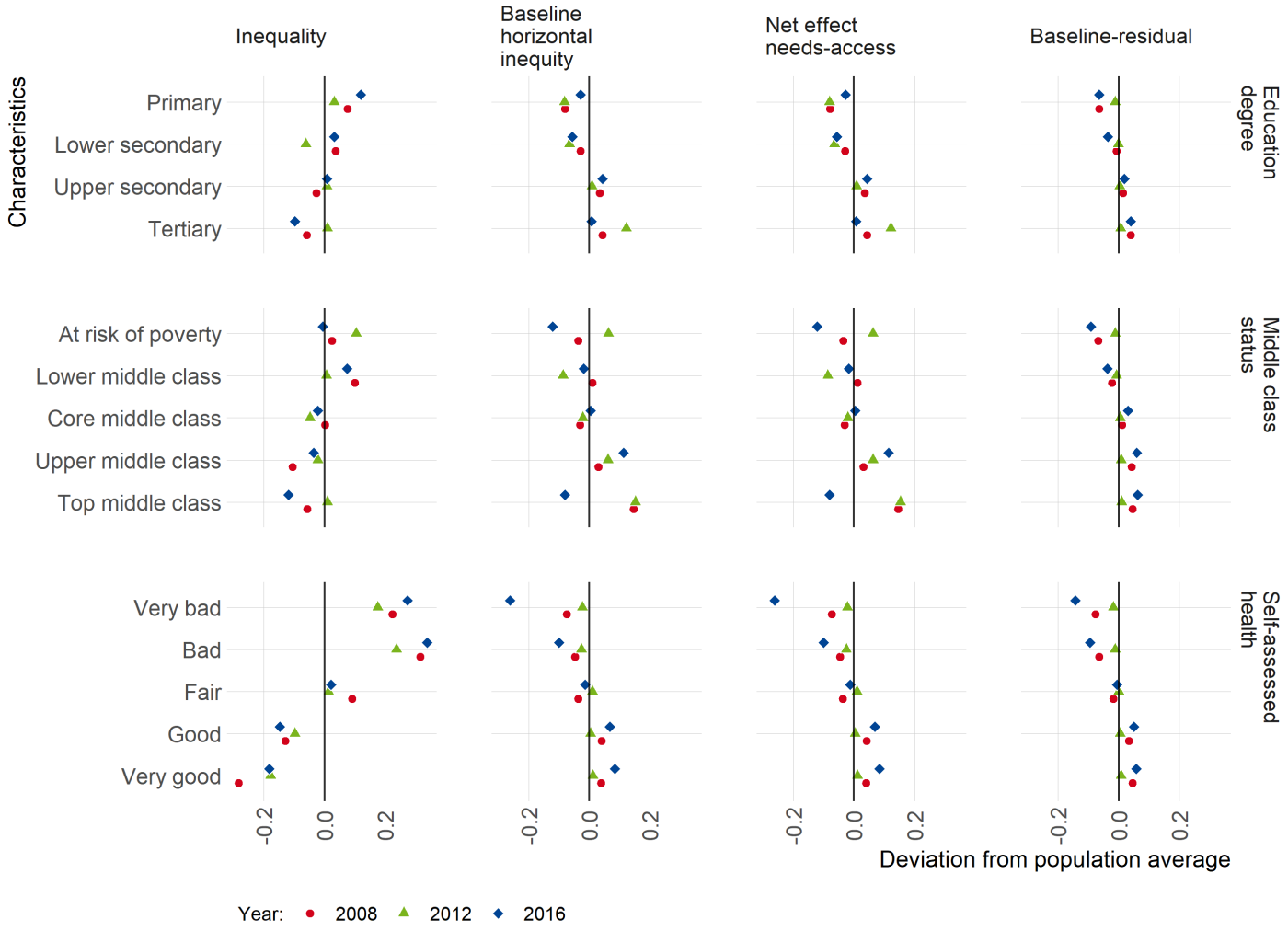


Figure 50 – Deviation in the needs-corrected conditional number of inpatient admission from population average for specific vulnerable subgroups, by scenario and year

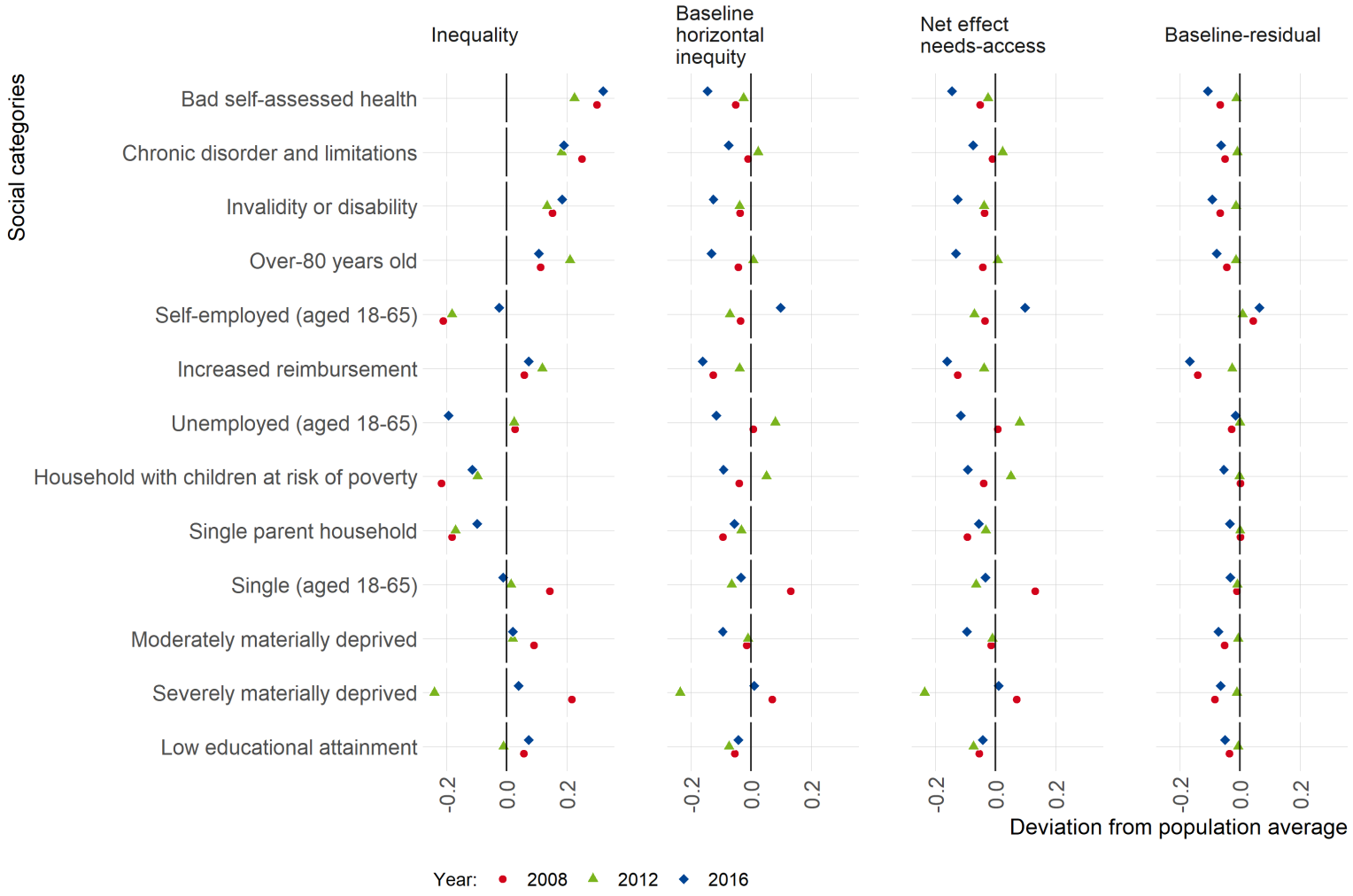
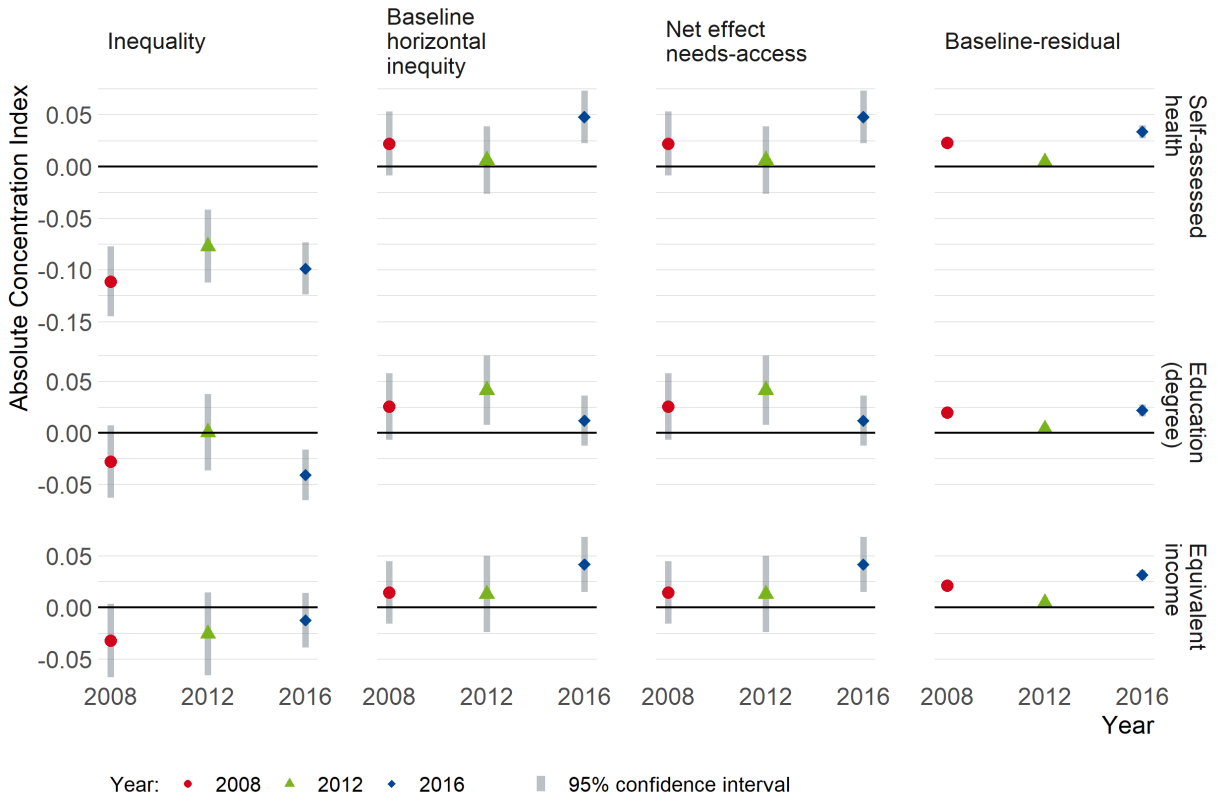


Figure 51 shows the absolute concentration index of the needs-corrected number of inpatient admissions to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher need-corrected number of inpatient admissions concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher need-corrected number of inpatient admissions for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 51 reveal systematic inequalities in number of inpatient admissions by self-assessed health (inequality). After correcting for healthcare needs, the concentration index indicates that there are no significant systematic socioeconomic inequities. The absence of socioeconomic inequity is found in all inequity scenarios.

Figure 51 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.7. Day-care treatments

1.7.1. Summary

We analyse inequity in day-care treatments over the past 12 months. Two types of utilisation are examined consecutively, the probability of a day-care treatment and the number of treatments given at least one day-care treatment.

Day-care treatments are defined as a hospital stay (it has received a stay_nr in IMA-AIM GZSS database), classified as medical or surgical day-care treatment (variable stay_cat in IMA-AIM HOSP database equals ("ODC, "ODC-CHI")).

Key points inequity in day-care treatments in the past year

The probability to have day-care treatment in the past year increased from 9% to 12% between 2008 and 2016 in the survey sample (18+); about 12% to 27% among higher care groups. The average annual number of treatments (among those with at least one treatment) is about 1.5 and has increased slightly over time among the survey sample (18+); about 75% of the individuals had only one day-care treatment.

Probability to have a day-care treatment

- Association with healthcare needs and to a limited extent with socioeconomic status. **Main associations (regression):**
  - Health status: higher probabilities for individuals incapacitated from work; with worse self-assessed health; eligible for the lump sum chronic illness; in higher age categories (except the over-80 year olds). No systematic association with disease profiles based on prescribed medication use.
  - Higher probabilities for students.
  - Lower probabilities in Wallonia and Brussels (compared to Flanders), for individuals with increased reimbursement status.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic inequities by self-assessed health.
  - Small, but growing socioeconomic inequity by income (in favour of individuals with higher incomes). For education, inequities are found in the net effect needs-access scenario, but not in the baseline horizontal inequity scenario.
  - Small effects among the groups of interest, probabilities below the population mean are found for individuals in financially vulnerable groups (increased reimbursement status, the unemployed, material deprivation, at risk of poverty); singles (between 18 and 64 years old); with primary education; the self-employed; single parents (situation improving over time).

Conditional number of day-care treatments

- Association with healthcare needs and to a limited extent with socioeconomic status. **Main associations (regression):**
  - Health status: more day-care treatments for individuals with worse self-reported health (fair, bad or very bad self-assessed health, presence of chronic disorder, limitations to daily activities); incapacitated from work; eligible for the lump sum chronic illness. Fewer day-care treatments for individuals who take particular medication, individuals with invalidity/disability, in the age category 18-34.
  - Fewer treatments are found for individuals who benefit from increased reimbursement (in 2012, 2016); who live in Wallonia.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - There are small systematic inequities in favour of individuals with better self-assessed health and higher income.
  - A below-average number of treatments are found for individuals with very bad self-assessed health; with chronic

disorder and limitations; over-80 year olds; with primary education; at risk of poverty; with increased reimbursement. Above-average number of treatment among single parents.

- Both results are (partially) driven by unexplained variability in the regression model and hence should be interpreted with caution.

1.7.2. Probability of a day-care treatment in the past year

1.7.2.1. Evolution over time for the population and population subgroups

Table 37 shows the evolution over time of the probability to have one or more day-care treatments in the past year. There was no information in the KCE HSPA report of 2019 on the population value of this indicator, hence only the propensity in the EU-SILC/IMA-AIM sample is reported.[18] About 10% of the population has had one or more day-care treatment in the past year. There is a small upward trend with an increase in the share of individuals with day-care treatment between 2008 and 2016, from 8.6% in 2008 to 9.2% in 2012 and 10.9% in 2016. When restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, we find that the probability is slightly higher and the gap increases over time, with 9.2%, 9.9% and 12.1% in 2008, 2012 and 2016, respectively

The reversed value is given as well, i.e. the probability of not having had a day-care treatment in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 37 – Evolution (2008-2016) of the probability to have at least one day-care treatment in the past year

Sample	Definition	2008	2012	2016
Survey (all)	Indicator	8.6%	9.2%	10.9%
	Reverse	91.4%	90.8%	89.1%
Survey (18+)	Indicator	9.2%	9.9%	12.1%
	Reverse	90.8%	90.1%	87.9%

Figure 52 shows the evolution of the probability to have at least one day-care treatment in the past year for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.7.2.2.

With about 10% of the population, the group of individuals with at least one day-care treatment is limited. When zooming in on particular subgroups, there might be some random variation that interferes with the observed trends.

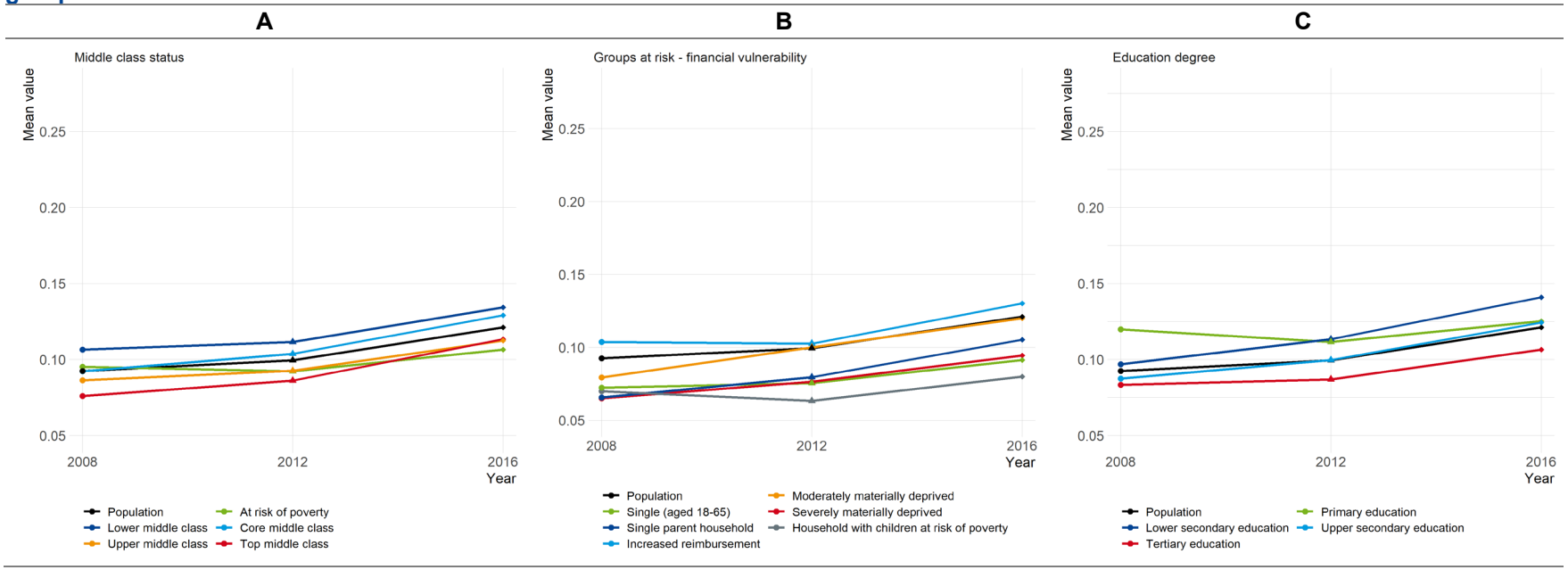
The observed patterns are in line with the probability to consult a doctor or receive inpatient care (see sections 1.2.2.1 and 1.6.2.1). Figure 52 indicates that there is a constant or upward trend in the probability of having a day-care treatment for most population subgroups. There is some variation in the probability to have day-care treatment, especially with respect to self-assessed and healthcare needs. A first conclusion is that we find a socioeconomic gradient in day-care treatments by income (panel A) and educational attainment (panel C), with generally higher probabilities among individuals with lower educational attainment and lower income. Remark, however, that individuals at risk of poverty have a lower coverage than individuals in the lower, core and upper middle class. Moreover individuals with severe material deprivation have a lower probability (panel B). Second, the probability to have day-care treatment is strongly associated with (self-assessed) health status. We find probabilities of around or above 15% for individuals with bad and very bad self-assessed health (panel E) and for individuals reporting chronic disorders and limitations or receiving an

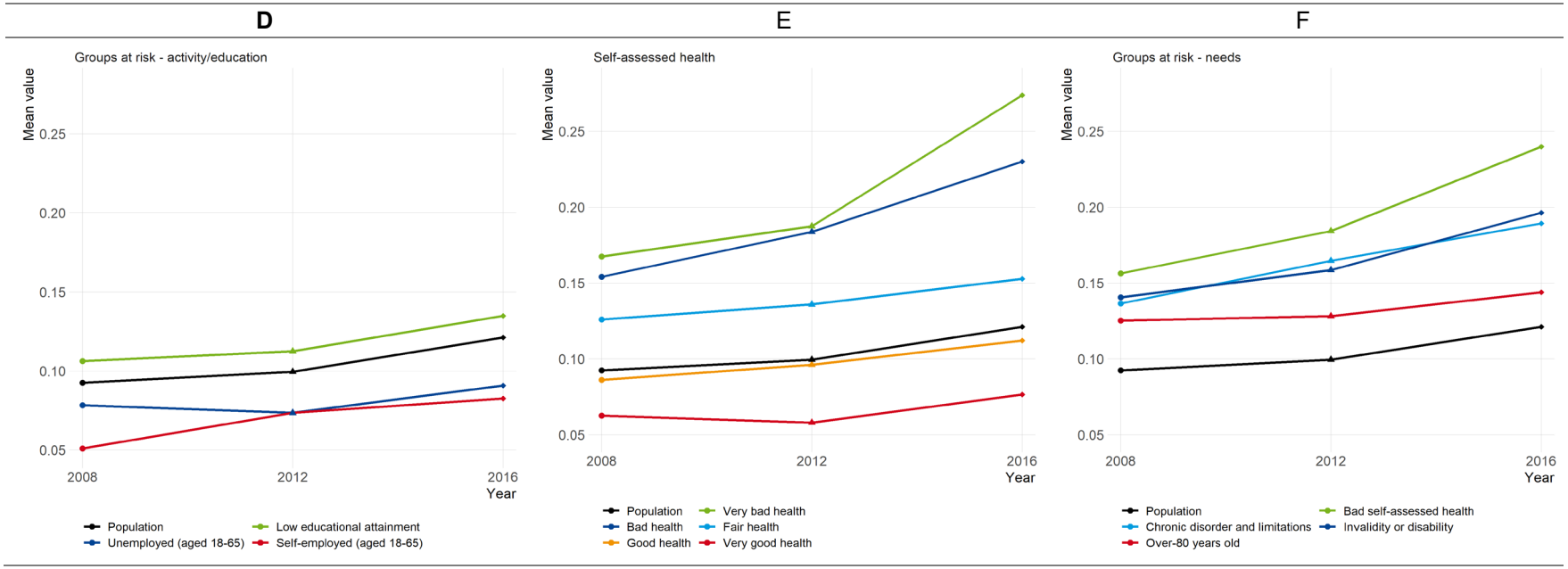
invalidity or disability allowance (panel F). Individuals with fair self-assessed health and over-80 year olds have a probability between 12% and 15%. Third, individuals who are unemployed and self-employed have a lower probability to receive day-care treatment (panel D). These subgroups also had lower probabilities to consult a doctor and have an inpatient treatment (see sections 1.2.2.1 and 1.6.2.1).

In addition, we have the following findings:

- Panel A: There is little variation in the probability to have day-care treatment (range 2016: 0.11 – 0.13). While in 2008 the probability of receiving day-care treatment in the group of individuals at risk of poverty matched the population average, they have the lowest probability in 2016, clearly below the population average.
- Panel B: Individuals with severe material deprivation, single adults, adults in single parent household, and in households with children at risk of poverty are less likely to receive day-care treatment than the population in general. Individuals with moderate material deprivation or who benefit from increased reimbursement have a probability in line with the population average.
- Panel C: There is little variation in the probability to have day-care treatment by educational attainment (range 2016: 0.11 – 0.14). Individuals with low educational attainment (primary education or lower secondary education) have the highest probability to have a day-care treatment. Individuals with tertiary education have the lowest probability. This might be related with different healthcare needs in the by education group.
- Panel D: Self-employed individuals have a lower probability to have a day-care treatment. There was, however, an important increase in the probability over time. Individuals who are unemployed also have a probability to receive day-care treatment that is below the population mean.
- Panel E and F: There is important variation in the probability to receive day-care treatment by self-assessed health status (range 2016: 0.08 – 0.27). Individuals in (very) good health have a probability below the population average and significantly lower than the probability for individuals in fair or (very) bad health. Moreover, there is a strong upward trend over time for individuals in bad or very bad health status. In the same period, we observe a decrease or lower increase in the probability to have inpatient care for both subgroups, suggesting some substitution of inpatient by day-care treatment among individuals with (very) bad health status (see section 1.6.2.1). Probabilities above the population average are also observed for the different subgroups with higher care needs in panel F.

Figure 52 – Evolution (2008-2016) of the probability to have at least one day-care treatment in the past year for different subgroups and populations groups at risk





1.7.2.2. Regression output

Table 38 reports the average marginal effects of a probit regression of the indicator of having at least one day-care treatment in the past year (value = 1) or no day-care treatment (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 38):

- There is a positive time trend, indicating a general increase in the probability to have day-care treatment between 2012 and 2016.
- The probability to have a day-care treatment is strongly associated with **healthcare needs**:
  - Age and sex: there are minor differences by sex, with males having a somewhat lower probability to have day-care treatment in the age category 18-34 than females and a somewhat higher probability among the over-80 year olds. Moreover, we see an increase in the fraction of the population with treatments up to age 80.
  - Self-reported health status: There is a clear gradient in the fraction of individuals with a day-care treatment by subgroup of self-assessed health. When correcting for other characteristics, the probability of one or more treatments increases as the self-reported

health status deteriorates. Compared to individuals with very good self-assessed health, the probability is 2, 3, 7 and 8 percentage points higher for individuals who report good, fair, bad and very bad health in the reduced pooled model. The presence of a chronic disorder or limitations to daily activities is weakly positively associated with the probability of a day-care treatment.

- Administrative health information: As for doctor consultation, contacts with the emergency department and inpatient treatments, we find a strong positive association between being incapacitated from work and the probability of receiving day-care treatment, with an increase of about 10 to 13 percentage points (see sections 1.2.2.2, 1.5.2.2 and 1.6.2.2). In addition, individuals eligible for the lump sum chronic illness have a probability of day-care treatment that is 6 to 7 percentage points higher.
- There is no systematic association between the use of prescribed medication for various disorders and the probability to have day-care treatment.
- There was no effect on the probability to have day-care treatment by membership of a community health centre.

- There is little variation in the probability to have day-care treatment by **socioeconomic profile**.
  - There is no systematic association between the probability to receive day care in the past year and income, education, material deprivation or country of birth.
  - Activity status: There are no systematic differences in the probability to have day care in the past year among the different subgroups of activity status. There is a higher probability for students to have day-care treatment in 2012 and 2016 if, respectively 5 and 3 percentage points.
  - Household composition: there are is a slightly lower probability to have day-care treatment for singles without children compare to other household compositions.
- After correcting for healthcare needs, we find that individuals with increased reimbursement status have a probability to receive day-care treatment that is 2 to 3 percentage points lower.
- There is no systematic association between healthcare supply and the probability to receive day care.
- The probability to receive day-care treatment is weakly associated with the region of residence. Individuals living in Brussels or Wallonia have a probability that is, ceteris paribus 2 to 4 percentage points lower than individuals living in Flanders. There is no effect of urbanization.

Table 38 – Regression output for the probability to have at least one day-care treatment in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)	Reduced model (Obs. = 31 476)	Reduced model 2008 (Obs. = 10 847)	Reduced model 2012 (Obs. = 10 352)	Reduced model 2016 (Obs. = 10 277)
Age and Sex (reference = female aged 18-34 years)					
Male aged 18-34 years	-0.024 (0.007)**	-0.023 (0.007)**	-0.035 (0.013)**	-0.029 (0.016)°	-0.021 (0.015)
Male aged 35-49 years	-0.004 (0.008)	-0.003 (0.008)	-0.014 (0.014)	-0.004 (0.014)	0.009 (0.016)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 476)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Female aged 35-49 years	0.014	(0.007)°	0.015	(0.007)*	-0.003	(0.011)	0.017	(0.013)	0.036	(0.016)*
Male aged 50-64 years	0.016	(0.008)*	0.018	(0.008)*	-0.002	(0.013)	0.015	(0.015)	0.045	(0.015)**
Female aged 50-64 years	0.024	(0.008)**	0.027	(0.008)***	0.010	(0.013)	0.032	(0.014)*	0.041	(0.015)**
Male aged 65-79 years	0.051	(0.012)***	0.053	(0.012)***	0.028	(0.018)	0.061	(0.018)***	0.062	(0.020)**
Female aged 65-79 years	0.044	(0.011)***	0.048	(0.011)***	0.014	(0.018)	0.051	(0.017)**	0.069	(0.018)***
Male aged 80 years or more	0.030	(0.016)°	0.034	(0.016)*	0.040	(0.026)	0.034	(0.025)	0.033	(0.028)
Female aged 80 years or more	0.000	(0.013)	0.005	(0.013)	-0.013	(0.029)	0.027	(0.024)	0.005	(0.025)
Self-assessed health (reference = very good)										
Self-assessed health - good	0.019	(0.004)***	0.019	(0.004)***	0.017	(0.008)*	0.031	(0.007)***	0.011	(0.009)
Self-assessed health - fair	0.033	(0.007)***	0.033	(0.007)***	0.035	(0.011)**	0.043	(0.011)***	0.019	(0.015)
Self-assessed health - bad	0.070	(0.013)***	0.067	(0.012)***	0.044	(0.016)**	0.071	(0.016)***	0.067	(0.020)***
Self-assessed health - very bad	0.083	(0.020)***	0.078	(0.019)***	0.056	(0.029)°	0.065	(0.025)**	0.080	(0.025)**
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.028	(0.009)**	0.028	(0.010)**	0.010	(0.013)	0.028	(0.015)°	0.039	(0.015)**
Chronic disorder, no limitations	0.015	(0.008)*	0.016	(0.007)*	0.007	(0.011)	0.026	(0.012)*	0.010	(0.013)
Chronic disorder, limitations	0.015	(0.008)°	0.015	(0.007)*	0.000	(0.010)	0.026	(0.012)*	0.018	(0.014)
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	-0.002	(0.010)								
Incapacity to work	0.159	(0.013)***	0.159	(0.013)***	0.116	(0.011)***	0.101	(0.012)***	0.127	(0.015)***
Entitled to lump sum chronic illness	0.077	(0.012)***	0.078	(0.012)***	0.066	(0.015)***	0.057	(0.014)***	0.073	(0.015)***
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	-0.034	(0.011)**	-0.034	(0.011)**	-0.020	(0.023)	-0.036	(0.022)°	-0.052	(0.026)*
Medication use - other disorder	0.053	(0.019)**	0.054	(0.019)**	0.019	(0.028)	0.035	(0.026)	0.078	(0.023)***
Medication use - cardiovascular disorder	0.005	(0.005)								
Medication use - thrombosis	0.014	(0.006)*	0.014	(0.006)*	0.001	(0.012)	0.007	(0.009)	0.026	(0.010)**

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 476)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Medication use - chronic obstructive pulmonary disease (COPD)	-0.005	(0.009)								
Medication use - asthma	0.016	(0.013)								
Medication use - diabetes	-0.004	(0.008)								
Medication use - epilepsy	-0.001	(0.012)								
Medication use - thyroid disorder	-0.020	(0.007)**	-0.020	(0.007)**	-0.009	(0.013)	-0.014	(0.013)	-0.037	(0.015)*
Community health centre										
Registered in community health centre	0.008	(0.015)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.025	(0.005)***	-0.025	(0.004)***	-0.018	(0.008)*	-0.023	(0.007)**	-0.033	(0.009)***
Region of residence - Brussels	-0.024	(0.016)	-0.031	(0.005)***	-0.028	(0.012)*	-0.031	(0.011)**	-0.036	(0.011)**
Urbanization - medium	0.006	(0.006)								
Urbanization - thin	0.010	(0.008)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.005	(0.006)	-0.005	(0.006)	-0.022	(0.011)*	0.005	(0.011)	0.000	(0.012)
Occupation - inactive	0.014	(0.009)	0.010	(0.008)	0.012	(0.010)	0.001	(0.013)	0.020	(0.015)
Occupation - self-employed in 2008	-0.026	(0.011)*	-0.025	(0.011)*	-0.031	(0.012)*				
Occupation - self-employed in 2012	-0.004	(0.016)	-0.004	(0.015)			-0.000	(0.016)		
Occupation - self-employed in 2016	-0.012	(0.014)	-0.012	(0.014)					-0.010	(0.017)
Occupation - unemployed	-0.010	(0.009)	-0.013	(0.008)	-0.022	(0.015)	-0.008	(0.016)	-0.010	(0.018)
Occupation - student	0.027	(0.012)*	0.027	(0.012)*	-0.008	(0.016)	0.050	(0.016)**	0.031	(0.019)°
Occupation - retired	0.015	(0.008)°	0.014	(0.008)°	0.008	(0.012)	0.005	(0.014)	0.028	(0.016)°
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.013	(0.007)°	-0.015	(0.007)*	-0.000	(0.011)	-0.017	(0.012)	-0.033	(0.013)*
Education degree - lower secondary	0.002	(0.006)	-0.000	(0.006)	-0.007	(0.009)	0.002	(0.010)	0.004	(0.012)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 476)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Education degree - upper secondary	0.002	(0.005)	-0.000	(0.005)	-0.004	(0.007)	-0.000	(0.007)	0.004	(0.009)
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.004	(0.005)								
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.016	(0.019)								
Household composition (reference = couple without children)										
Household composition - single without children	-0.019	(0.006)**	-0.020	(0.006)***	-0.023	(0.011)*	-0.021	(0.010)*	-0.017	(0.010)°
Household composition - single with children	-0.011	(0.010)	-0.014	(0.010)	-0.029	(0.018)	-0.016	(0.018)	0.002	(0.017)
Household composition - couple with children	-0.008	(0.007)	-0.009	(0.006)	-0.012	(0.010)	-0.004	(0.009)	-0.009	(0.011)
Household composition - other	-0.013	(0.006)*	-0.014	(0.006)*	-0.009	(0.011)	-0.026	(0.011)*	-0.005	(0.012)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.005	(0.006)								
Insurance status										
Insurance - increased reimbursement in 2008	-0.019	(0.009)*	-0.021	(0.009)*	-0.018	(0.010)°				
Insurance - increased reimbursement in 2012	-0.025	(0.009)**	-0.028	(0.009)**			-0.030	(0.011)**		
Insurance - increased reimbursement in 2016	-0.017	(0.008)*	-0.020	(0.008)*					-0.026	(0.011)*
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	-0.001	(0.001)	-0.000	(0.001)	-0.001	(0.001)	-0.000	(0.001)	0.000	(0.001)
Density of GPs in neighbouring municipalities	-0.005	(0.002)**	-0.003	(0.001)*	-0.002	(0.002)	-0.003	(0.002)	-0.005	(0.003)°
Density of specialists in municipality	0.000	(0.000)								
Density of specialists in neighbouring municipalities	0.001	(0.001)								
Distance to nearest ED	-0.000	(0.001)								
Number of EDs within 10km radius	-0.000	(0.001)								
Time (reference = 2008)										
Time: year 2012	0.005	(0.005)	0.006	(0.005)						

Independent variables	Full model (Obs. = 31 473)	Reduced model (Obs. = 31 476)	Reduced model 2008 (Obs. = 10 847)	Reduced model 2012 (Obs. = 10 352)	Reduced model 2016 (Obs. = 10 277)
Time: year 2016	0.022 (0.006)***	0.023 (0.006)***			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.7.2.3. Overview inequity and evolution in the different scenarios

Figure 53 visualizes the absolute Gini coefficient for inequality in the probability of having at least one day-care treatment in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of at least one day-care treatment in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 53, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe an increase in inequity in the probability to have received day care in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient increased from about 0.10 in 2008 to about 0.13 in 2016. Hence, we find that the disparity between individuals in the probability of having at least one day-care treatment in the past year that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 38 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not having received day care in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Based on the trends of the baseline scenario and the net effect needs-access scenario, we conclude that inequity in the probability to receive day care has increased over time when measured by the absolute Gini coefficient or the reversed relative Gini coefficient; and remained stable over time when measured by the relative Gini coefficient. This is a negative finding. The same pattern was found with respect to the probability to receive inpatient care, although the changes in the Gini coefficients are more pronounced (see section 1.6.2.3). Following the alternative approach (the baseline-residual scenario), we find an increase in the absolute and reversed relative Gini coefficient and a decrease in the relative Gini coefficient.

Figure 53 – Evolution (2008-2016) of the absolute Gini index by scenario

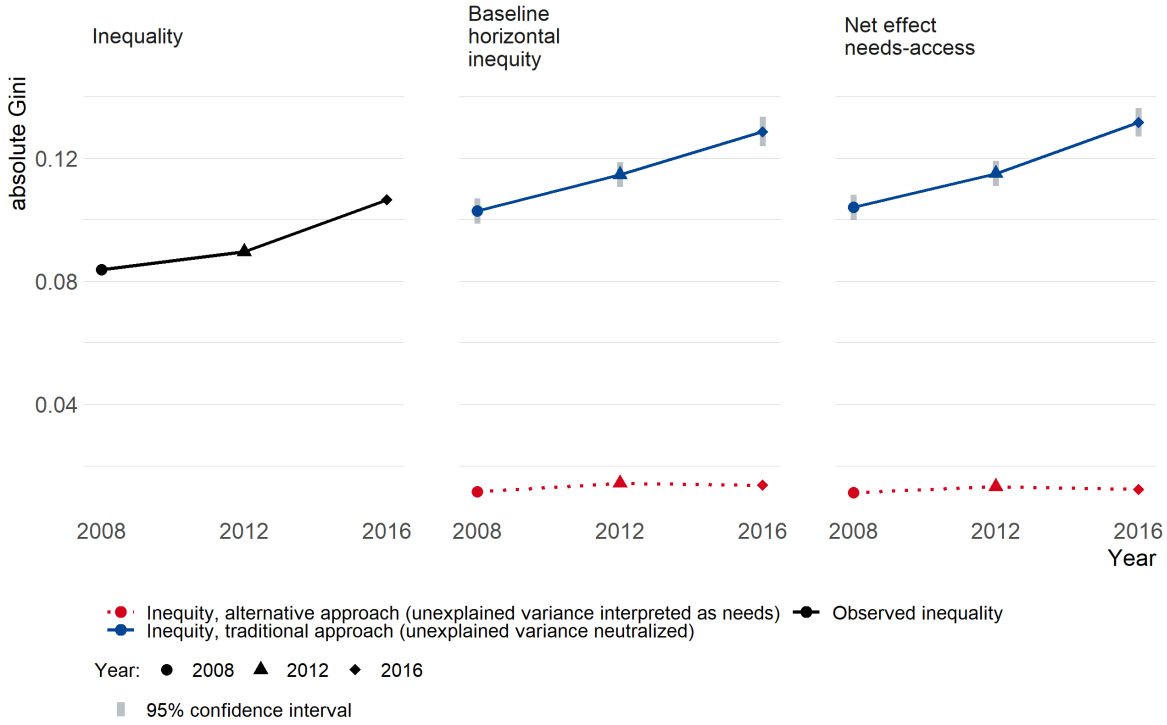


Table 39 – Evolution (2008-2016) of the inequity in the probability to have at least one day-care treatment in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.103	0.115^	0.129^*	↑
	Relative	0.829	0.803	0.796	→
	Reversed relative	0.113	0.127^	0.146^*	↑
Net effect needs-access	Absolute	0.104	0.115^	0.132^*	↑
	Relative	0.825	0.803	0.782	→
	Reversed relative	0.114	0.127^	0.149^*	↑
Baseline-residual	Absolute	0.012	0.014^	0.014^*	↑
	Relative	0.125	0.144^	0.113^*	↓
	Reversed relative	0.013	0.016^	0.016^	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.7.2.4. Overview inequity over time for different population subgroups

Figure 54 and Figure 55 show how the probability to have a day-care treatment in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 54, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 55, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability of having a day-care treatment than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 54 and Figure 55 indicate that in the inequality scenario, the probability to receive day-care treatments deviates from the population average for subgroups based on healthcare needs, with higher probabilities for subgroups with fair, bad or very bad self-assessed health, with a chronic disorder and limitations, with invalidity allowance or over-80 year olds. Once a correction for needs is made (various inequity scenarios), the deviations from the population average are mitigated or reversed, i.e. probabilities below (but close to) the population average. The negative gap is likely related to the negative relation between increased reimbursement status and the probability of day-care treatment (see section 1.7.2.2). This

negative association is equally visible in the below-average probability for individuals with increased reimbursement status in Figure 55. It spills over to other groups with an important fraction of individuals who benefit from increased reimbursement (e.g. individuals at risk of poverty, or with higher care needs).

Secondly, there are no inequities with respect to income and education, with the exception of a probability below the population average for individuals with primary education in 2012 and 2016. Third, there are some small negative deviations relative to the population mean for financially vulnerable subgroups, such as individuals in households with material deprivation, individuals in households at risk of poverty, individuals who are unemployed and individuals with increased reimbursement. These deviations are small. There is, however, no clear pattern between inequities and inequalities. For other indicators, we generally find that inequalities are more pronounced than inequities; this is not the case for day care treatment where inequalities can be smaller than (e.g. individuals with increased reimbursement), bigger than (e.g. single parent households) or similar to inequities (e.g. material deprivation).

The results are consistent in the baseline scenario and the net effect needs-access scenario; the deviations are somewhat smaller in the baseline-residual scenario.

Figure 54 – Deviation in the needs-corrected probability to have at least one day-care treatment in the past year from population average for subgroups based on income, education and self-assessed health, by scenario and year

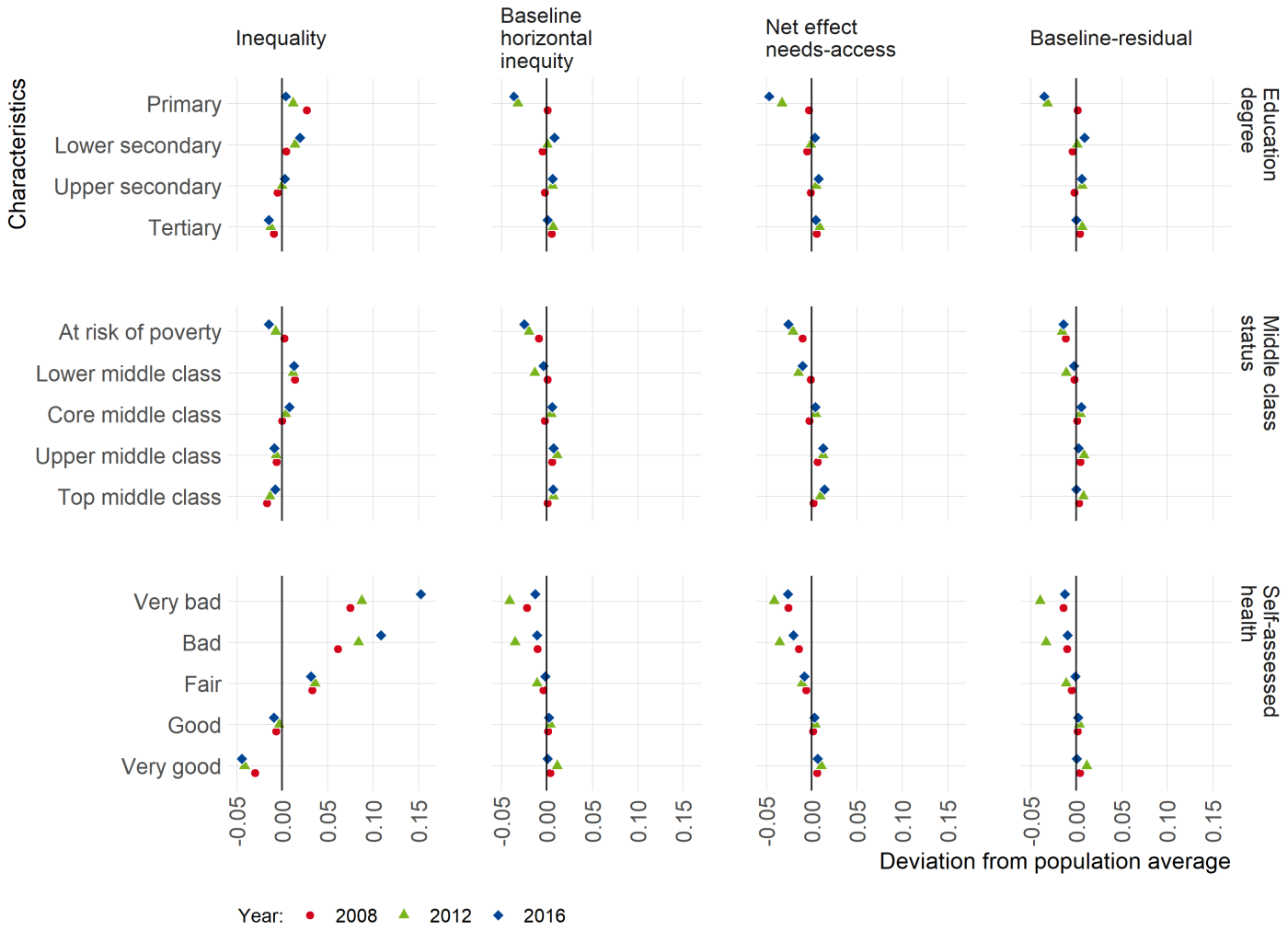


Figure 55 – Deviation in the needs-corrected probability to have at least one day-care treatment in the past year from population average for specific vulnerable subgroups, by scenario and year

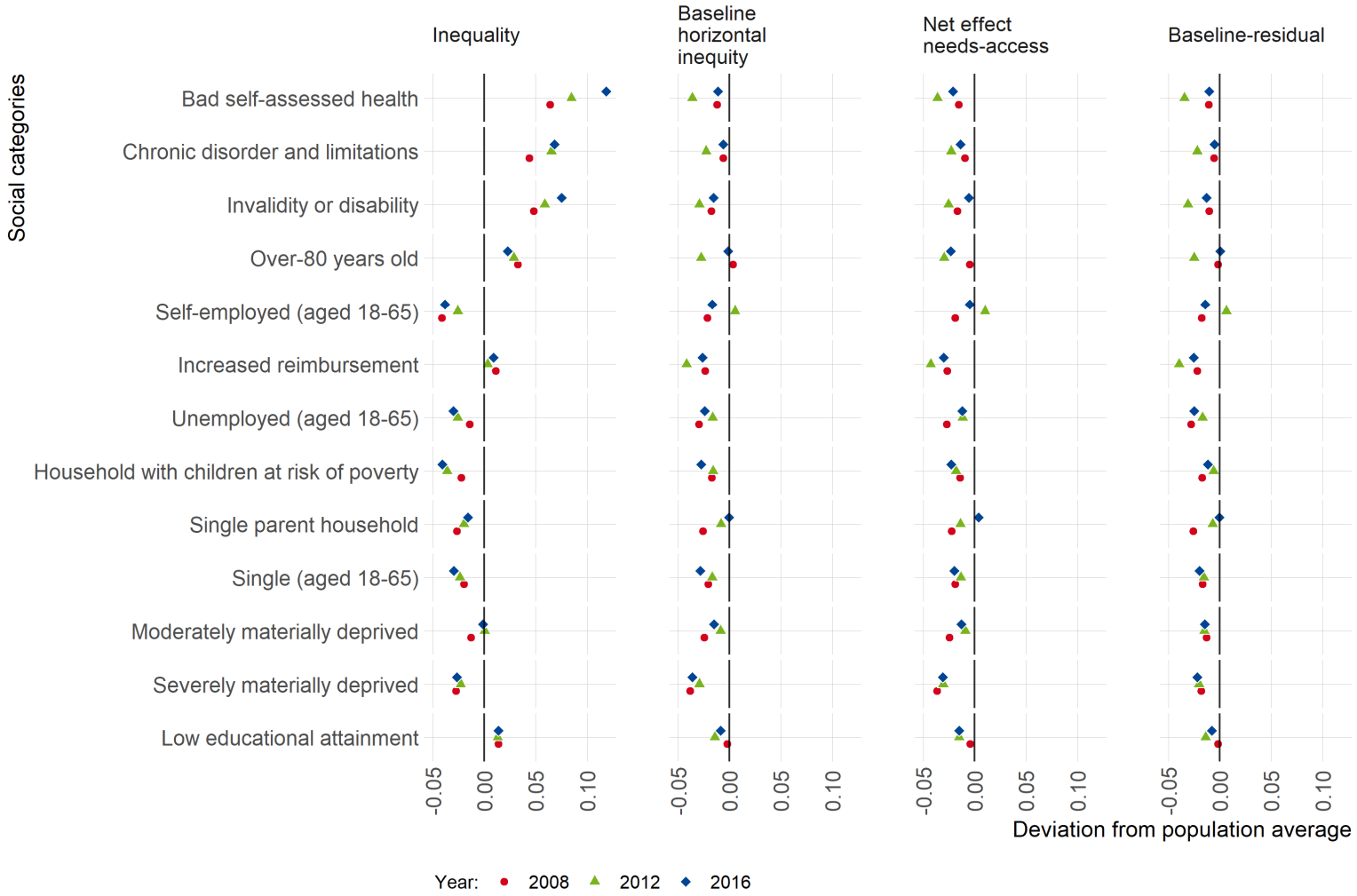
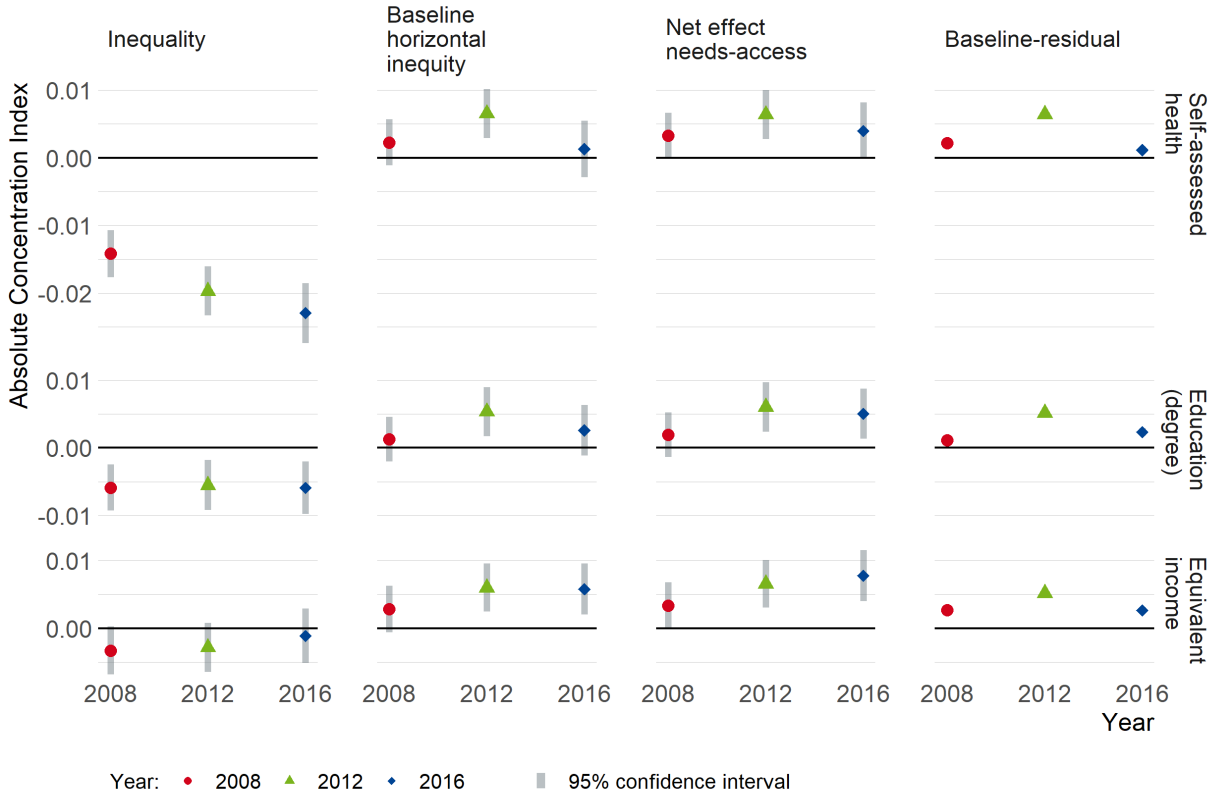


Figure 56 shows the absolute concentration index of the needs-corrected probability to have at least one day-care treatment in the past year to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of receiving day care concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 56 show that there are systematic socioeconomic inequalities in the probability to have at least one day-care treatment in the past year with respect to self-assessed health and, to a minor extent, education, with a higher probability among individuals with worse self-assessed health with lower educational attainment. However, after correcting for needs, the concentration index indicates that there are no systematic inequities with respect to health and very small, but growing inequities with respect to education (net effect needs-access scenario) and income (baseline horizontal inequity scenario and net effect needs-access scenario).

Figure 56 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.7.3. Conditional number of day-care treatments in the past year

1.7.3.1. Evolution over time for the population and population subgroups

Table 40 and Figure 57 show the evolution over time of the average annual number of day-care treatments for individuals with at least one treatment. There was no information in the KCE HSPA report of 2019 on the population average number of day-care treatments, hence only the number of day-care treatments in the EU-SILC/IMA-AIM sample is reported.[18] Table 37 and Figure 52 showed that the probability of having at least one day-care treatments was about 10% and saw a minor increase over time from 8.6% in 2008 to 9.2% in 2012 and 10.9% in 2016. Table 40 and Figure 57 indicate that not only the probability, but also the conditional number of day-care treatments has increased, i.e. the average number of day-care treatments per individual given at least one treatment, from 1.56 treatments in 2008 to 1.65 treatments in 2012 and 1.73 treatments in 2016. When restricting the sample to the adult population (18+), the conditional number of day-care treatments is lower and the growth over time is smaller. This implies that the advancement of day-care treatment was faster among children than adults. The majority of the individuals with day-care treatment has only 1 treatment, between 72% and 75% in each of the assessed years; 15% to 16% has two treatments, 3% to 6% has three treatments and the remaining 6% to 7% has more than three treatments.

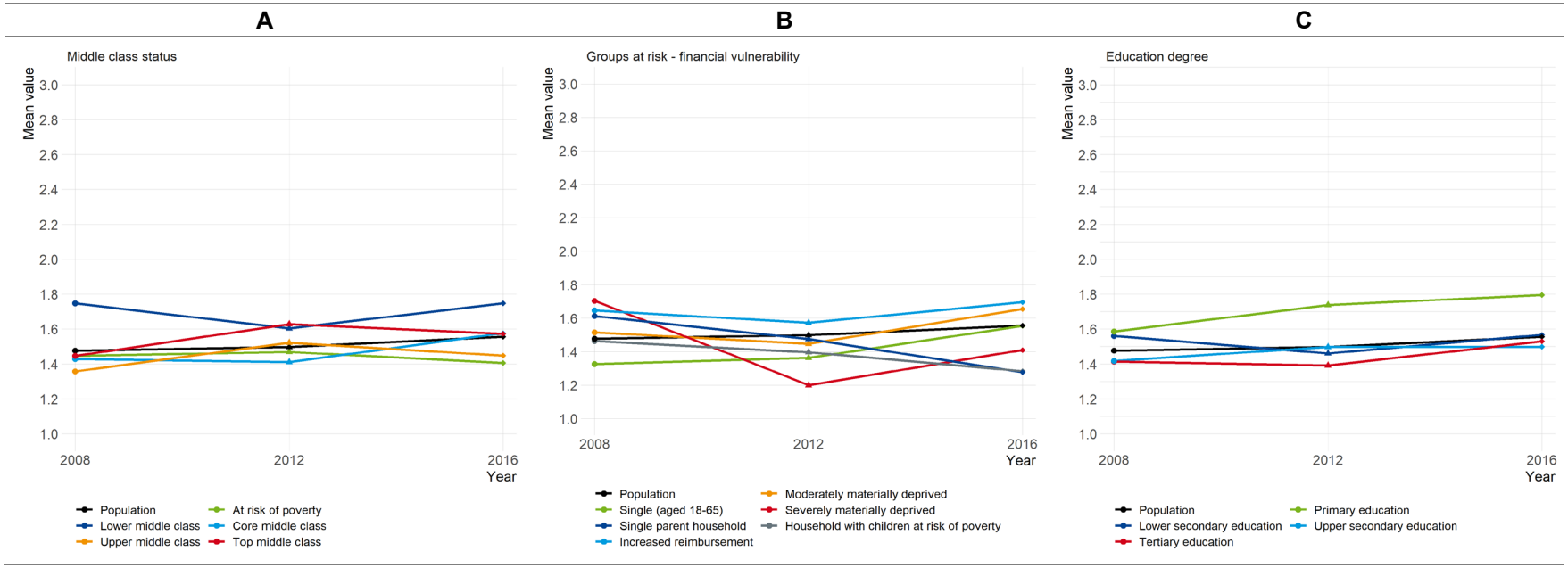
Table 40 – Evolution (2008-2016) of the number of day-care treatments in the past year given at least one treatment

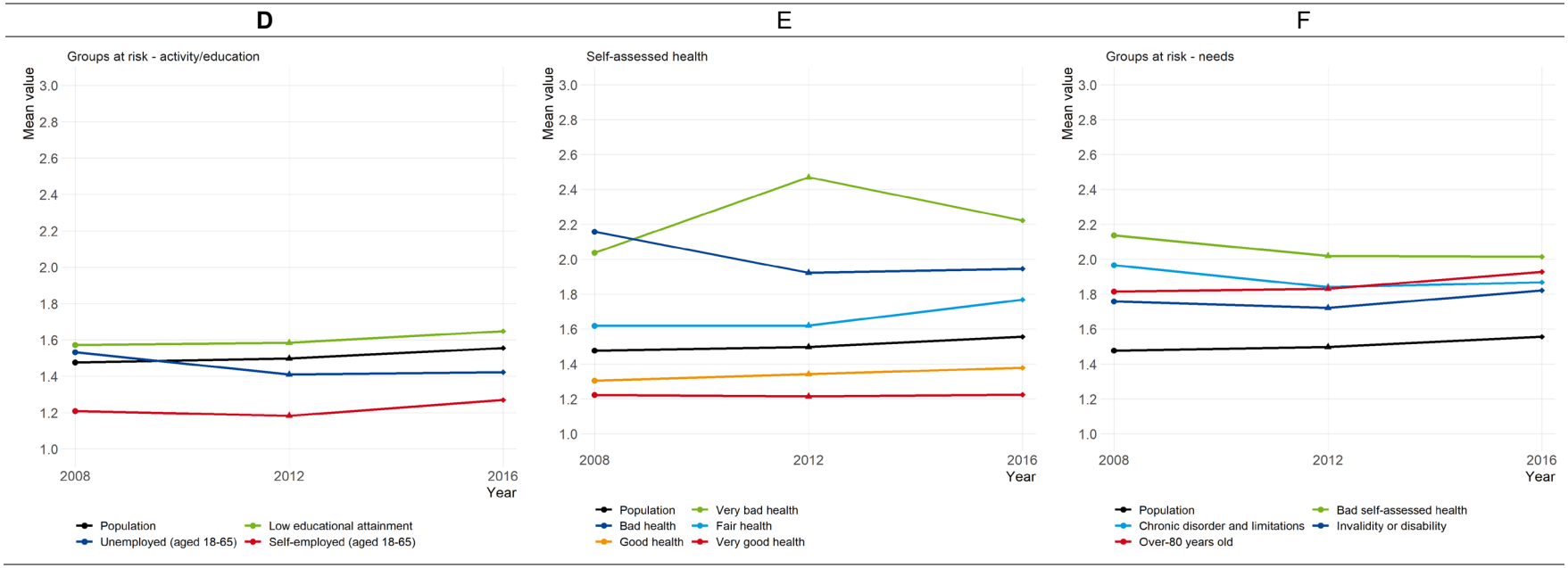
Sample	Definition	2008	2012	2016
Survey (all)	Indicator	1.56	1.65	1.73
Survey (18+)	Indicator	1.48	1.50	1.56

Figure 57 shows the evolution of the number of day-care treatments conditional on having at least one treatment, for a variety of population subgroups (see section 1.1.2).

First, we find little variation over time for most population subgroups. We do find a decrease in number of treatments for individuals with severe material deprivation in 2012 (panel B), among singles between 18 and 65 and households with children at risk of poverty (panel B), for individuals with bad self-assessed health or chronic disorders (panel E). This may equally be random variation given the small size of the population subgroup conditional on receiving day care. Second, we find little variation in the conditional annual average number of day-care treatments by income (panel A), educational attainment (panel C), activity status (panel D) and among financially vulnerable subgroups (panel B). Self-employed individuals, however, have a lower conditional number of day-care treatments, while individuals with primary education have a higher number (panel D and C). Remark that individuals with a degree of primary education had an atypical evolution in the probability to have day-care, which was stable, while for the population in general, an increase was observed (see section 1.7.2.1). The subgroup of individuals with increased reimbursement has a conditional number of day-care treatments above the population mean (panel B). Third, a higher number of treatments (annually between 1.7 and 2.6 on average compared to the population average of 1.5, see panel E and F) is observed for individuals with higher care needs, i.e. those in (very) bad health, with chronic disorders and limitations to daily activities, over-80 year olds and individuals with invalidity/disability.

Figure 57 – Evolution (2008-2016) of the number of day-care treatments given at least one treatment for different subgroups and populations groups at risk





1.7.3.2. Regression output

Table 41 reports the average marginal effects of a generalized negative binomial count model[f] for the sample of individuals with at least one day-care treatment (see section 1.1.3). The results should be interpreted as a change in number of treatments expressed in treatments.

There are few significant associations in the regression analysis, especially in the year specific models. This is at least partly related to the small sample size, but might also indicate relatively little variation in number of day-care treatments explained by the characteristics in the model. In fact most individuals with a treatment in the past year only have one (see section 1.7.3.1). We find the following associations:

- **Healthcare needs** are associated with the number of day-care treatments.

[f] A truncated negative binomial model was the preferred choice, but did not converge.

- Individuals in the age-category 18 to 34 have, ceteris paribus, fewer day-care treatments than individuals aged 35+.
- There is a consistent association between self-reported health status and the conditional number of treatments. A higher number of conditional treatments is found as health is worse, although the effect is not always significant. We find an additional number of 0 to 0.6 treatments for individuals reporting fair, bad or very bad health. There is no systematic relation between the presence of a chronic disorder or limitations to daily activities and the conditional number of day-care treatments.
- Administrative health information: We find a reduction in the conditional number of treatments for individuals who receive an invalidity allowance. It may be that the presence of an invalidity may bring additional complications and hence day care is not necessarily the most appropriate treatment option. We find a strong association between individuals eligible for the lump sum chronic illness and the conditional number of treatments, with an additional 1 to 1.2 treatments. Being incapacitated for work is also positively associated with the conditional number of day-care treatments, but the association is not very strong and only significant in 2008 (+0.2 treatments). The effect on GP, specialist, emergency and inpatient care was much more pronounced for this group (see sections 1.3.3.2, 1.4.3.2 and 1.6.3.2).
- Medication use: a consistent negative association is found, which is, however, small in size and not always significant. As for invalidity, the presence of a particular disorder may lead to complications and day care may therefore not be the most appropriate treatment.
- There is no systematic association between the conditional number of day-care treatments and membership of a community health centre.

- There is very little variation in the conditional number of day-care treatments by **socioeconomic profile**.
  - We find some year-specific effects on the conditional number of day-care treatment, with e.g. an increase of 0.4 treatments in 2008 for individuals who are unemployed and a decrease of 0.8 hospitalziations for students in 2012, compared to full-time employees.
- Individuals who benefit from **increased reimbursement** have a lower number of day-care treatments (0.1 to 0.3 fewer treatments)
- There is a weakly significant negative effect of the density of specialist in the municipality on the conditional number of day-care treatment, implying that a higher density of specialists leads to a lower average number of day-care treatments.
- The conditional number of day-care treatments is about 0.2 to 0.4 treatments lower in Wallonia in comparison with Flanders. No significant difference was found between Flanders and Brussels. There is no effect of urbanization.

Table 41 – Regression output for the conditional number of day-care treatments, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 3 302)	Reduced model (Obs. = 3 303)	Reduced model 2008 (Obs. = 1 019)	Reduced model 2012 (Obs. = 1 055)	Reduced model 2016 (Obs. = 1 229)
Age and Sex (reference = female aged 18-34 years)					
Male aged 18-34 years	0.046 (0.087)	0.044 (0.088)	-0.023 (0.285)	0.665 (9.740)	0.936 (0.472)*
Male aged 35-49 years	0.284 (0.096)**	0.275 (0.093)**	0.367 (0.279)	0.769 (1.728)	1.130 (0.425)**
Female aged 35-49 years	0.269 (0.082)**	0.283 (0.080)***	0.257 (0.279)	0.763 (1.241)	0.538 (0.389)
Male aged 50-64 years	0.254 (0.076)***	0.232 (0.071)**	0.225 (0.402)	0.770 (1.157)	0.610 (0.393)
Female aged 50-64 years	0.289 (0.116)*	0.232 (0.074)**	-0.103 (0.704)	0.966 (1.086)	0.629 (0.385)
Male aged 65-79 years	0.450 (0.111)***	0.383 (0.093)***	0.559 (0.374)	1.028 (0.954)	0.847 (0.405)*
Female aged 65-79 years	0.371 (0.100)***	0.311 (0.087)***	0.339 (0.247)	0.851 (0.349)*	0.753 (0.407)°
Male aged 80 years or more	0.458 (0.166)**	0.424 (0.143)**	0.492 (0.281)°	1.032 (0.358)**	0.930 (0.452)*
Female aged 80 years or more	0.449 (0.146)**	0.400 (0.122)**	0.602 (0.317)°	0.829 (0.735)	0.955 (0.433)*
Self-assessed health (reference = very good)					
Self-assessed health - good	0.063 (0.060)	0.047 (0.062)	-0.072 (0.194)	0.181 (0.737)	-0.054 (0.178)
Self-assessed health - fair	0.151 (0.082)°	0.152 (0.076)*	0.030 (0.146)	0.108 (0.213)	0.307 (0.178)°
Self-assessed health - bad	0.258 (0.115)*	0.253 (0.097)**	0.186 (0.743)	0.216 (0.204)	0.111 (0.212)
Self-assessed health - very bad	0.396 (0.210)°	0.297 (0.160)°	0.399 (0.525)	0.383 (0.385)	0.630 (0.263)*
Self-reported chronic disorders and limitations daily activities (reference = none)					
No chronic disorder, limitations	0.230 (0.135)°	0.183 (0.086)*	0.077 (0.208)	0.263 (0.578)	0.147 (0.116)
Chronic disorder, no limitations	0.123 (0.087)	0.113 (0.078)	0.117 (0.233)	0.446 (0.174)*	-0.002 (0.154)
Chronic disorder, limitations	0.166 (0.083)*	0.149 (0.066)*	0.400 (0.135)**	0.550 (0.597)	0.042 (0.116)
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)					
Invalid or disabled	-0.226 (0.067)***	-0.173 (0.064)**	-0.358 (0.059)***	-0.143 (0.940)	-0.273 (0.131)*
Incapacity to work	0.257 (0.088)**	0.246 (0.080)**	0.239 (0.040)***	0.437 (0.686)	-0.037 (0.131)
Entitled to lump sum chronic illness	1.288 (0.170)***	1.221 (0.144)***	0.981 (0.444)*	1.106 (0.395)**	1.228 (0.151)***
Clinical profile based on medication use (reference = no disorder)					

Independent variables	Full model (Obs. = 3 302)		Reduced model (Obs. = 3 303)		Reduced model 2008 (Obs. = 1 019)		Reduced model 2012 (Obs. = 1 055)		Reduced model 2016 (Obs. = 1 229)	
Medication use - neurological disorder	-0.270	(0.143)°	-0.281	(0.073)***	-0.502	(0.233)*	0.069	(2.121)	-0.390	(0.284)
Medication use - other disorder	-0.263	(0.117)*	-0.265	(0.099)**	-0.751	(0.343)*	0.005	(0.609)	-0.843	(0.317)**
Medication use - cardiovascular disorder	0.037	(0.058)								
Medication use - thrombosis	0.007	(0.058)								
Medication use - chronic obstructive pulmonary disease (COPD)	-0.152	(0.083)°	-0.183	(0.056)**	-0.386	(0.609)	-0.269	(1.005)	-0.137	(0.145)
Medication use - asthma	0.077	(0.134)								
Medication use - diabetes	-0.150	(0.067)*	-0.128	(0.056)*	-0.215	(0.196)	-0.184	(0.528)	-0.326	(0.127)**
Medication use - epilepsy	0.171	(0.194)								
Medication use - thyroid disorder	0.015	(0.096)								
Community health centre										
Registered in community health centre	-0.105	(0.127)	-0.132	(0.098)	0.057	(0.579)	0.054	(0.601)	0.079	(0.203)
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.263	(0.058)***	-0.202	(0.040)***	-0.279	(0.131)*	-0.190	(0.479)	-0.363	(0.095)***
Region of residence - Brussels	-0.310	(0.127)*	-0.140	(0.080)°	0.205	(0.926)	0.054	(1.978)	-0.340	(0.179)°
Urbanization - medium	-0.068	(0.065)								
Urbanization - thin	0.133	(0.091)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.222	(0.119)°	0.167	(0.103)	0.382	(0.175)*	0.233	(0.192)	0.042	(0.176)
Occupation - inactive	0.194	(0.108)°	0.198	(0.096)*	0.299	(0.538)	0.032	(0.293)	0.252	(0.151)°
Occupation - self-employed in 2008	-0.142	(0.202)	-0.206	(0.143)	-0.105	(0.189)				
Occupation - self-employed in 2012	-0.239	(0.175)	-0.188	(0.180)			-0.201	(0.707)		
Occupation - self-employed in 2016	-0.100	(0.216)	-0.152	(0.142)					-0.119	(0.312)
Occupation - unemployed	0.115	(0.131)	0.118	(0.117)	0.415	(0.156)**	0.183	(0.816)	0.092	(0.250)
Occupation - student	-0.258	(0.108)*	-0.245	(0.102)*	0.108	(0.353)	-0.775	(0.069)***	-0.499	(0.653)
Occupation - retired	0.110	(0.098)	0.114	(0.087)	0.135	(0.225)	0.104	(0.945)	-0.030	(0.193)

Independent variables	Full model (Obs. = 3 302)	Reduced model (Obs. = 3 303)	Reduced model 2008 (Obs. = 1 019)	Reduced model 2012 (Obs. = 1 055)	Reduced model 2016 (Obs. = 1 229)
Highest obtained educational degree (reference = tertiary education)					
Education degree - primary	0.041 (0.092)				
Education degree - lower secondary	0.065 (0.082)				
Education degree - upper secondary	0.042 (0.065)				
Equivalized disposable household income					
Income (natural logarithm - linear & squared)	0.116 (0.087)				
Socioeconomic status (reference = not materially deprived)					
Severe material deprivation index	0.078 (0.283)				
Household composition (reference = couple without children)					
Household composition - single without children	-0.073 (0.068)	-0.025 (0.065)	-0.214 (0.399)	0.228 (0.183)	-0.123 (0.114)
Household composition - single with children	0.150 (0.290)	0.166 (0.211)	0.458 (0.308)	0.331 (0.244)	-0.177 (0.316)
Household composition - couple with children	-0.065 (0.079)	-0.102 (0.061)°	-0.145 (0.608)	0.011 (0.353)	-0.219 (0.152)
Household composition - other	-0.171 (0.070)*	-0.163 (0.059)**	-0.453 (0.450)	0.224 (0.020)***	-0.165 (0.156)
Country of birth (reference = Belgium)					
Country of birth other than Belgium	0.172 (0.098)°	0.175 (0.088)*	-0.025 (0.120)	0.462 (0.562)	0.075 (0.121)
Insurance status					
Insurance - increased reimbursement in 2008	-0.119 (0.104)	-0.121 (0.088)	-0.051 (0.421)		
Insurance - increased reimbursement in 2012	-0.152 (0.089)°	-0.198 (0.065)**		-0.276 (0.124)*	
Insurance - increased reimbursement in 2016	-0.127 (0.102)	-0.186 (0.068)**			-0.236 (0.105)*
Healthcare supply (density per 10 000 population, distance in km)					
Density of GPs in municipality	-0.008 (0.012)				
Density of GPs in neighbouring municipalities	-0.016 (0.023)				
Density of specialists in municipality	-0.002 (0.004)	-0.005 (0.002)*	-0.003 (0.032)	0.001 (0.032)	-0.007 (0.005)
Density of specialists in neighbouring municipalities	0.007 (0.008)	0.004 (0.004)	0.009 (0.011)	-0.010 (0.146)	0.004 (0.008)
Distance to nearest ED	0.009 (0.006)				

Independent variables	Full model (Obs. = 3 302)	Reduced model (Obs. = 3 303)	Reduced model 2008 (Obs. = 1 019)	Reduced model 2012 (Obs. = 1 055)	Reduced model 2016 (Obs. = 1 229)
Number of EDs within 10km radius	0.012 (0.011)				
Time (reference = 2008)					
Time: year 2012	-0.006 (0.065)	0.007 (0.058)			
Time: year 2016	0.006 (0.058)	0.054 (0.047)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.7.3.3. Overview inequity and evolution in the different scenarios

Figure 58 visualizes the absolute Gini coefficient for inequality in the conditional number of day-care treatments in the past year (so without needs correction) as well as inequity in the fairness gap for the conditional number of day-care treatments in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 58, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower or even close to zero, indicating the absence of inequity.

If we follow the traditional approach, the results of the baseline inequity scenario indicate an increase in inequity in the conditional number of day-care treatments in the past year. In the net effect needs-access scenario, the trend is stable over time. Hence, we find that the disparity between individuals in the number of day-care treatments that cannot be explained and justified by (observable) healthcare needs has increased over time in the baseline scenario and remained the same in the other two scenarios.

Table 42 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

In the baseline horizontal inequity scenario, an upward trend in inequity is measured by both the absolute and relative Gini index, the latter effect is however not significant. In the other scenarios, a constant trend is found for the absolute as well as the relative Gini index.

Figure 58 – Evolution (2008-2016) of the absolute Gini index by scenario

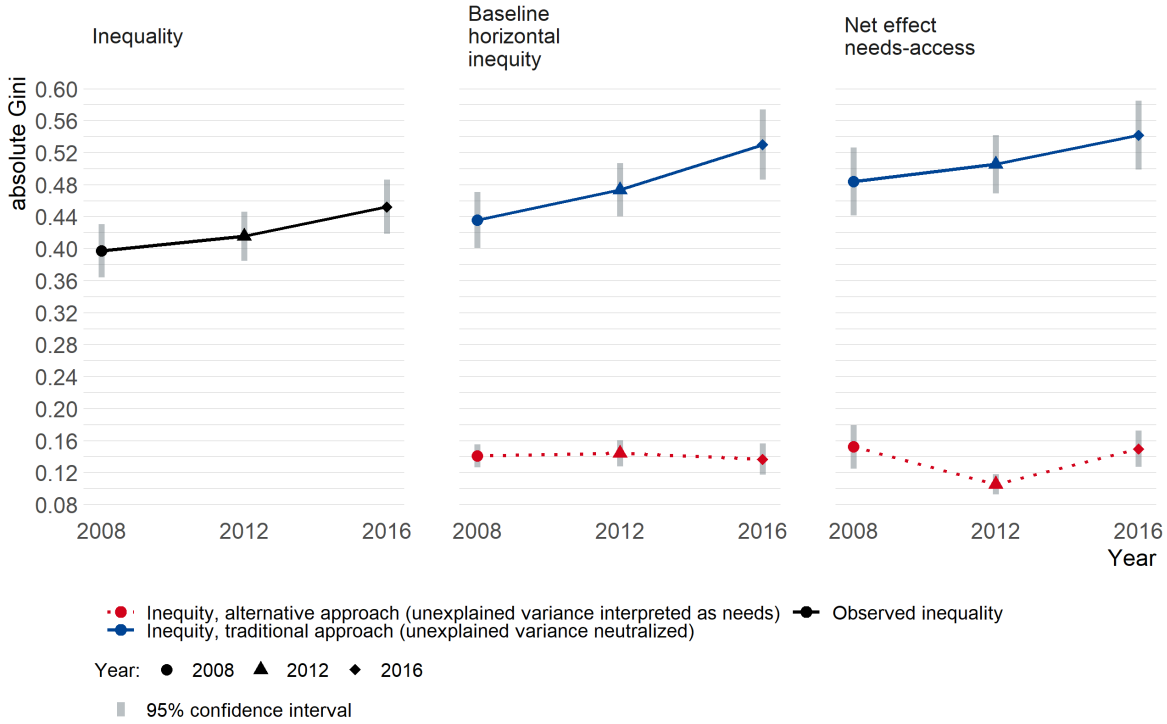


Table 42 – Evolution (2008-2016) of the inequity in the conditional number of day-care treatment for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.436	0.473	0.530^	↑
	Relative	0.295	0.316	0.341	→
Net effect needs-access	Absolute	0.484	0.506	0.542	→
	Relative	0.327	0.337	0.348	→
Baseline-residual	Absolute	0.141	0.144	0.137	→
	Relative	0.095	0.096	0.088	→

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).

**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*

§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.7.3.4. Overview inequity over time for different population subgroups

Figure 59 and Figure 60 show how care use in various population subgroups differs from the population average when looking at inequality as well as inequity. When analysing inequity, a correction is made for healthcare needs and preferences according to the different inequity-scenarios, both for the average population and subgroup value. In Figure 59, population groups are defined based on categories of equivalized income, categories of education degree, and categories of self-assessed health. In Figure 60, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower number of day-care treatments than the population average. Values to the right of the vertical line, on the other hand, indicate a higher number of treatments than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

In both Figure 59 and Figure 60, we find that deviations from the population mean are generally limited, both in the inequality and the inequity scenarios, most deviations are in the range -0.5/+0.5, with the exception of very bad self-assessed health. Given the small sample size, the observed differences might be partly related to random variation.

For individuals reporting a very bad health status, but more general for subgroups based on healthcare needs, such as individuals with bad health, invalidity, high age or presence of a chronic disorder and limitations, we find positive deviations in the inequality scenario, i.e. a higher conditional number of treatments; after correcting for needs, the deviation has disappeared or turned negative in the baseline horizontal inequity scenario and the net effect needs-access scenario.

There are two reasons for the negative conditional number of day-care treatments: unexplained variability and the negative relation between increased reimbursement status and the number of day-care treatments (see section 1.7.3.2). First, in the baseline-residual scenario, there are almost no negative deviations. This suggest that the negative deviations in the baseline horizontal inequity scenario are at least partly related to the

unexplained variability in the data and its treatment in the different scenarios as a source of justified differences in care use (e.g. because they reflect unmeasured healthcare needs) or unjustified differences (e.g. because they reflect unmeasured differences in socioeconomic status). The difference between the baseline horizontal inequity scenario and the baseline-residual scenario, i.e. negative deviations relative to the population mean in the baseline horizontal inequity scenario and no or small deviations in the baseline-residual scenario, are also visible for population subgroups in financial vulnerable situations, such as individuals at risk of poverty, with increased reimbursement or materially deprived. The underlying reason is the same, i.e. individuals in financially vulnerable situations tend to have higher care needs (see Scientific report section 2.4.1). Second, there is a negative association between increased reimbursement status and the conditional number of day-care treatments. This negative association presents itself in Figure 60 through the below-average number of day-care treatments for individuals with increased reimbursement status. It spills over to other groups with an important fraction of individuals who benefit from increased reimbursement (e.g. individuals at risk of poverty, with primary education, or with higher care needs).

Our main findings are:

- Disparities between income and educational groups are limited both before correction for healthcare need (inequality) as after correcting for needs (inequity). However, for individuals with a degree of primary education, the effects go in opposite directions with inequalities [inequities] indicating a conditional number of treatment above [below] the population average.
- There is an important discrepancy in the results for inequality and inequity with respect to self-assessed health. The finding for inequality indicate a below-average number of treatments for individuals reporting (very) good health and above-average for individuals reporting (very) bad health. The findings for inequity, on the other hand, show a below-average number of treatments for individuals reporting very bad health, and a needs-corrected conditional number of treatments in line with the population mean for the other subgroups. This illustrates the importance of correcting for healthcare needs before comparing population subgroups. As explained above, the important negative deviation for the subgroup reporting very bad self-assessed health in the baseline horizontal inequity scenario contrasts sharply with the small deviation for this group in the baseline-residual inequity scenario. This suggest that the deviation is at least partly related to the treatment of the unexplained variance in the data in the different inequity scenarios and may reflect unmeasured healthcare needs.
- Among the vulnerable groups, we find that once a correction is made for healthcare needs (baseline scenario), subgroups with high care needs have a number of day-care treatments that is below the population average. Subgroups related to the financial situation of individuals (at risk of poverty, increased reimbursement, unemployment, material deprivation) generally have a lower number of day-care treatments. This likely reflects the same effect as for the population groups with high care needs as there is an overlap between population subgroups with low income and population subgroups with high care needs.
- The results in the baseline-residual scenario show smaller deviations (and sometimes positive deviations) relative to the population mean than the results in the other inequity scenarios.

Figure 59 – Deviation in the needs-corrected conditional number of day-care treatment from population average for subgroups based on income, education and self-assessed health, by scenario and year

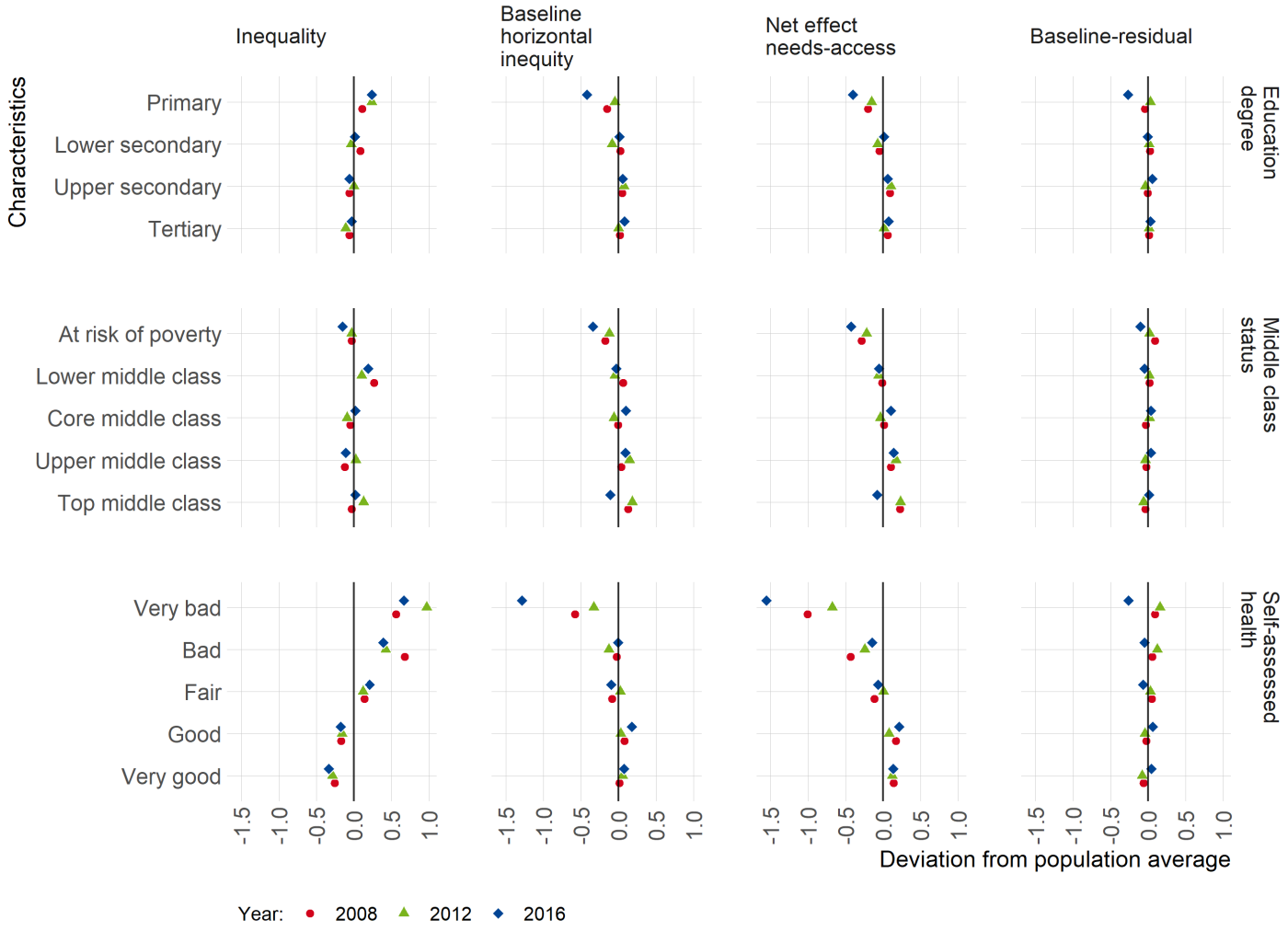


Figure 60 – Deviation in the needs-corrected conditional number of day-care treatment from population average for specific vulnerable subgroups, by scenario and year

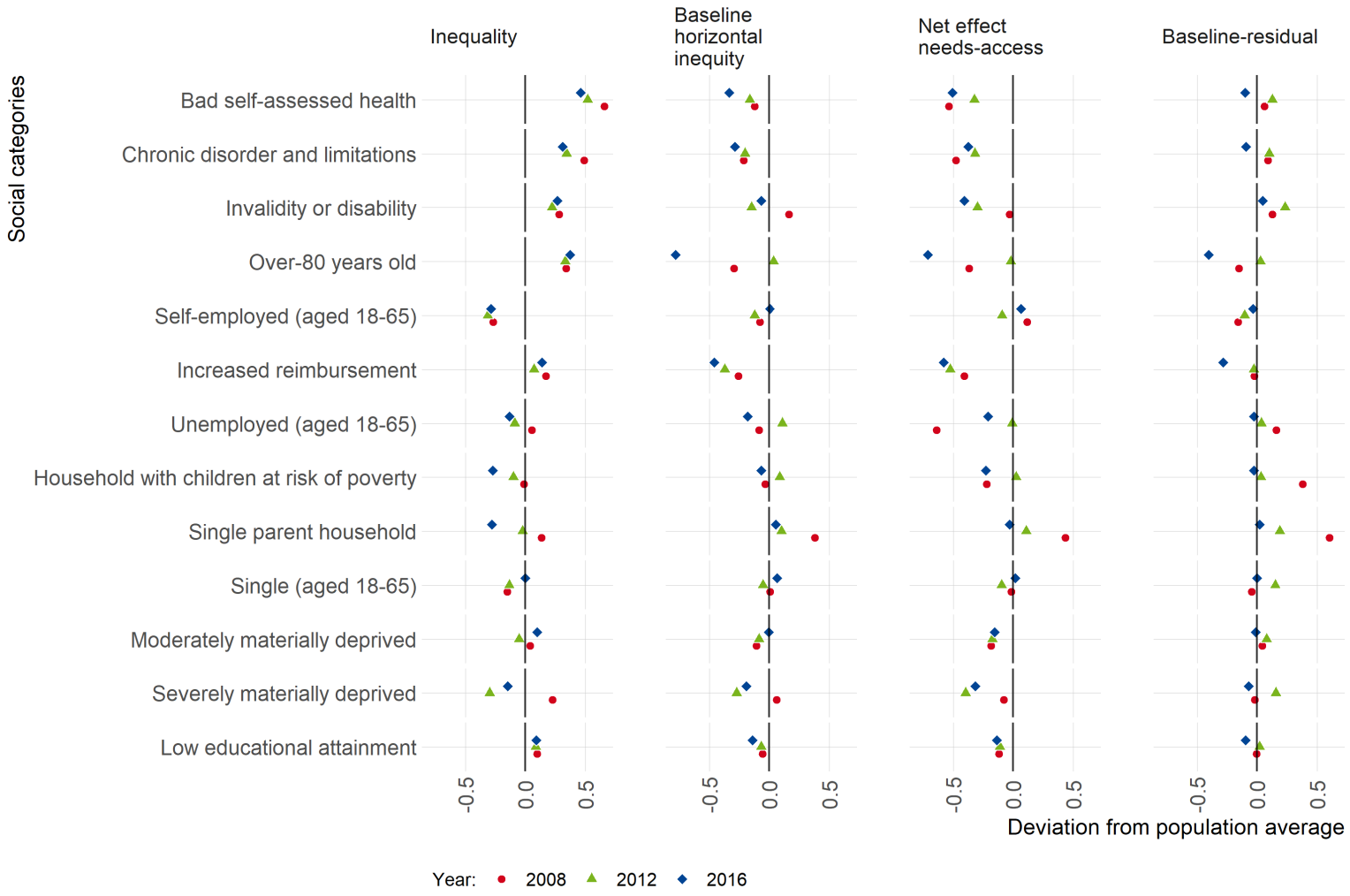
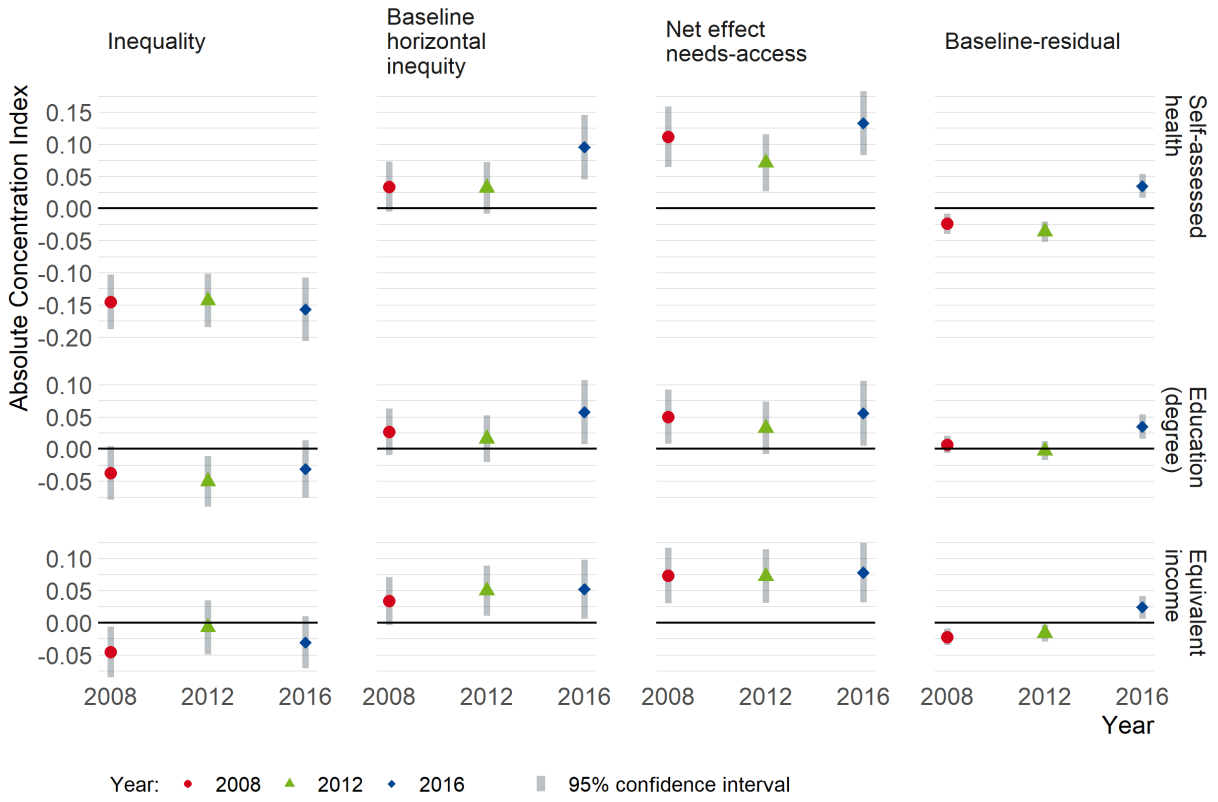


Figure 61 shows the absolute concentration index of the needs-corrected number of day-care treatments to self-assessed health, education and income for the different inequity scenarios. Instead of comparing population (subgroup) averages as in Figure 59, the absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher need-corrected number of day-care treatments concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher need-corrected number of day-care treatments for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 61 reveal systematic inequalities in number of day-care treatments by self-assessed health (inequality). After correcting for healthcare needs, the concentration index indicates no systematic socioeconomic inequity with respect to education. The effects with respect to self-assessed health and income are very small and only borderline significant. They are in favour of individuals with better self-assessed health and higher income. The even smaller coefficient of the concentration index in the baseline-residual scenario again indicates that the effects are related to the unexplained variance in the model. We therefore conclude that there is no relevant systematic socioeconomic inequity with respect to the conditional number of day-care treatments.

Figure 61 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.8. Regular dentist visits

1.8.1. Summary

We analyse inequity in the probability to have regular dentist visits). First we look at all dentist visits (curative and preventive combined); next we restrict the analysis to preventive dentist visits.

Regular dentist visits are defined as contacts with a dentist in at least 2 of the past 3 years. A contact with a dentist is identified through the professional code of the provider:

- The first two digits of the professional code (variable practitioner_cat in IMA-AIM GZSS database) greater or equal to 30 and lower or equal to 39, or
- The first two digits of the professional code (variable practitioner_cat in IMA-AIM GZSS database) greater or equal to 10 and lower or equal to 19 and the qualification of the healthcare provider (variable ss00065B in IMA-AIM GZSS database) equal to 52, 520, 152, 222, 422, 521.

Preventive dentist visits are identified through the nomenclature codes with an additional requirement that the nomenclature is between 301276 and 301361, 301394 to 302540, 371394 to 371486, or 371556 to 372540.

We analyse the evolution in the period 2009 to 2016; 2009 was chosen instead of 2008 (which is used for the other indicators) since we need three years of data to calculate the indicator and we only have IMA data as from 2007.

Key points inequity in regular dentist visits and regular preventive dentist visits

- EU-SILC/IMA-AIM survey value for the indicators is above the population value, but follows the same upward trend over time.
- 52% of the surveyed adults in 2009 and 2012 and 57% in 2016 had regular dentist visits; when restricting to preventive dentist visits the fractions amount to 27%, 26% and 32% in 2009, 2012 and 2016, respectively. Higher visit rates are found among individuals with better health status.

Probability to have regular dentist visits

- Limited association with healthcare needs, but important variation by socioeconomic status. **Main associations (regression):**
  - Health status: visit rates are higher in age groups 35-64 and lower among over-80 year olds; males have lower rates than females (except among the 80+); higher rates for individuals taking medication for asthma and epilepsy (in 2012 and 2016) and lower rates associated with COPD and cardiovascular disease. No association with self-assessed health status, presence of chronic disorder or limitations to daily activities, invalidity/disability or incapacity to work.
  - Lower visit rates for individuals with material deprivation; with lower income; with lower educational attainment; not borne in Belgium (2012, 2016); living in Wallonia or Brussels (relative to Flanders).
  - Higher visit rates for students in 2016, possibly an effect related to the full reimbursement of co-payment for basic dental care for children as from 2009.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):

- Systematic inequity by self-assessed health, with regular visits concentrated among individuals with better self-assessed health.
- Important systematic socioeconomic inequity by income level and educational attainment with more regular dentist visits concentrated among higher incomes and better educated individuals. Clear and increasing gradients by income and education, with above-average probabilities in upper/top middle class, with tertiary education; below-average probabilities among individuals at risk of poverty, in lower middle class, with primary or lower secondary education.
- Among the groups of interest, below-average probabilities are found for individuals with higher care needs (high age, worse health status) and in a vulnerable financial situation (material deprivation, increased reimbursement status, unemployment, at risk of poverty). Groups in a difficult financial situation see their position deteriorating over time relative to the population mean. Individuals with increased reimbursement do not appear to have better access to dental care.

Probability to have regular preventive dentist visits

- The effects are to a large extent similar with regular dentist visits.
- Limited association with healthcare needs, but important variation by socioeconomic status. **Main associations (regression):**
  - Health status: visits rates are higher in age groups 35-64 and lower among over-65 year olds; males have lower rates than females (except among the 80+); higher rates for individuals in good and very good self-assessed health.
  - Similar socioeconomic and sociodemographic effects as for regular dentist visits. In addition, individuals in densely populated areas have a higher probability for preventive dental care.
- There are systematic inequalities with respect to self-assessed health (higher visit rates among individuals with better self-assessed health), income (higher rates among higher income individuals) and educational attainment (higher rates among better educated individuals).
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - Important systematic socioeconomic inequities remain by income level and educational attainment with more regular preventive visits concentrated among higher incomes and better educated individuals. Clear and increasing gradients by income and education, with above-average probabilities in upper/top middle class, with tertiary education; below-average probabilities among individuals at risk of poverty, in lower middle class, with primary or lower secondary education.
  - Below-average probabilities for individuals in a vulnerable financial situation (material deprivation, increased reimbursement status, unemployment, at risk of poverty), singles and individuals with invalidity/disability. The situation is deteriorating over time relative to the population mean. Individuals with increased reimbursement do not appear to have better access to preventive dental care.

1.8.2. Probability of regular dentist visits (preventive and curative combined)

1.8.2.1. Evolution over time for the population and population subgroups

Table 43 reports the evolution over time of the probability to have regular dentist visit (visits in at least 2 of the past 3 years). For the insured population aged 3 years or more, the fraction of individuals with regular dentist visits increased from 47.9% in 2009 to 49.2% in 2012 and 54.1% in 2016.[20] Among the individuals included in the EU-SILC/IMA-AIM sample, this fraction is higher with 52.5% in 2009 and 2012 and 58.1% in 2016 of the interviewed individuals who have regular dentist visits, but the trend over time is similar.

The fraction of individuals with regular dentist visits is somewhat lower when restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, with 51.9%, 51.4% and 57.3% of the interviewed adults with regular visits in 2009, 2012 and 2016, respectively.

The reversed value is given as well, i.e. the probability of not having regular dentist visits. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 43 – Evolution (2009-2016) of the probability to have regular dentist visits

Sample	Definition	2009*	2012	2016
Population (3+)	Indicator	47.9%	49.2%	54.1%
Survey (3+)	Indicator	52.5%	52.5%	58.1%
	Reverse	47.5%	47.5%	41.9%
Survey (18+)	Indicator	51.9%	51.4%	57.3%
	Reverse	48.1%	48.6%	42.7%

** The indicator is calculated for the year 2009 as 3 years of data are necessary and we only have IMA-AIM data available from 2007 onwards.*

Figure 62 shows the evolution of the probability to have regular dentist visits for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.8.2.2.

Figure 62 indicates that for most population groups, there was a stable trend over time (sometimes with an upward or downward twist in 2012) and that the increase in regular dentists visits is concentrated in specific subgroups, in particular among individuals with (very) good self-assessed health, with chronic disorder and limitations, in the core, upper or top middle class and with tertiary education.

There is important variation in the fraction of individuals with regular dentist visits across the population subgroups. We have the following major findings. First, there is an important socioeconomic gradient with respect to income (panel A) and education (panel C). Individuals with high income (upper and top middle class) and high educational attainment (tertiary education) have a probability to have regular dentist visits well above the population mean. The opposite is true for individuals with low income (at risk of poverty and lower middle class) and low educational attainment (primary and lower secondary education). Other financially vulnerable population subgroups (individuals with increased reimbursement, with material deprivation or in unemployment, see panel B and D) also have a probability well below the population average, in particular individuals with severe material deprivation. The middle income and educational groups (core middle class and upper secondary education) have a probability in line with the population mean. Second, the fraction of individuals with regular dentist visits is below average for individuals with higher care needs, i.e. those with fair, bad and very bad self-reported health, with chronic disorders and limitation, invalidity or disability have (panel E and F), the fraction is particularly low among over-80 year olds. Third, self-employed individuals – who have lower probabilities to consult the GP, specialist, go to an emergency department or have inpatient treatment – have a probability to have regular dentist visits above the population mean (panel D).

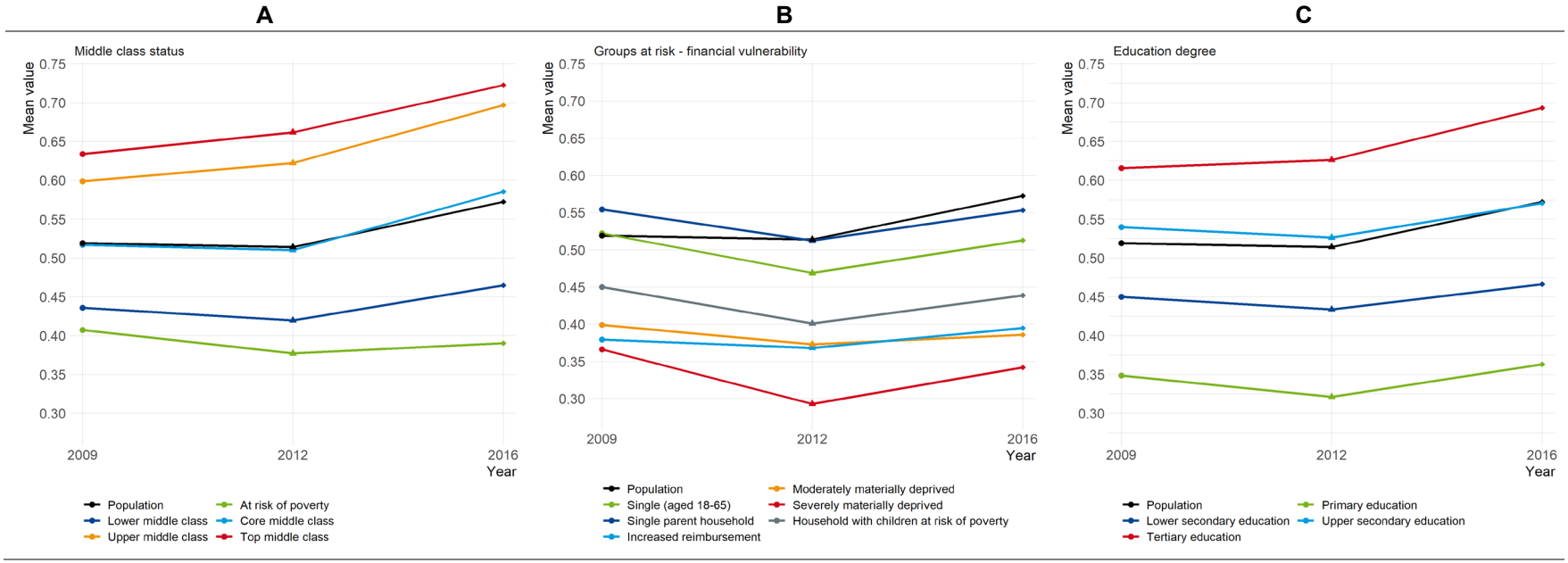
In addition, we have the following findings:

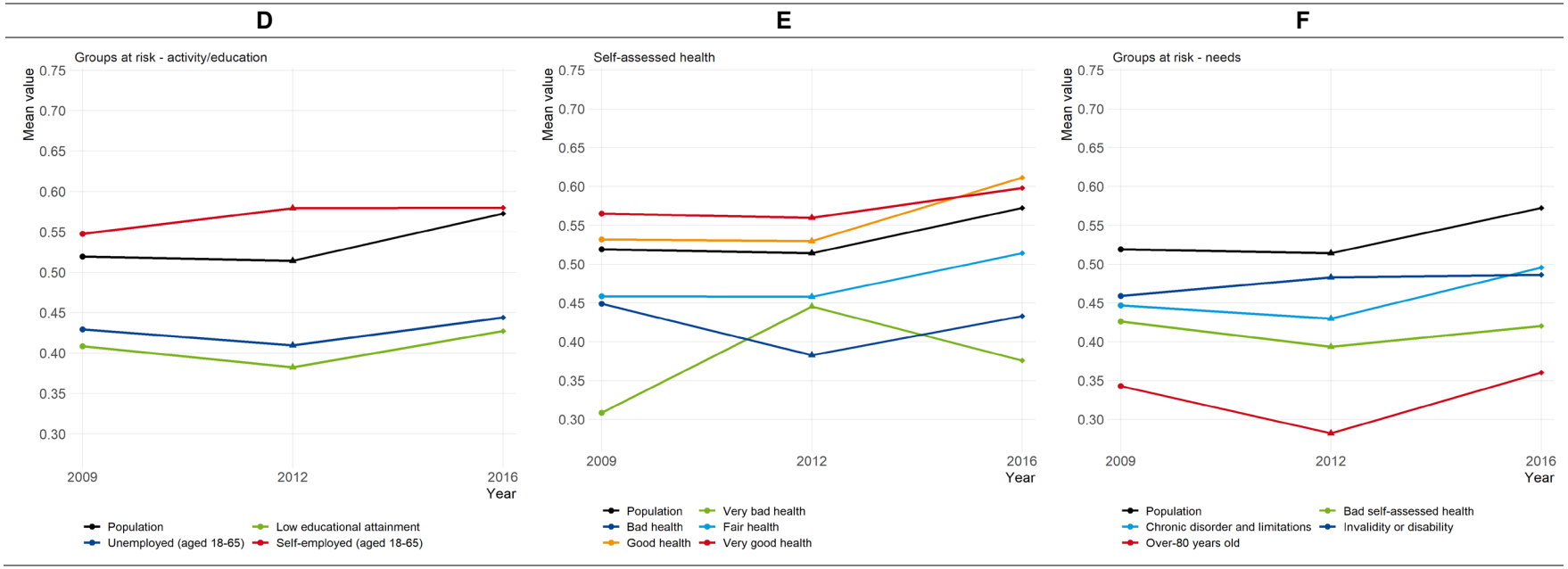
- Panel A: There is important variation in the fraction of individuals with regular dentist visit by income group (range 2016: 0.39 – 0.72). In the subgroup of individuals at risk of poverty, the probability to have regular dentist visits has decreased from 41% to 39%, while in the top and upper middle class it has increased, respectively, from 60% to 70% and 63% to 72% between 2009 and 2016.
- Panel B: Among individuals with material deprivation or increased reimbursement status, the probability to have regular dentist visits is 15 to 25 percentage points below the population average, with a widening gap over time. The probability is especially low and decreasing among individuals with severe material deprivation. A low probability is also observed lower among households with children at risk of poverty.

Regular dental care among single adults and adults in single parent households is more in line with the population average.

- Panel C: There is important variation in the fraction of individuals with regular dentist visit by educational attainment (range 2016: 0.36 – 0.69). The fraction of individuals with regular visits increases with higher levels of educational attainment.
- Panel D: The fraction of individuals with regular dentist visits is above the population average among individuals who are self-employed. For individuals who are unemployed, on the other hand, the probability is below the population average.
- Panel E and F: There is important variation in coverage by self-assessed health status (range 2016: 0.38 – 0.61). Individuals in (very) good health have a higher probability to have regular dentist visits than the population average and than individuals in fair or (very) bad health. The fraction of individuals with regular visits is about 50% or less for individuals reporting fair, bad or very bad health. A similarly low fraction is found for individuals in other subgroups with higher care needs, i.e. individuals over 80 years old, individuals with disability or in invalidity, and individuals reporting chronic disorders in combination with limitation to daily activities. In the latter subgroup, however, there has been an increase between 2012 and 2016.

Figure 62 – Evolution (2009-2016) of the probability to have regular dentist visits for different subgroups and populations groups at risk





1.8.2.2. Regression output

Table 44 reports the average marginal effects of a probit regression of the indicator of having regular dentist visits (value = 1) or not (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 44):

- There is a positive time trend, indicating a general increase in the probability to have regular dentist visits between 2012 and 2016.
- **Healthcare needs** capture the variability in the probability to have regular dentist visits only to a limited extent. Regular visits generally increase with age in the age categories 18-64. In the age categories above 65 the probability decreases again. Moreover males have a lower probability than females in the same age category, to regularly visit the dentist, again with the exception of the over-80 year olds. No systematic association is found between regular dentist visits and self-reported health stratus, presence of chronic disorders and limitations, invalidity or incapacity to work.
  - Age and sex: regular dentist visits are increasing with age up to age 65 where the probability starts to decrease again. The over-80 year olds have the lowest probability. Males have a 2 to 10 percentage point lower probability to have regular dentist visits than females in the same age category, except in the age category above 80 years.
  - Self-reported health status: there is no systematic significant association with self-assessed health.

- Administrative health information: there is no systematic significant association with receiving an allowance for invalidity or disability, being incapacitated for work or the lump sum chronic illness.
- Medication use: there is some association between the probability to have regular dentist visits and medication use for various disorders. In particular, individuals who take medication for cardiovascular disease and COPD have a somewhat lower probability, while individuals who take medication for asthma or epilepsy have a higher probability with an additional 7 to 10 percentage points in 2012 and 2016.
- No difference is found between individuals who are or are not registered in a community health centre.

- There is important variation in regular dentist visits by **socioeconomic profile**. One can equally observe diverging trends over time.
  - Education degree: When controlling for other characteristics, there is a very strong association by educational attainment. Individuals with a primary degree are 17 percentage points less likely to have regular dentist visits than individuals with tertiary education. This gap remains constant over time. For individuals with a degree in lower and upper secondary education, the probability to have regular visits is, respectively, about 10 to 14 percentage points and 5 to 8 percentage points lower compared to individuals with tertiary education. The gap is widening over time.
  - Income level and material deprivation: There is a strong positive association between income and the probability to have regular dentist visits, implying that high income individuals are more regularly going to a dentist. The effect is intensifying over time. With respect to material deprivation, we find a significant strong negative association with regular dentist visits in addition to the income effect.
  - Activity status: The effects of difference in activity status are only to a limited extent associated with regular dentist visits. On the other hand, the time trends can be quite different between the different subgroups. Part-time employees had a higher probability in 2008 and 2012 – respectively 5 and 3 percentage points higher – and a non-significant effect in 2016, implying a relatively decreasing trend compared to full-time employees. Retired individuals had a (non-significant) 3 percentage points higher probability in 2008 and 2012, and a 7 percentage point higher probability in 2016. Students had a probability that was not significantly different from full-time employees in 2008 and 2012, but a 15 percentage point higher probability in 2016. This may be partly related to the full reimbursement of co-payments for basic dental care of children since 2009, which led to a higher frequency in dentist visits in among children. This behaviour may be continued by students after turning 18. No significant effects were found for inactive, unemployed and self-employed individuals compared to full-time employees.
  - Household composition: No or minor effects are found with respect to household composition.
  - Country of birth: The probability of individuals not borne in Belgium decreases over time relative to individuals borne in Belgium with a difference of 0, -3 and -6 percentage points in 2008, 2012 and 2016, respectively.

- There is no difference in the probability to have regular dentist visits between individuals with or without **increased reimbursement** status when controlling for other characteristics.
- The density of dentist shows a weak positive association, implying that a higher density of dentist is associated with a higher probability to have regular dentist visits.
- There are important regional differences. Ceteris paribus, the probability to have regular dentist visits is 7 to 8 percentage points and 7 to 10 percentage points lower, respectively for individuals living in Wallonia and Brussels compared to individuals living in Flanders. There is no effect of urbanization.

Table 44 – Regression output for the probability to have regular dentist visits, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008/2009† (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.093	(0.011)***	-0.092	(0.011)***	-0.083	(0.019)***	-0.105	(0.019)***	-0.078	(0.022)***
Male aged 35-49 years	-0.014	(0.013)	-0.013	(0.013)	-0.011	(0.020)	-0.028	(0.021)	0.006	(0.021)
Female aged 35-49 years	0.055	(0.013)***	0.055	(0.013)***	0.020	(0.020)	0.047	(0.023)*	0.099	(0.021)***
Male aged 50-64 years	-0.017	(0.014)	-0.016	(0.014)	-0.016	(0.023)	-0.033	(0.024)	0.006	(0.024)
Female aged 50-64 years	0.064	(0.014)***	0.063	(0.014)***	0.030	(0.022)	0.082	(0.023)***	0.077	(0.023)***
Male aged 65-79 years	-0.064	(0.020)**	-0.067	(0.020)***	-0.079	(0.033)*	-0.050	(0.032)	-0.074	(0.032)*
Female aged 65-79 years	-0.006	(0.019)	-0.010	(0.019)	-0.033	(0.031)	0.010	(0.030)	-0.016	(0.030)
Male aged 80 years or more	-0.148	(0.026)***	-0.152	(0.026)***	-0.115	(0.046)*	-0.156	(0.042)***	-0.172	(0.044)***
Female aged 80 years or more	-0.145	(0.027)***	-0.152	(0.026)***	-0.128	(0.046)**	-0.156	(0.046)***	-0.166	(0.042)***
Self-assessed health (reference = very good)										
Self-assessed health - good	0.002	(0.008)	0.003	(0.008)	-0.016	(0.014)	-0.014	(0.014)	0.033	(0.014)*
Self-assessed health - fair	-0.010	(0.012)	-0.005	(0.011)	-0.022	(0.019)	-0.008	(0.018)	0.008	(0.017)
Self-assessed health - bad	-0.010	(0.019)	-0.003	(0.016)	0.009	(0.027)	-0.020	(0.026)	0.003	(0.026)
Self-assessed health - very bad	-0.028	(0.031)	-0.022	(0.029)	-0.094	(0.051)°	0.051	(0.051)	-0.039	(0.040)
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.008	(0.016)								
Chronic disorder, no limitations	0.011	(0.012)								
Chronic disorder, limitations	0.007	(0.012)								
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.028	(0.019)								
Incapacity to work	0.001	(0.014)								
Entitled to lump sum chronic illness	-0.024	(0.016)								

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008/2009† (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.019	(0.023)								
Medication use - other disorder	0.068	(0.030)*	0.068	(0.030)*	0.050	(0.064)	0.069	(0.048)	0.063	(0.047)
Medication use - cardiovascular disorder	-0.027	(0.008)**	-0.026	(0.008)**	-0.024	(0.014)°	-0.040	(0.015)**	-0.015	(0.014)
Medication use - thrombosis	-0.017	(0.011)	-0.017	(0.011)	-0.033	(0.023)	-0.023	(0.017)	-0.005	(0.018)
Medication use - chronic obstructive pulmonary disease (COPD)	-0.045	(0.018)*	-0.046	(0.018)*	-0.010	(0.031)	-0.067	(0.029)*	-0.058	(0.030)°
Medication use - asthma	0.065	(0.023)**	0.066	(0.023)**	0.009	(0.046)	0.076	(0.039)°	0.100	(0.038)**
Medication use - diabetes	0.001	(0.013)								
Medication use - epilepsy	0.047	(0.023)*	0.049	(0.023)*	-0.012	(0.045)	0.068	(0.047)	0.078	(0.038)*
Medication use - thyroid disorder	0.021	(0.013)	0.022	(0.013)	0.001	(0.027)	0.010	(0.023)	0.044	(0.025)°
Community health centre										
Registered in community health centre	0.006	(0.023)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.069	(0.011)***	-0.075	(0.009)***	-0.067	(0.015)***	-0.075	(0.013)***	-0.079	(0.015)***
Region of residence - Brussels	-0.089	(0.032)**	-0.086	(0.030)**	-0.095	(0.038)*	-0.067	(0.041)	-0.090	(0.050)°
Urbanization - medium	-0.005	(0.011)								
Urbanization - thin	-0.024	(0.014)°								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.035	(0.011)**	0.036	(0.011)***	0.052	(0.019)**	0.034	(0.017)*	0.027	(0.018)
Occupation - inactive	-0.014	(0.013)	-0.006	(0.013)	0.025	(0.022)	-0.006	(0.022)	-0.022	(0.021)
Occupation - self-employed in 2008	-0.020	(0.020)	-0.020	(0.020)	-0.019	(0.021)				
Occupation - self-employed in 2012	0.011	(0.023)	0.010	(0.023)			0.005	(0.024)		
Occupation - self-employed in 2016	-0.045	(0.024)°	-0.045	(0.024)°					-0.031	(0.024)
Occupation - unemployed	-0.021	(0.015)	-0.020	(0.015)	-0.014	(0.027)	-0.015	(0.025)	-0.024	(0.025)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008/2009† (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Occupation - student	0.062	(0.016)***	0.062	(0.016)***	0.021	(0.028)	0.011	(0.028)	0.152	(0.023)***
Occupation - retired	0.035	(0.014)*	0.037	(0.014)**	0.026	(0.023)	0.025	(0.024)	0.066	(0.023)**
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.177	(0.011)***	-0.176	(0.011)***	-0.169	(0.021)***	-0.166	(0.022)***	-0.176	(0.021)***
Education degree - lower secondary	-0.116	(0.011)***	-0.116	(0.011)***	-0.106	(0.017)***	-0.098	(0.019)***	-0.137	(0.018)***
Education degree - upper secondary	-0.061	(0.008)***	-0.061	(0.008)***	-0.046	(0.015)**	-0.047	(0.014)***	-0.084	(0.013)***
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.059	(0.009)***	0.059	(0.009)***	0.038	(0.016)*	0.065	(0.016)***	0.086	(0.016)***
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.274	(0.034)***	-0.270	(0.034)***	-0.276	(0.058)***	-0.287	(0.061)***	-0.236	(0.052)***
Household composition (reference = couple without children)										
Household composition - single without children	-0.025	(0.010)*	-0.024	(0.010)*	-0.001	(0.018)	-0.031	(0.017)°	-0.039	(0.018)*
Household composition - single with children	0.024	(0.016)	0.025	(0.017)	0.056	(0.029)°	0.030	(0.030)	-0.008	(0.028)
Household composition - couple with children	0.017	(0.011)	0.016	(0.011)	0.018	(0.018)	0.025	(0.017)	-0.001	(0.017)
Household composition - other	-0.033	(0.011)**	-0.033	(0.011)**	-0.032	(0.019)°	-0.047	(0.020)*	-0.024	(0.018)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.036	(0.011)***	-0.036	(0.011)**	0.006	(0.020)	-0.034	(0.019)°	-0.058	(0.017)***
Insurance status										
Insurance - increased reimbursement in 2008	0.006	(0.017)	0.005	(0.017)	-0.018	(0.020)				
Insurance - increased reimbursement in 2012	-0.007	(0.016)	-0.009	(0.016)			-0.008	(0.017)		
Insurance - increased reimbursement in 2016	-0.041	(0.016)*	-0.043	(0.016)**					-0.004	(0.018)
Healthcare supply (density per 10 000 population, distance in km)										
Density of doctors (GPs, specialists) in municipality	-0.001	(0.001)								
Density of doctors (GPs, specialists) in neighbouring municipalities	0.001	(0.001)								

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008/2009† (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Density of dentists in municipality	0.004	(0.002)**	0.003	(0.001)*	0.003	(0.002)	0.004	(0.002)*	0.002	(0.001)
Density of dentists in neighbouring municipalities	0.003	(0.003)	0.004	(0.002)*	0.001	(0.003)	0.006	(0.003)°	0.007	(0.003)*
Distance to nearest ED	0.001	(0.001)								
Number of EDs within 10km radius	0.003	(0.002)	0.003	(0.002)	0.005	(0.002)°	0.002	(0.002)	0.001	(0.003)
Time (reference = 2008/2009†)										
Time: year 2012	-0.007	(0.008)	-0.006	(0.008)						
Time: year 2016	0.049	(0.010)***	0.050	(0.010)***						

† The indicator value refers to the year 2009 (IMA-AIM year 2007, 2008, 2009), while the independent variables are taken from the EU-SILC survey wave 2008.
*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.8.2.3. Overview inequity and evolution in the different scenarios

Figure 63 visualizes the absolute Gini coefficient for inequality in the probability to have regular dentist visits (so without needs correction) as well as inequity in the fairness gap for the probability to have regular dentist visits calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 63, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero.

If we follow the traditional approach, we observe a stable or slightly decreasing evolution in inequity in the probability to have regular dentist visits in the different inequity scenarios. For the baseline scenario, the absolute Gini coefficient remained at about 0.26. Hence, we find that the disparity between individuals in the probability of having regular dentist visits that cannot be explained and justified by (observable) healthcare needs has not changed over time.

Table 45 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not having regular dentist visits (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

When following the traditional approach, the relative and absolute Gini coefficients indicate that inequity has decreased over time, while the reverse relative Gini coefficient indicates an increase in inequity over time. When following the alternative approach, there is an unambiguous increase in inequity (baseline-residual scenario).

Figure 63 – Evolution (2009-2016) of the absolute Gini index by scenario

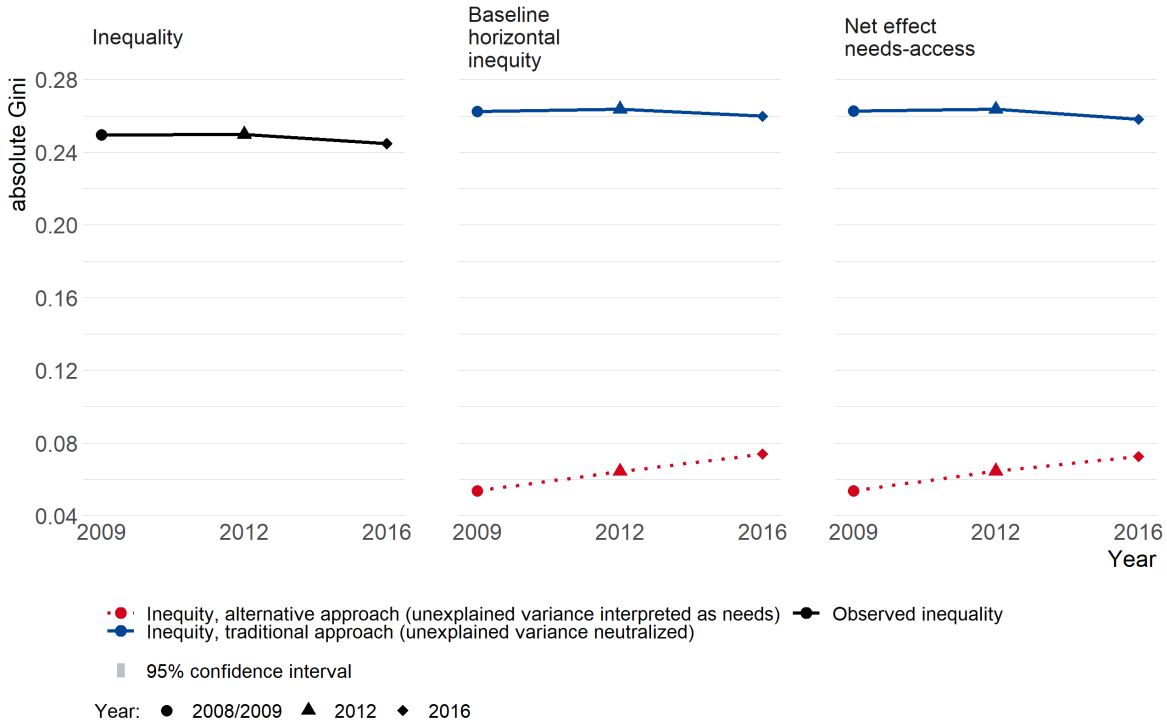


Table 45 – Evolution (2009-2016) of the inequity in the probability to have regular dentist visits for different scenarios

Scenario	Inequality (Gini)	2009	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.262	0.264	0.260 *	→
	Relative	0.486	0.490	0.437^*	↓
	Reversed relative	0.522	0.517^	0.568^*	↑
Net effect needs-access	Absolute	0.263	0.264	0.258^*	↓
	Relative	0.486	0.490	0.436^*	↓
	Reversed relative	0.522	0.517^	0.569^*	↑
Baseline-residual	Absolute	0.054	0.064^	0.074^*	↑
	Relative	0.104	0.125^	0.129^*	↑
	Reversed relative	0.112	0.133^	0.173^*	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.8.2.4. Overview inequity over time for different population subgroups

Figure 64 and Figure 65 show how the probability to have regular dentist visits in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 64, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 65, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability to have regular dentist visits than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 64 and Figure 65 indicate that the inequalities with respect to the probability to have regular dentist visits are quite pronounced and range between -25 and +15 percentage points. For most indicators, we find that after correcting for healthcare needs (various inequity scenarios), the disparities are less pronounced. While the disparities have reduced somewhat, they remain quite similar in the inequality and inequity scenarios. This further underlines the limited association between healthcare needs and the probability to have regular dentist visits (see section 1.8.2.2).

We conclude that, first, there are important gradients in the probability to have regular dentist visits with respect to income, self-assessed health and

education and this both for inequality and inequity (Figure 64). Before as well as after correcting for needs, the probability to have regular visits is markedly lower for individuals with primary and lower secondary education; individuals at risk of poverty and in the lower middle class; and individuals with fair, bad and very bad self-assessed health status. Moreover, for these population subgroups, the gap with the population mean is widening. A probability above the population mean is found for individuals with tertiary education, in the upper and top middle class and, to a lesser extent, for individuals with good and very good self-assessed health. Second, for all vulnerable population subgroups (except self-employed individuals) the probability to have regular dentist visits is below the population average. This is clearly visible for population subgroups that reflect either higher care needs (i.e. presence of a chronic disorder, invalidity or high age) or financial vulnerability (i.e. at risk of poverty, with increased reimbursement, unemployment or material deprivation). Again, the situation is deteriorating over time relative to the population mean. It is important to note that increased reimbursement does not increase accessibility to the dentist. Third, the effects of the baseline scenario are corroborated by the net effect needs-access scenario and the baseline-residual scenario.

In the baseline inequity scenario, we find that:

- There is a clear socioeconomic gradient in the probability to have regular dentist visits by educational attainment, with higher [lower] probabilities among individuals with high [low] educational attainment.
- There is a clear socioeconomic gradient in the probability to have regular dentist visits by income, with higher [lower] probabilities among individuals with high [low] income.
- Individuals in fair, bad and very bad self-reported health have a lower probability to have regular dentist visits.
- Except for the self-employed, there is a probability to have regular dentist visits below the population average among all vulnerable groups. The probability is particularly lower (10 to 25 percentage points) among the financially vulnerable groups characterized by poverty risk, unemployment, increased reimbursement status and material deprivation. A negative finding is that the position of most vulnerable groups deteriorates over time relative to the population average.

Figure 64 – Deviation in the needs-corrected probability to have regular dentist visits from population average for subgroups based on income, education and self-assessed health, by scenario and year

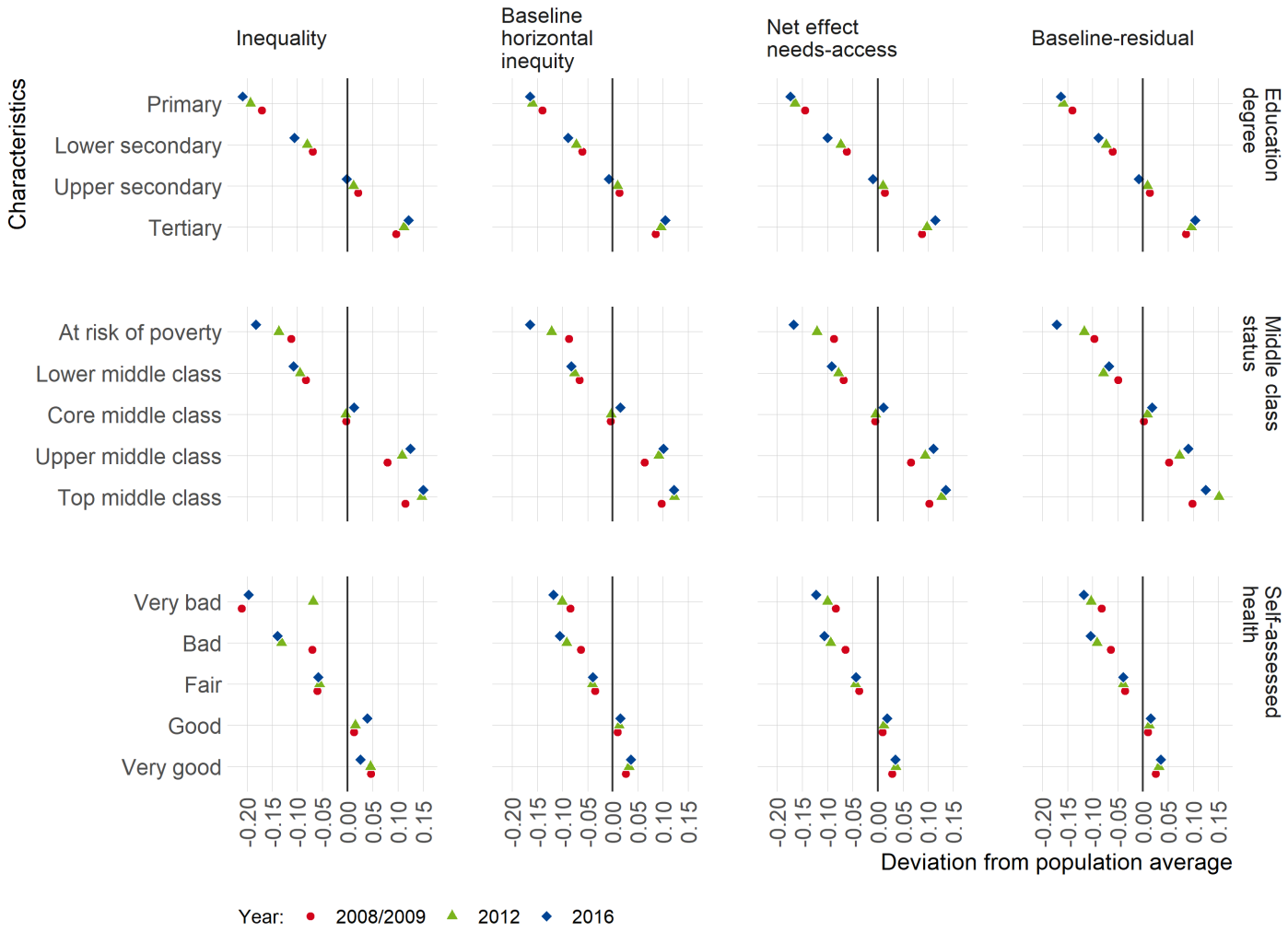


Figure 65 – Deviation in the needs-corrected probability to have regular dentist visits from population average for specific vulnerable subgroups, by scenario and year

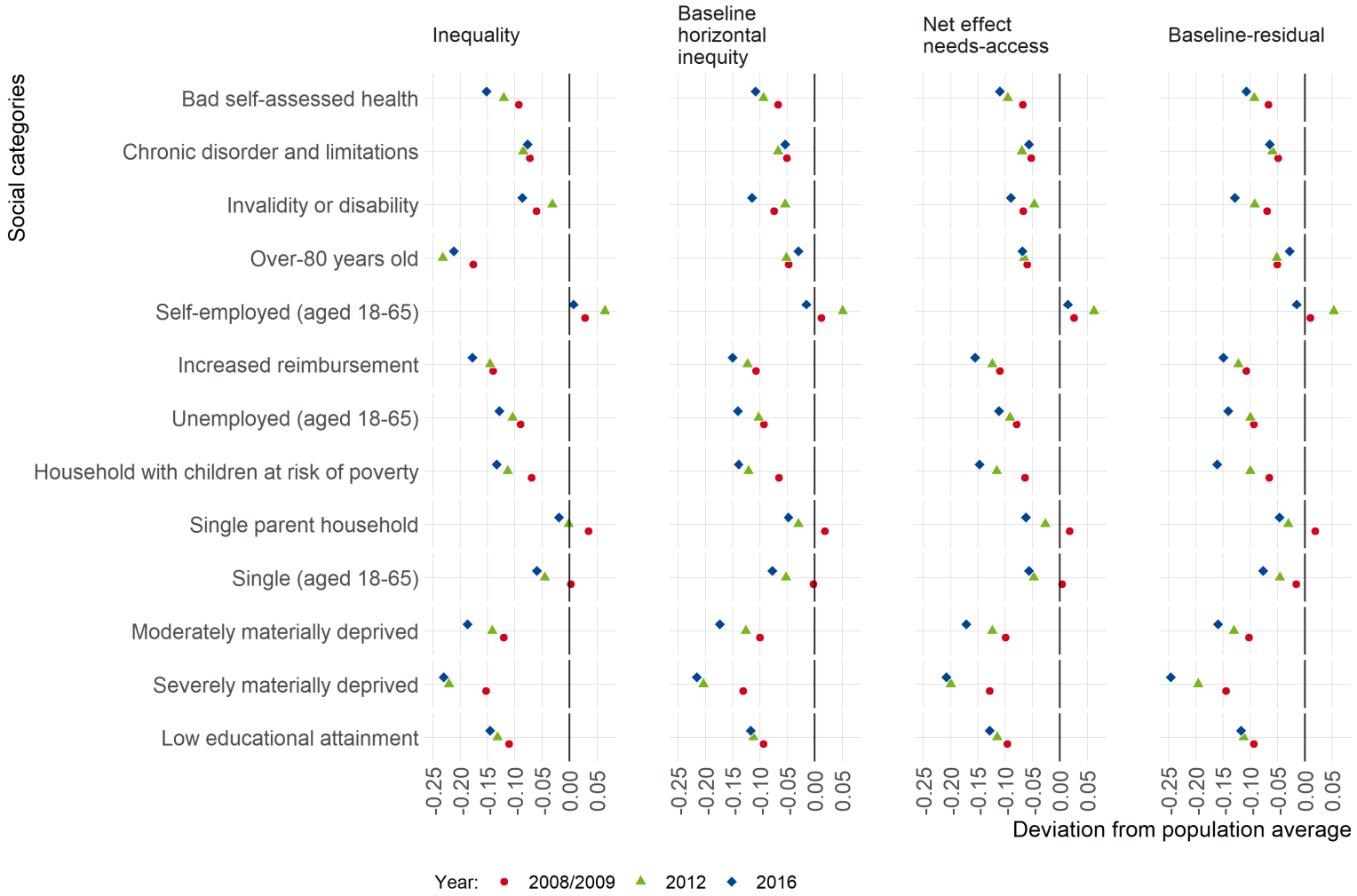
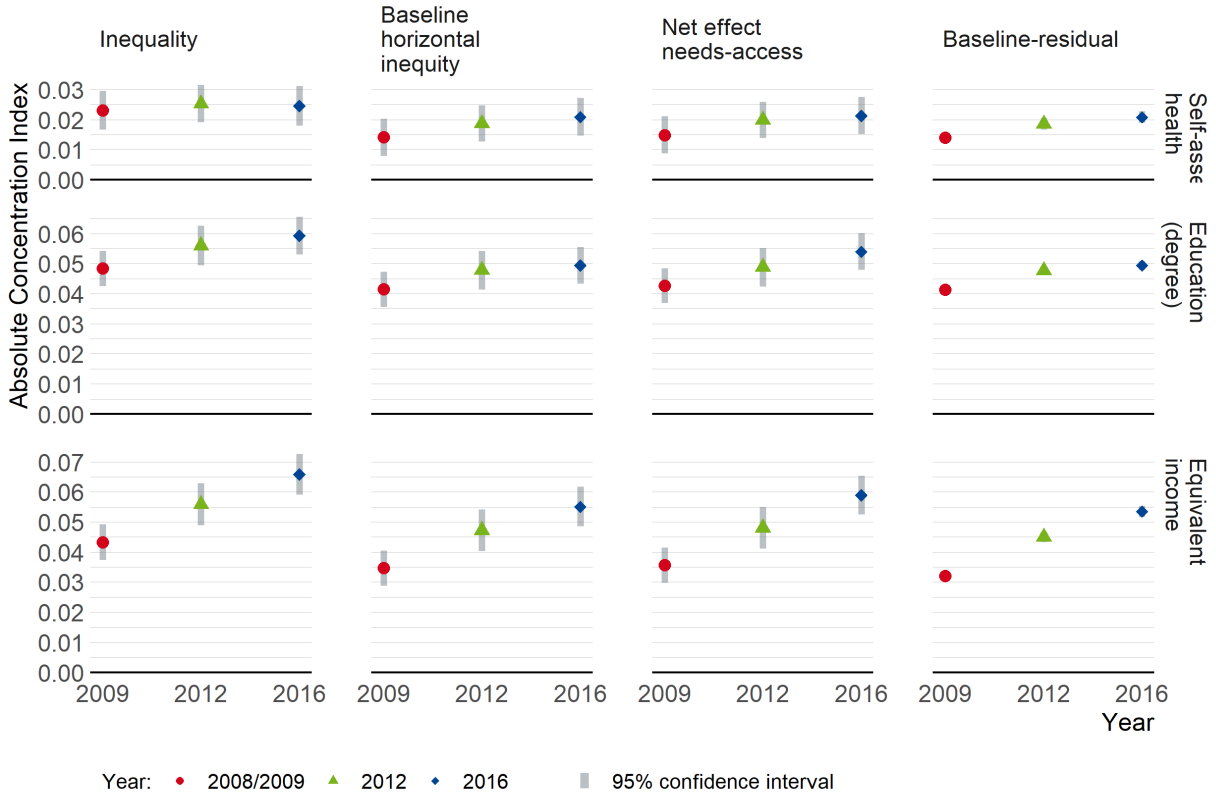


Figure 66 shows the absolute concentration index of the needs-corrected probability to have regular dentist visits to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher needs-corrected probability to have regular dentist visits concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher needs-corrected probability for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 66 show that systematic socioeconomic inequalities and inequities in the probability to have regular dentist visits are of the same magnitude and direction, with higher probabilities concentrated among high educated individuals, high income individuals and individuals with better self-assessed health. The socioeconomic inequities with regard to income are increasing over time. The results in the net effect needs-access scenario and the baseline-residual scenario match those of the baseline horizontal inequity scenario.

Figure 66 – Evolution (2009-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.8.3. Probability of regular preventive dentist visits

As discussed in section 1.8.3.1, the fraction of the population with regular preventive dentist visits is significantly lower than (about half) the fraction with regular dentist visit. However, much of the differences between population subgroups in regular preventive dentist visits are similar to the patterns found for regular dentist visits. Hence, there is some overlap in the discussion of the results of both indicators, but we try to focus in what follows on the differences in patterns with regular dentist visits.

The analysis of preventive care is different from curative care. One important difference is the role of healthcare needs and the interpretation of needs-corrected probabilities (see Scientific report section 1.1). With respect to preventive care, one could argue that differences in healthcare needs are irrelevant, as prevention is important and valuable irrespective of needs in order to preserve one's health status. Therefore, the results from the inequality scenario (without any correction for healthcare needs) are at least as important to consider as those from the various inequity scenarios (with correction for healthcare needs). Nonetheless, the inequity scenarios can be relevant, e.g. it might be justified that individuals aged 65/80 years or more have a lower probability to have regular preventive dentist visits as individuals at higher age are more likely to have dentures, which might require a different treatment and frequency of dental care.

1.8.3.1. Evolution over time for the population and population subgroups

Table 46 reports the evolution over time of the probability to have regular preventive dentist visits (visits for preventive dental care in at least 2 of the past 3 years). For the insured population aged 3 years or more, the fraction of individuals with regular preventive dentist visits increased from 21.6% in 2009 to 24.3% in 2012 and 30.2% in 2016.[20] Among the individuals included in the EU-SILC/IMA-AIM sample, the fraction is higher, but follows the same upwards course, with 27.5% in 2009, 26.8% in 2012 and 33.4% in 2016 of the interviewed individuals who have regular preventive dentist visits. The fraction of individuals with regular preventive dentist visits is similar when restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, with 26.6%, 25.6% and 32.2% of the interviewed adults with regular visits in 2009, 2012 and 2016, respectively.

The reversed value is given as well, i.e. the probability of not having regular preventive dentist visits. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 46 – Evolution (2009-2016) of the probability to have regular preventive dentist visits

Sample	Definition	2009*	2012	2016
Population	Indicator	21.6%	24.3%	30.2%
Survey (all)	Indicator	27.5%	26.8%	33.4%
	Reverse	72.5%	73.2%	66.6%
Survey (18+)	Indicator	26.6%	25.6%	32.2%
	Reverse	73.4%	74.4%	67.8%

** The indicator is calculated for the year 2009 as 3 years of data are necessary and we only have IMA-AIM data available from 2007 onwards.*

Figure 67 shows the evolution of the probability to have regular preventive dentist visits for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.8.3.2.

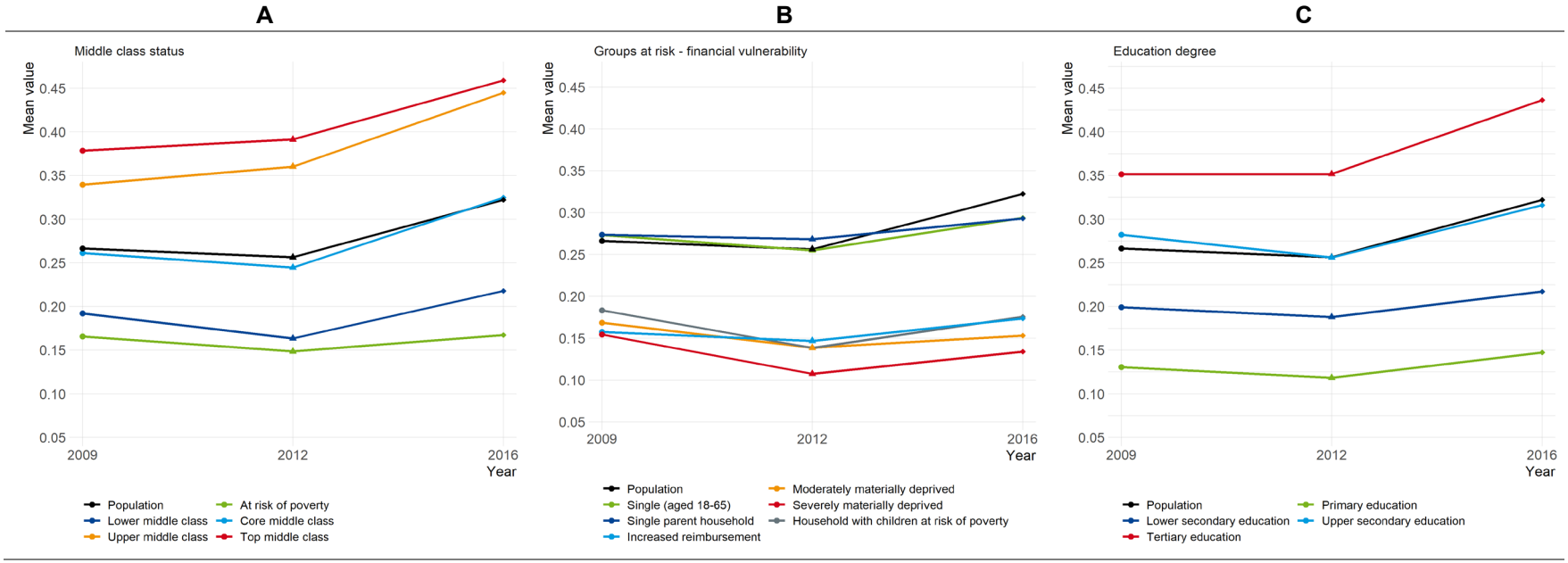
Figure 67 indicates that the main results are in line with the trends observed in Figure 62. First, there is an important (socioeconomic) gradient with respect to income (panel A), education (panel C) and self-assessed health (panel E) as well as a lot of variation around the population average of 26%-32%. This implies that for some subgroups the fraction that has regular preventive dentist visits falls below 20%, e.g. individuals at risk of poverty or in the lower middle class (panel A), individuals with increased reimbursement and individuals with material deprivation (panel B), individuals with primary or lower secondary education (panel C), individuals

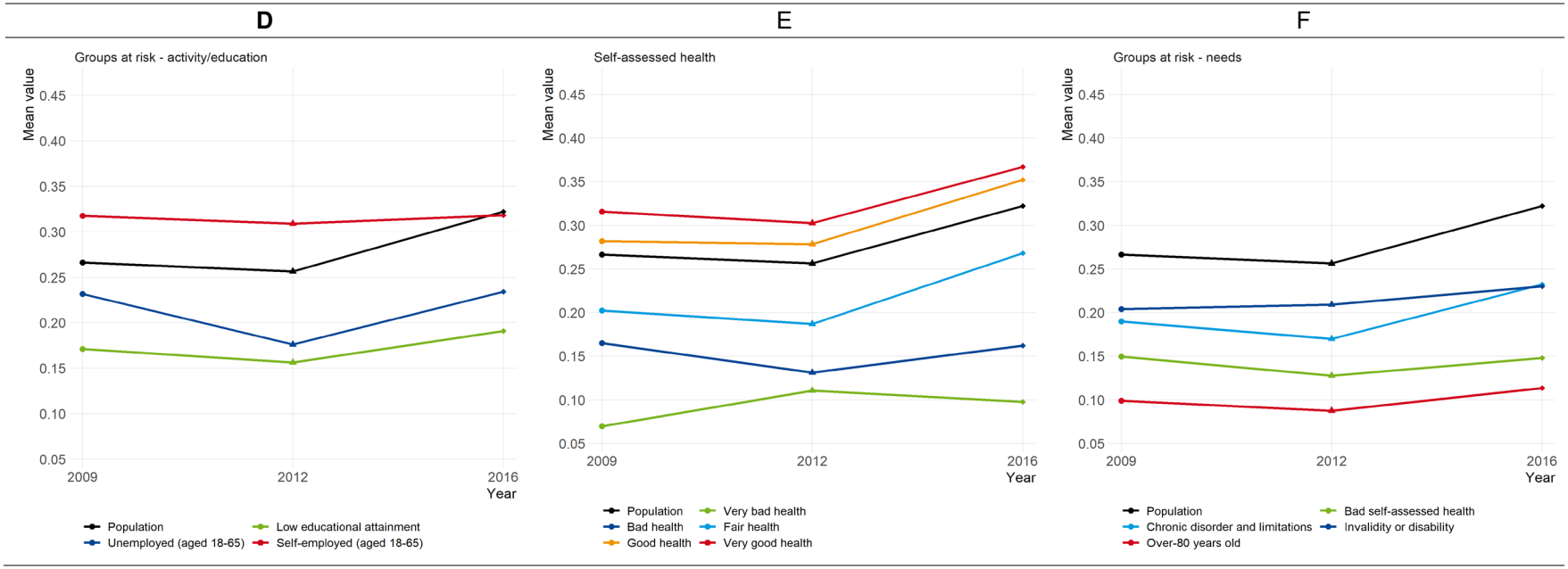
with bad or very bad self-assessed health (panel E) and over-80 year olds (panel F). Second, the increase in the probability to have regular preventive dentist visits between 2012 and 2016 is concentrated among individuals with higher income (core, upper and top middle class) and higher educational attainment (upper secondary and tertiary education) and individuals in fair, good or very good self-assessed health.

In addition, we have the following findings:

- Panel A: There is important variation in the fraction of individuals with regular preventive dentist visit by income group (range 2016: 0.17 – 0.46). The probability in the groups at risk of poverty and lower middle class is about half to a third of the probability in the upper and top middle class. The gap between high and low incomes is widening over time.
- Panel B: Among individuals with increased reimbursement status, with material deprivation or living in households with children at risk of poverty, the probability to have regular preventive dentist visits is 10 to 20 percentage points below the population average. The probability has not increased over time, and hence the gap with the population average is widening over time. Increased reimbursement status does not increase accessibility to preventive dental care. Preventive dental care among single adults and adults in single parent households is in line with the population average.
- Panel C: There is important variation in the fraction of individuals with regular preventive dentist visit by educational attainment (range 2016: 0.15 – 0.44). The fraction of individuals with regular visits increases with higher levels of educational attainment.
- Panel D: The fraction of individuals with regular preventive dentist visits is above the population average among individuals who are self-employed. For individuals who are unemployed, on the other hand, the probability is below the population average.
- Panel E and F: There is important variation in coverage by self-assessed health status (range 2016: 0.10 – 0.37). Individuals in (very) good health have a higher probability to have regular preventive dentist visits than the population average and than individuals in fair or (very) bad health. Low probabilities are found for individuals in subgroups with higher care needs, i.e. individuals in bad or very bad health, over 80 years old, individuals with disability or in invalidity, and individuals reporting chronic disorders in combination with limitation to daily activities.

Figure 67 – Evolution (2009-2016) of the probability to have regular preventive dentist visits for different subgroups and populations groups at risk





1.8.3.2. Regression output

Table 47 reports the average marginal effects of a probit regression of the indicator of having regular preventive dentist visits (value = 1) or not (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 44):

- There is a positive time trend, indicating a general increase in the probability to have regular preventive dentist visits between 2012 and 2016.
- **Healthcare needs** capture the variability in the probability to have regular preventive dentist visits only to a limited extent. As for dentist visits in general, there is quite some variation by age and sex. Contrary to the results for dentist visits in general, there is a clear association with self-assessed health. Individuals with worse self-assessed health are less likely to have regular preventive dentist visits. The absence of an association with dentist visits in general suggest that individuals with worse self-assessed health rely on dentist for acute, curative care rather than preventive care. No or weak associations are between regular preventive dentist visits and presence of chronic disorders and limitations, invalidity or incapacity to work, and various disorders defined on prescribed medication use.

- Age and sex: The probability to have regular preventive dentist visits differs between males and females, with a 5 to 6 percentage points lower probability among males, except in the age category above 80 years. For females, the probability to have regular preventive dentist visits is highest in the age group 35-64, it decreases strongly by age thereafter. For males, the highest probability is observed in the age category 35-49 with substantially lower probabilities at lower and higher ages.
- Self-reported health status: there is a clear gradient by self-assessed health with in the reduced pooled model a lower probability of 3, 6 and 12 percentage points for individuals in fair, bad and very bad health, respectively, compared to individuals in good and very good health. There is a weak positive association with the presence of a chronic disorder.
- Administrative health information: there is no systematic significant association with receiving an allowance for invalidity or disability, being incapacitated for work or the lump sum chronic illness.
- Medication use: there is no systematic significant association between the probability to have regular preventive dentist visits and medication use for various disorders.
- No difference is found between individuals who are or are not registered in a community health centre.

- There is important variation in regular preventive dentist visits by **socioeconomic profile**, in particular with respect to the financial situation and obtained education degree.
  - Education degree: When controlling for other characteristics, there is a very strong association by educational attainment. Individuals with a primary degree are 11 to 15 percentage points less likely to have regular preventive dentist visits than individuals with tertiary education. For individuals with a degree in lower and upper secondary education, the probability to have regular preventive visits is, respectively, about 7 to 13 percentage points and 3 to 7 percentage points lower compared to individuals with tertiary education. For all education groups, the gap with individuals having tertiary education is increasing over time.
  - Income level and material deprivation: There is a strong positive association between income and the probability to have regular preventive dentist visits, implying that high income individuals are more regularly going to a dentist for preventive dental care. The effect is amplifying over time. With respect to material deprivation, we find a significant strong negative association with regular preventive dentist visits in addition to the income effect.
  - Activity status: The effects of difference in activity status are only to a limited extent associated with regular preventive dentist visits, and this especially in 2016. Compared to full-time employees, students have a 10 percentage points higher probability in 2016, retired individuals a 6 percentage points higher probability and self-employed individuals a 5 percentage points lower probability. No significant different effects are found for other activity subgroups or years. The positive association for students in 2016 may be partly related to the full reimbursement of co-payments for basic dental care of children since 2009, which led to a higher frequency in dentist visits among children. This behaviour may be continued by students after turning 18.
  - Household composition: No or minor effects are found with respect to household composition.
  - Country of birth: The probability of regular preventive dentist visits by individuals not borne in Belgium is lower in 2012 and 2016 relative to individuals borne in Belgium with a difference of 0, -8 and -5 percentage points in 2008, 2012 and 2016, respectively.
- There is no difference in the probability to have regular preventive dentist visits between individuals with or without **increased reimbursement** status when controlling for other characteristics.

- The density of dentist shows a weak positive association, implying that a higher density of dentist in the municipality or neighbouring municipalities is associated with a higher probability to have regular preventive dentist visits.
- There are important regional differences. Ceteris paribus, the probability to have regular preventive dentist visits is 8 to 10 percentage points and 3 to 12 percentage points lower, respectively for individuals living in Wallonia and Brussels compared to individuals living in Flanders. Moreover, individuals in densely populated areas have a 3 to 4 percentage points higher probability to have regular preventive dentist visits compared to individuals in medium or thinly populated areas.

Table 47 – Regression output for the probability to have regular preventive dentist visits, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008/2009† (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.048	(0.009)***	-0.048	(0.009)***	-0.065	(0.017)***	-0.055	(0.016)***	-0.019	(0.019)
Male aged 35-49 years	0.001	(0.011)	0.001	(0.011)	-0.003	(0.019)	-0.002	(0.017)	0.010	(0.022)
Female aged 35-49 years	0.064	(0.011)***	0.064	(0.011)***	0.017	(0.018)	0.038	(0.017)*	0.121	(0.020)***
Male aged 50-64 years	-0.024	(0.011)*	-0.024	(0.011)*	-0.048	(0.019)*	-0.049	(0.018)**	0.033	(0.022)
Female aged 50-64 years	0.042	(0.010)***	0.042	(0.010)***	-0.004	(0.019)	0.037	(0.018)*	0.081	(0.021)***
Male aged 65-79 years	-0.106	(0.015)***	-0.108	(0.015)***	-0.096	(0.030)**	-0.131	(0.029)***	-0.116	(0.030)***
Female aged 65-79 years	-0.054	(0.017)**	-0.056	(0.017)***	-0.071	(0.029)*	-0.061	(0.027)*	-0.043	(0.030)
Male aged 80 years or more	-0.168	(0.018)***	-0.170	(0.017)***	-0.197	(0.050)***	-0.190	(0.039)***	-0.212	(0.042)***
Female aged 80 years or more	-0.168	(0.019)***	-0.171	(0.019)***	-0.167	(0.053)**	-0.202	(0.045)***	-0.225	(0.042)***
Self-assessed health (reference = very good)										
Self-assessed health - good	-0.004	(0.007)	-0.004	(0.007)	-0.009	(0.012)	-0.011	(0.012)	0.003	(0.013)
Self-assessed health - fair	-0.029	(0.011)**	-0.029	(0.011)**	-0.029	(0.017)°	-0.048	(0.019)*	-0.020	(0.020)
Self-assessed health - bad	-0.061	(0.016)***	-0.059	(0.016)***	-0.032	(0.028)	-0.063	(0.028)*	-0.089	(0.027)**
Self-assessed health - very bad	-0.119	(0.025)***	-0.117	(0.026)***	-0.173	(0.060)**	-0.073	(0.056)	-0.159	(0.048)***
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.015	(0.016)	0.015	(0.016)	-0.018	(0.023)	0.027	(0.024)	0.030	(0.025)
Chronic disorder, no limitations	0.025	(0.012)*	0.026	(0.012)*	0.019	(0.019)	0.021	(0.019)	0.039	(0.020)°
Chronic disorder, limitations	0.016	(0.011)	0.018	(0.010)°	0.016	(0.019)	0.002	(0.018)	0.036	(0.017)*

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008/2009† (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.026	(0.019)								
Incapacity to work	-0.001	(0.013)								
Entitled to lump sum chronic illness	-0.032	(0.015)*	-0.029	(0.015)°	-0.033	(0.025)	-0.027	(0.025)	-0.031	(0.028)
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	-0.024	(0.022)								
Medication use - other disorder	0.022	(0.029)								
Medication use - cardiovascular disorder	-0.018	(0.008)*	-0.018	(0.008)*	-0.035	(0.014)*	-0.004	(0.012)	-0.015	(0.014)
Medication use - thrombosis	-0.016	(0.009)	-0.015	(0.009)	-0.029	(0.025)	-0.009	(0.015)	-0.022	(0.017)
Medication use - chronic obstructive pulmonary disease (COPD)	-0.027	(0.016)°	-0.027	(0.016)°	-0.004	(0.030)	-0.040	(0.027)	-0.041	(0.032)
Medication use - asthma	0.035	(0.023)	0.034	(0.023)	-0.049	(0.041)	0.056	(0.034)	0.062	(0.034)°
Medication use - diabetes	-0.030	(0.014)*	-0.030	(0.014)*	-0.053	(0.025)*	-0.018	(0.022)	-0.035	(0.024)
Medication use - epilepsy	-0.007	(0.023)								
Medication use - thyroid disorder	0.004	(0.014)								
Community health centre										
Registered in community health centre	-0.022	(0.019)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.085	(0.012)***	-0.092	(0.009)***	-0.075	(0.013)***	-0.094	(0.014)***	-0.107	(0.016)***
Region of residence - Brussels	-0.064	(0.029)*	-0.071	(0.015)***	-0.066	(0.025)**	-0.027	(0.020)	-0.123	(0.024)***
Urbanization - medium	-0.029	(0.010)**	-0.026	(0.009)**	-0.033	(0.016)*	-0.004	(0.013)	-0.042	(0.016)**
Urbanization - thin	-0.045	(0.015)**	-0.043	(0.013)**	-0.063	(0.019)**	-0.031	(0.018)°	-0.039	(0.023)°
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.010	(0.009)	0.010	(0.009)	0.004	(0.016)	0.011	(0.013)	0.018	(0.015)
Occupation - inactive	-0.012	(0.012)	-0.007	(0.011)	0.009	(0.019)	0.001	(0.018)	-0.018	(0.022)
Occupation - self-employed in 2008	-0.001	(0.017)	-0.000	(0.017)	-0.006	(0.017)				
Occupation - self-employed in 2012	-0.005	(0.022)	-0.005	(0.021)			-0.004	(0.021)		

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008/2009† (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Occupation - self-employed in 2016	-0.056	(0.019)**	-0.056	(0.019)**					-0.051	(0.023)*
Occupation - unemployed	-0.010	(0.014)	-0.011	(0.014)	0.012	(0.022)	-0.023	(0.023)	-0.019	(0.025)
Occupation - student	0.023	(0.013)°	0.022	(0.014)	-0.019	(0.023)	-0.016	(0.023)	0.097	(0.019)***
Occupation - retired	0.026	(0.012)*	0.026	(0.013)*	-0.003	(0.019)	0.029	(0.021)	0.059	(0.023)*
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.126	(0.011)***	-0.126	(0.010)***	-0.121	(0.020)***	-0.109	(0.018)***	-0.145	(0.022)***
Education degree - lower secondary	-0.095	(0.009)***	-0.095	(0.009)***	-0.081	(0.015)***	-0.070	(0.015)***	-0.127	(0.017)***
Education degree - upper secondary	-0.051	(0.007)***	-0.051	(0.007)***	-0.029	(0.012)*	-0.039	(0.011)***	-0.073	(0.012)***
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.052	(0.008)***	0.052	(0.008)***	0.038	(0.013)**	0.068	(0.013)***	0.053	(0.016)***
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.247	(0.034)***	-0.250	(0.034)***	-0.235	(0.051)***	-0.209	(0.065)**	-0.317	(0.057)***
Household composition (reference = couple without children)										
Household composition - single without children	-0.016	(0.010)	-0.015	(0.010)	0.010	(0.016)	-0.023	(0.016)	-0.034	(0.016)*
Household composition - single with children	0.003	(0.016)	0.003	(0.016)	0.013	(0.029)	0.025	(0.027)	-0.032	(0.028)
Household composition - couple with children	-0.007	(0.009)	-0.007	(0.009)	0.004	(0.016)	-0.013	(0.015)	-0.015	(0.017)
Household composition - other	-0.026	(0.010)*	-0.026	(0.010)*	-0.011	(0.016)	-0.042	(0.018)*	-0.028	(0.019)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.045	(0.009)***	-0.046	(0.009)***	-0.005	(0.016)	-0.076	(0.016)***	-0.045	(0.015)**
Insurance status										
Insurance - increased reimbursement in 2008	0.031	(0.017)°	0.033	(0.017)°	0.010	(0.018)				
Insurance - increased reimbursement in 2012	0.016	(0.017)	0.016	(0.017)			0.019	(0.018)		
Insurance - increased reimbursement in 2016	-0.015	(0.016)	-0.015	(0.016)					0.019	(0.019)
Healthcare supply (density per 10 000 population, distance in km)										
Density of doctors (GPs, specialists) in municipality	0.000	(0.000)								

Independent variables	Full model (Obs. = 31 473)	Reduced model (Obs. = 31 473)	Reduced model 2008/2009† (Obs. = 10 847)	Reduced model 2012 (Obs. = 10 349)	Reduced model 2016 (Obs. = 10 277)
Density of doctors (GPs, specialists) in neighbouring municipalities	-0.001 (0.001)				
Density of dentists in municipality	0.003 (0.002)	0.003 (0.001)**	0.002 (0.002)	0.003 (0.002)°	0.003 (0.001)°
Density of dentists in neighbouring municipalities	0.009 (0.003)*	0.005 (0.002)*	0.002 (0.003)	0.007 (0.003)*	0.007 (0.003)*
Distance to nearest ED	-0.000 (0.001)				
Number of EDs within 10km radius	-0.001 (0.002)				
Time (reference = 2008/2009†)					
Time: year 2012	-0.010 (0.008)	-0.009 (0.008)			
Time: year 2016	0.054 (0.009)***	0.056 (0.009)***			

† The indicator value refers to the year 2009 (IMA-AIM year 2007, 2008, 2009), while the independent variables are taken from the EU-SILC survey wave 2008.
*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.8.3.3. Overview inequity and evolution in the different scenarios

Figure 68 visualizes the absolute Gini coefficient for inequality in the probability to have regular preventive dentist visits (so without needs correction) as well as inequity in the fairness gap for the probability to have regular preventive dentist visits calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 68, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero.

The evolution of inequality is in line with the evolution of inequity in the various scenarios, with an upward trend over time. The absolute Gini coefficient in the inequality scenario has increased from 0.20 in 2008 to 0.22 in 2016. For the baseline scenario, the absolute Gini coefficient increased from 0.22 to 0.24. Hence, we find that the disparity between individuals in the probability of having regular preventive dentist visits that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 48 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not having regular preventive

dentist visits) for the different inequity scenarios (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

When following the traditional approach, the reversed relative and absolute Gini coefficients indicate that inequity has increased over time, while the relative Gini coefficient indicates a decrease in inequity over time. When following the alternative approach, there is an unambiguous increase in inequity (baseline-residual scenario).

Figure 68 – Evolution (2009-2016) of the absolute Gini index by scenario

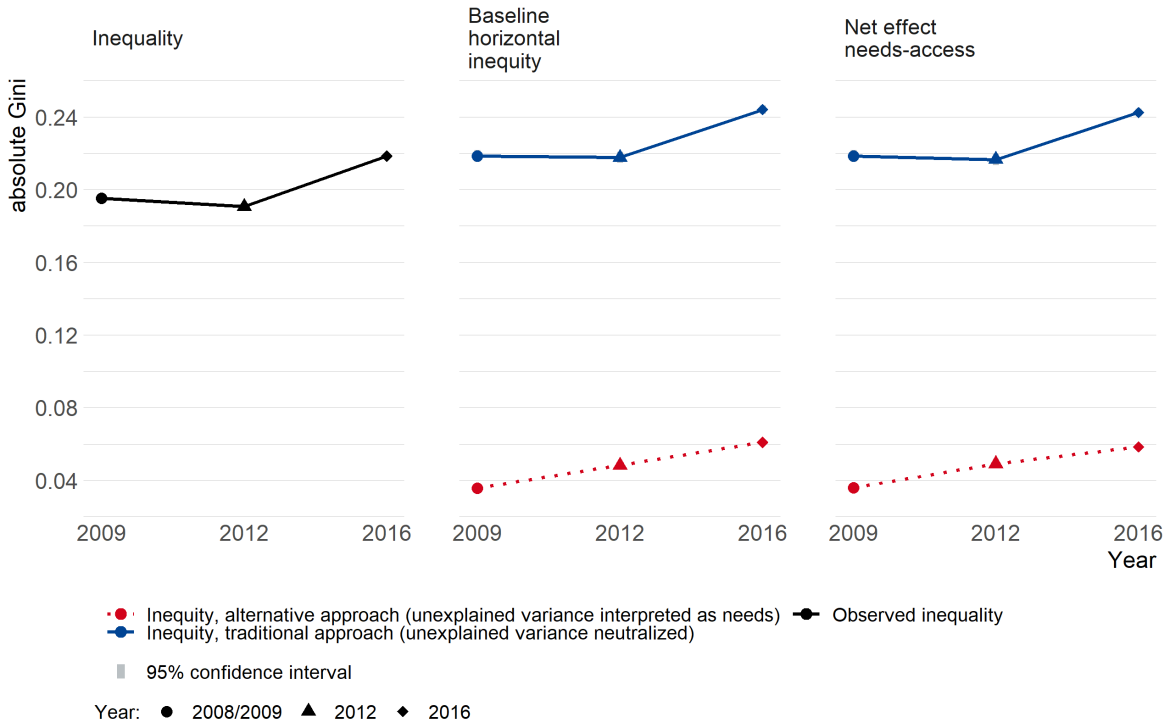


Table 48 – Evolution (2009-2016) of the inequity in the probability to have regular preventive dentist visits for different scenarios

Scenario	Inequality (Gini)	2009	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.218	0.218	0.244^*	↑
	Relative	0.697	0.698	0.641^*	↓
	Reversed relative	0.294	0.288	0.351^*	↑
Net effect needs-access	Absolute	0.218	0.217	0.242^*	↑
	Relative	0.697	0.700	0.644^*	↓
	Reversed relative	0.294	0.287	0.350^*	↑
Baseline-residual	Absolute	0.036	0.048^	0.061^*	↑
	Relative	0.135	0.188^	0.189^	↑
	Reversed relative	0.049	0.065^	0.090^*	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.8.3.4. Overview inequity over time for different population subgroups

Figure 69 and Figure 70 show how the probability to have regular preventive dentist visits in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 69, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 70, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower probability to have regular preventive dentist visits than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 69 and Figure 70 indicate that the inequalities with respect to the probability to have regular preventive dentist visits are quite pronounced and range between -20 and +15 percentage points. After correcting for healthcare needs (various inequity scenarios), the disparities are less pronounced for subgroup based on healthcare needs. The disparities are quite similar in the inequality and inequity scenarios for subgroups based on income, the financial situation or education.

We conclude that, first, there are important gradients in the probability to have regular preventive dentist visits with respect to income and education and this both for inequality and inequity (Figure 64). Before and after

correcting for needs, the probability to have regular preventive visits is markedly lower for individuals with primary and lower secondary education; individuals at risk of poverty and in the lower middle class. Moreover, the (negative) deviations from the population mean are increasing over time. A probability above the population mean is found for individuals with tertiary education and in the upper and top middle class.

Second, for self-assessed health, and other indicators of higher care needs, there are important inequalities, but the inequities are less pronounced. This pattern differs from the results for dentist visits in general. In the inequality scenario, we find probabilities of having regular preventive dentist visits below the population average for individuals with fair, bad and very bad self-assessed health, individuals with chronic disorders, with invalidity and over-80 year olds. In the inequity scenario, the deviations from the population average are small(er). The inequity results for these groups should, however, be interpreted with caution, because there are good reasons not to correct for healthcare needs in case of preventive care (see Scientific report section 1.1) and because the regression results show negative associations between higher care needs (self-assessed health and high age) and regular preventive dental care (see section 1.8.3.2). The effect of the latter is clearly visible when comparing the inequality and inequity results for the subgroup over-80 year olds. It is debatable whether less preventive dental care for higher need individuals is justifiable.

Third, for most vulnerable population subgroups the probability to have regular preventive dentist visits is below the population average. This is clearly visible for population subgroups which are financial vulnerable (i.e. at risk of poverty, with increased reimbursement, unemployment or material deprivation). Again, the situation is deteriorating over time relative to the population mean. It is important to note that increased reimbursement does not increase accessibility to preventive dental care. Finally, the effects of the baseline scenario are corroborated by the net effect needs-access scenario and the baseline-residual scenario.

In the inequality and baseline inequity scenario, we find that:

- There is a clear socioeconomic gradient in the probability to have regular preventive dentist visits by educational attainment, with higher [lower] probabilities among individuals with high [low] educational attainment.
- There is a clear socioeconomic gradient in the probability to have regular preventive dentist visits by income, with higher [lower] probabilities among individuals with high [low] income.
- Individuals in fair, bad and very bad self-reported health have a lower probability to have regular preventive dentist visits in the inequality scenario, the disparities are less pronounced in the inequity scenarios.
- The probability to have regular preventive dentist visits is for most vulnerable population subgroups below the population average. The group of self-employed is an exception. Population subgroups based on higher care needs show important inequalities, but the disparities in the inequity scenarios are small and for the over-80 year olds, the gap with the population mean is no longer negative, but has become positive. The probability is particularly lower (10 to 20 percentage points) among the subgroups at risk of poverty and with material deprivation. A negative finding is that the position of most vulnerable groups deteriorates over time relative to the population average.

Figure 69 – Deviation in the needs-corrected probability to have regular preventive dentist visits from population average for subgroups based on income, education and self-assessed health, by scenario and year

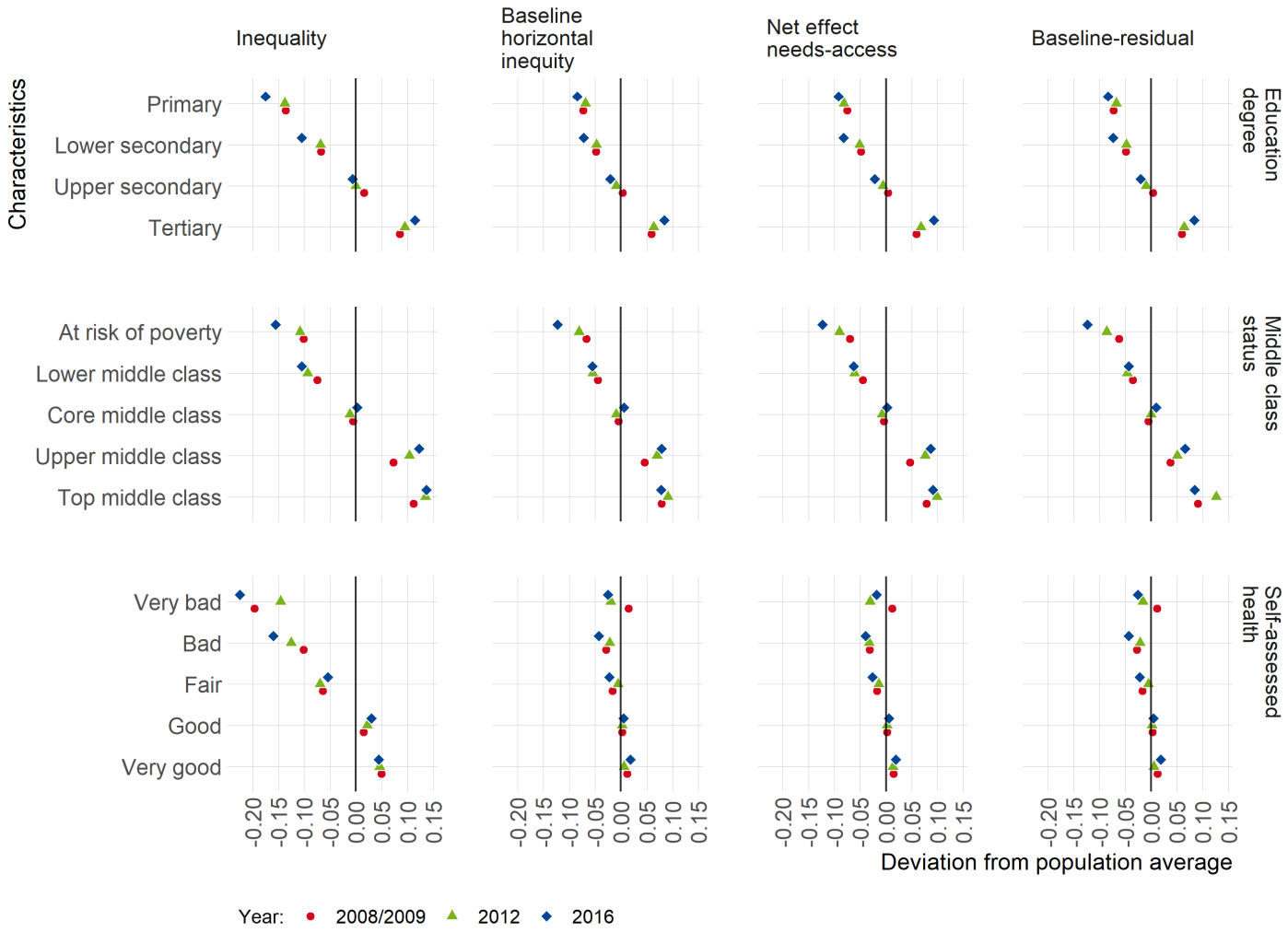


Figure 70 – Deviation in the needs-corrected probability to have regular preventive dentist visits from population average for specific vulnerable subgroups, by scenario and year

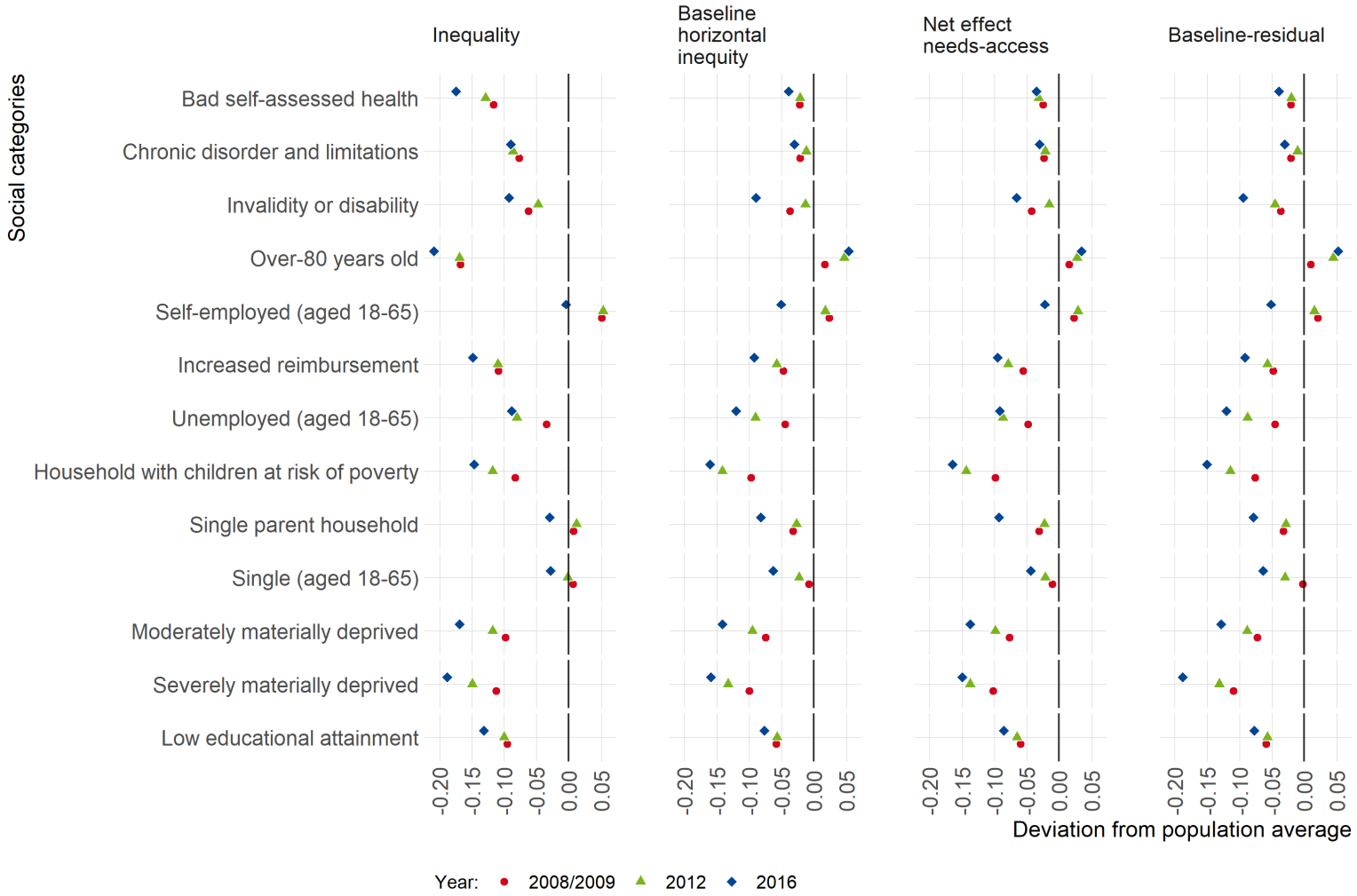
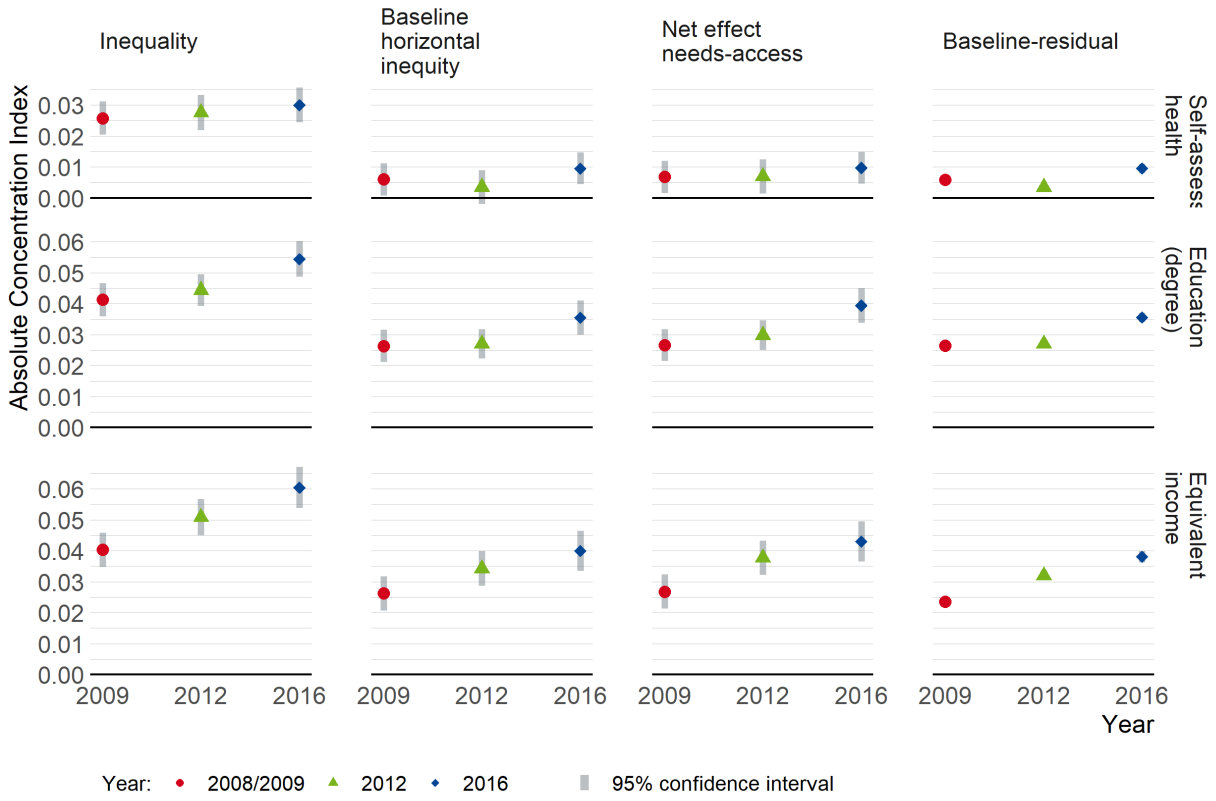


Figure 71 shows the absolute concentration index of the needs-corrected probability to have regular preventive dentist visits to self-assessed health, education and income for the inequality scenario and the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher (needs-corrected) probability to have regular preventive dentist visits concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher (needs-corrected) probability for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 71 show that there are important systematic socioeconomic inequalities in the probability to have regular preventive dentist visits, with higher probabilities concentrated among high educated individuals, high income individuals and individuals with better self-assessed health. In the inequity scenarios, the concentration index is no longer significant with respect to self-assessed health. After correction for healthcare needs, important systematic socioeconomic inequities with respect to income and education remain, although smaller than the inequalities, with higher probabilities concentrated among high educated individuals and high income individuals.

The results in the net effect needs-access scenario and the baseline-residual scenario match those of the baseline horizontal inequity scenario.

Figure 71 – Evolution (2009-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.9. Coverage by Global Medical Record (GMR)

1.9.1. Summary

We analyse inequity in the coverage by a global medical record (GMR). Individuals who are registered in a community health centre are excluded from the analysis as no registration is made for a GP consultation or coverage by a GMR.

Coverage by a GRM is identified through registration of the following nomenclature codes: 102771, 102793, 102395, 101371, 101393, 101312, 101334, 103574 and 103596.

Key points inequity in coverage by GMR in the past year

- EU-SILC/IMA-AIM survey value for the indicator closely matches population values.
- There has been a surge in GMR-coverage over time, increasing from 47% in 2008 to 68% in 2016; coverage is highest among the elderly.

Coverage by GMR

- The effects are in line with those for the indicator GP visits. Effects for both healthcare needs and socioeconomic status. **Main associations (regression):**
  - Health status: higher probabilities for individuals incapacitated from work; for a large range of disorders as defined by prescribed medication use (in particular asthma, cardiovascular disease and diabetes); in higher age categories; among females. Weak association with self-reported health status. While the presence of a chronic disorder increases the probability, limitations to daily activities do not.
  - Lower probabilities for individuals with material deprivation in 2008; individuals who are self-employed or student (relative to full-time employee); individuals living in Wallonia and Brussels (relative to Flanders).
  - Higher probabilities for individuals who are retired; with lower/higher secondary education; who benefit from increased reimbursement in 2016.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic inequities by self-reported health nor systematic socioeconomic inequities by income.
  - There are small inequities by educational attainment in favour of individuals with lower educational attainment. This is potentially related to an age effect with relatively lower levels of educational attainment among the elderly who have higher coverage rates.
  - Among the groups of interest, coverage is below the population mean for individuals at risk of poverty, individuals with material deprivation (in 2008 and 2012), singles aged between 18 and 65, the unemployed (in 2008 and 2012), individuals in the top middle class and the self-employed. The probabilities for individuals with material deprivation, the unemployed and the top middle class are evolving toward the population average. Above-average coverage rates are found for the over-80 year olds, individuals with low educational attainment and individuals with increased reimbursement.

1.9.2. *Evolution over time for the population and population subgroups*

Table 49 reports the evolution over time of the probability to have a global medical record (GMR). Coverage by a GMR has increased sharply over time. 46.8%, 55.8% and 67.5% of the insured population had a GMR in 2008, 2012 and 2016 respectively.[18, 20] Among all individuals included in the EU-SILC/IMA-AIM sample, this fraction of the interviewed individuals with a GMR is lower with 44.3%, 51.7% and 63.3% in 2008, 2012 and 2016 respectively, but it follow the same upward trend. When restricting the EU-SILC/IMA-AIM sample to individuals aged 18 or more – the sample used in the regression and inequity analysis –, the fraction is more in line with the population fraction, with probabilities of 48.2%, 55.2% and 66.6% in 2008, 2012 and 2016, respectively.

The reversed value is given as well, i.e. the probability of not having a GMR. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up (see section 1.1.5.1).

Table 49 – Evolution (2008-2016) in the coverage by a Global Medical Record

Sample	Definition	2008	2012	2016
Population	Indicator	46.8%	55.8%	67.5%
Survey (all)	Indicator	44.3%	51.7%	63.3%
	Reverse	55.7%	48.3%	36.7%
Survey (18+)	Indicator	48.2%	55.2%	66.6%
	Reverse	51.8%	44.8%	33.4%

Figure 72 shows the evolution of the probability to have a GMR for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.9.3.

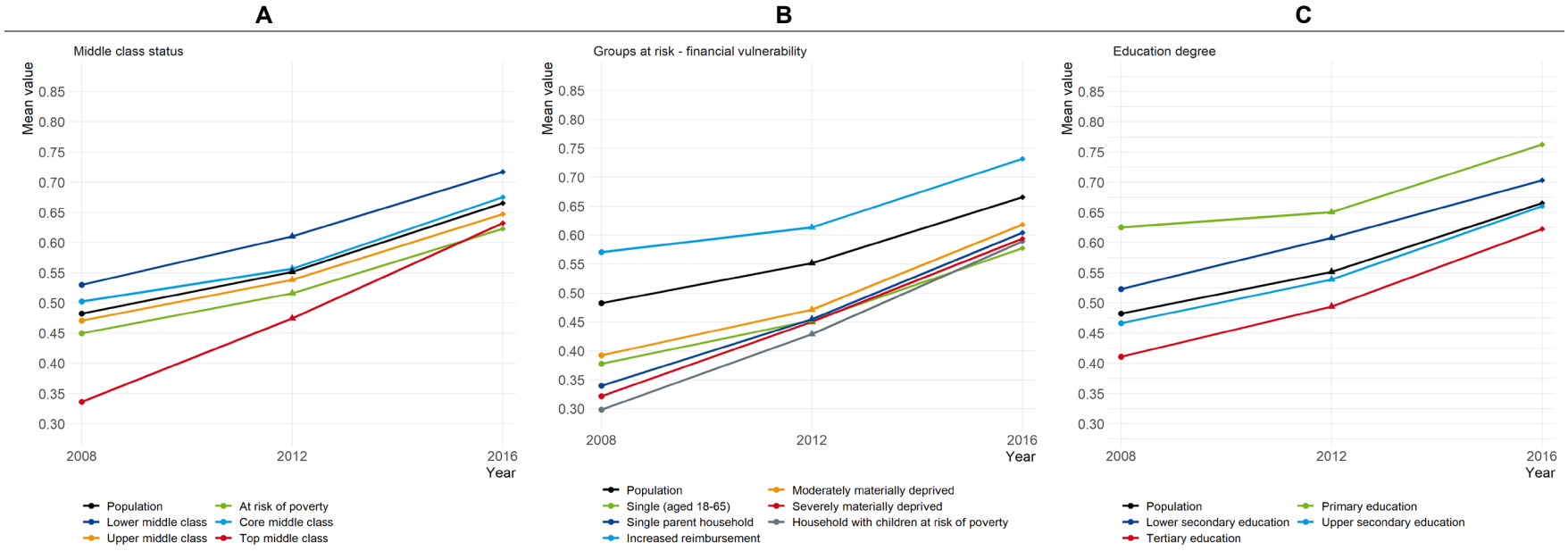
Figure 72 indicates that the upward trend in GMR coverage over time (see Table 49), is common to all population subgroups. Nonetheless, there is important variation in the fraction of individuals with a GMR across the population subgroups. The observed differences in GMR coverage are to a large extent similar to the differences in the probability to consult a GP (see section 1.3.2.1). We have the following major findings. First, individuals with higher care needs, i.e. those with fair, bad and very bad self-reported health, with chronic disorders and limitation, invalidity or disability have the highest GMR-coverage (panel E and F), the coverage is particularly high among over-80 year olds. Second, individuals in financially vulnerable subgroups have a lower GMR-coverage, except individuals who benefit from increased reimbursement (panel B). Third, there is some socioeconomic gradient in GMR coverage by income (panel A) and educational attainment (panel C), with generally higher coverage among individuals with lower educational attainment and lower income. Remark, however, that individuals at risk of poverty have a lower coverage than individuals in the lower, core and upper middle class (panel A).

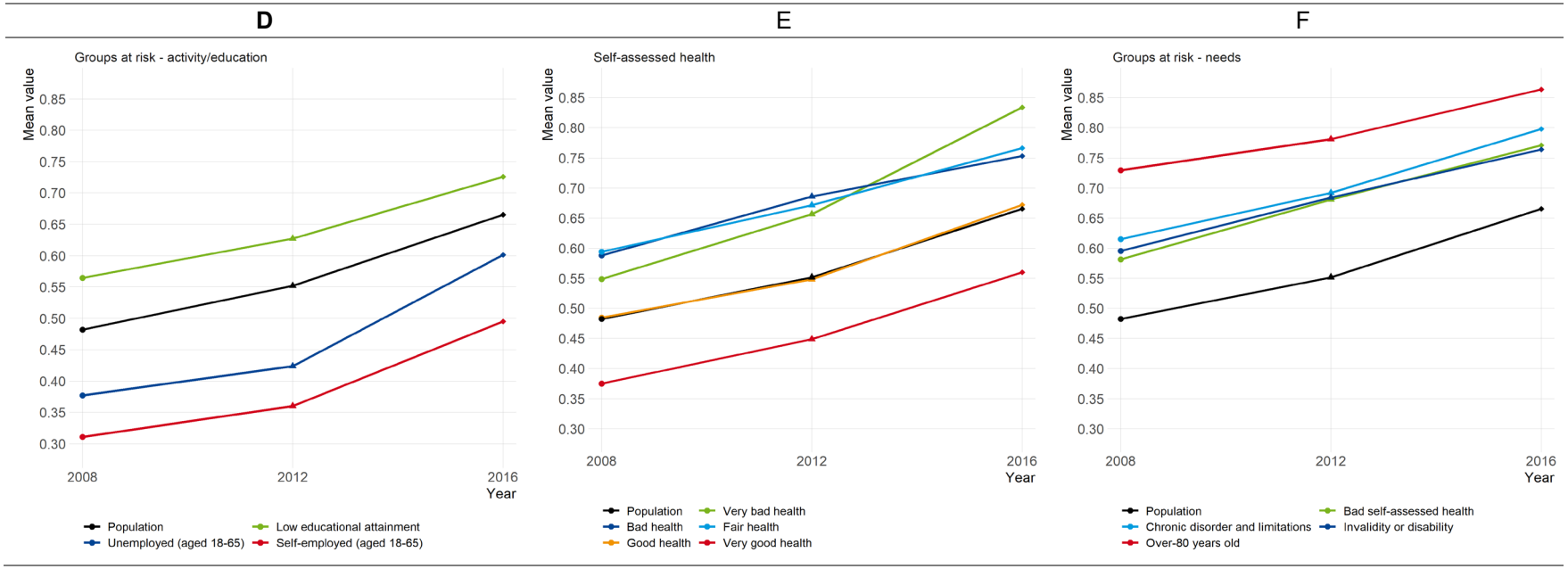
In addition, we have the following findings:

- Panel A: There is some variation in GMR-coverage by income level (range 2016: 0.62 – 0.72). Individuals at risk of poverty and in the top middle class have the lowest coverage. The latter subgroup had a strong positive trend over the studied period, while the upward trend in the other subgroups was in line with the evolution in the population.
- Panel B: individuals with material deprivation have a GMR-coverage below the population average, while individuals who benefit from increased reimbursement have a GMR-coverage well above the population average. The same discrepancy was found for the probability to consult a GP in the past year (see section 1.3.2.1). Single adults, adults in single parent households, and in households with children at risk of poverty have a GMR coverage below the population average, but with a somewhat stronger upward trend than the population. Individuals in single parent households are one of the few population subgroups where the GMR-coverage is out of sync with the probability to consult a GP in the past year (see section 1.3.2.1). This subgroup had a probability to visit a GP in line with the population average, but the GMR-coverage is considerably below the population average.

- Panel C: There is little variation in GMR-coverage by educational attainment (range 2016: 0.62 – 0.70). The coverage increases with lower levels of educational attainment.
- Panel D: The GMR-coverage is lower than the population average among individuals who are unemployed or self-employed. Both groups were also characterized by a below-average probability to consult a GP.
- Panel E and F: There is important variation in coverage by self-assessed health status (range 2016: 0.56 – 0.83). Individuals in (very) good health have a lower probability than individuals in fair or (very) bad health. Between 75% and 85% of those reporting to have fair or (very) bad health have a GMR in 2016. A similar or even higher coverage, is found for individuals in other subgroups with higher care needs, i.e. individuals over 80 years old, individuals with disability or in invalidity, and individuals reporting chronic disorders in combination with limitation to daily activities.

Figure 72 – Evolution (2008-2016) of the probability to have a global medical record for different subgroups and populations groups at risk





1.9.3. Regression output

Table 50 reports the average marginal effects of a probit regression of the indicator of the probability of having a GMR (value = 1) or not (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 50):

- There is a positive time trend, indicating a general increase in GMR-coverage over time irrespective of the underlying individual characterisitcs or environment.
- **Healthcare needs** are associated with the probability to have a GMR. GMR-coverage increases with age, but males have a lower coverage than females in all age categories. GMR-coverage is most strongly associated with being incapacitated for work and various disease profiles based on prescribed medication use, in particular asthma, cardiovascular disease, and diabetes. Other needs variables, such as self-assessed health, presence of chronic disorders or invalidity are only to a limited extent associated with GMR-coverage.
  - Age and sex: GMR coverage is strongly increasing with age. Males have a 3 to 11 percentage point lower probability to have a GMR than females in the same age category.
  - Self-reported health status: there is a limited effect of self-reported health status. When correcting for other characteristics, individuals with bad, fair and good health have a higher probability to have a GMR of about 4 to 7 percentage points compare to individuals with very good self-assessed health. No significant effect is found for

individuals with very bad self-assessed health. The presence of a chronic disorder increases the probability of having a GMR of about 3% to 4%, there is no effect on the probability when limitations to daily activities are reported.

- Administrative health information: invalidity or disability has a positive effect that was only significant in 2012. Being incapacitated for work has a very strong positive association on the probability of having a GMR (an increase of about 10 percentage points). Hence, being incapacitated does not only result in higher care use (GP, specialist, ED and inpatient care), but is also an opportunity to open or renew the GMR.
- Medication use: Medication use for various disorders is strongly associated with the probability to have a GMR, an increase of 5 to 14 percentage points. In particular, individuals who take medication for cardiovascular disease, diabetes, and asthma have a higher coverage (coverage higher with more than 7.5 percentage points).

- There is limited variation in the probability to have a global medical record by **socioeconomic profile**, especially with regard to education and activity status.
  - Education degree: When correcting for other characteristics, we find that individuals with lower secondary and higher secondary education have a higher coverage of about 2 to 5 percentage points than individuals with tertiary education. No significant difference was found for individuals with primary education.
  - Activity status: Compared to full-time employees, individuals who are self-employed have a GMR-coverage that is 10, 11 and 8 percentage points lower in 2008, 2012 and 2016, respectively. Retired individuals have a higher coverage of about 7, 6 and 3 percentage points in 2008, 2012 and 2016, respectively, although the association was not significant in 2016. Student have a lower coverage of 4 and 5 percentage points in 2012 and 2016. We find no significant difference in coverage between full-time employees and individuals who are inactive, unemployed or part-time employed.
  - Income level and material deprivation: There is no variation in GMR coverage by income. With respect to material deprivation, we find a significant negative association between material deprivation and GMR-coverage in 2008; in 2012 and 2016, the association was not significant.
  - Household composition: Single persons have a lower probability to have a GMR, compared to adults in a couple without children. The gap is, however, decreasing over time. No or minor effects are found for other household composition, such as single parents or a couple with children
  - Country of birth: Individuals who were not born in Belgium have a lower probability to have a GMR in 2012.
- Individuals who benefit from **increased reimbursement** have a higher probability to have a GMR in 2016. This might be due to the increased accessibility of GP care for this subgroup that has also led to an increased probability to visit a GP (see section 1.3.2.2).
- The density of specialists**,** the distance to a hospital site with an emergency department (ED) and the number of hospital sites with an ED in a 10km radius are weakly associated with GMR-coverage. A higher density of specialist in the municipality, a shorter distance to a hospital site with ED or more hospital sites with ED in the vicinity are associated with a lower probability to have a GMR. Hence there might be some reluctance to have a GMR if alternatives to GP care are more abundant.
- As was the case for the probability to visit a GP, the probability to have a GMR is strongly associated with the region of residence. Individuals living in Wallonia have a probability of coverage that is, ceteris paribus 32, 28, and 25 percentage points lower than individuals living in Flanders in 2008, 2012 and 2016, respectively. While the gap is decreasing in Wallonia, it is increasing for individuals living in Brussels, with a probability that is 16, 15 and 21 percentage points lower than individuals living in Flanders in 2008, 2012 and 2016, respectively. There is no effect of urbanization.

Table 50 – Regression output for the probability to have a global medical record, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 618)		Reduced model 2008 (Obs. = 10 675)		Reduced model 2012 (Obs. = 10 088)		Reduced model 2016 (Obs. = 9 855)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.114	(0.011)***	-0.114	(0.011)***	-0.102	(0.018)***	-0.105	(0.018)***	-0.120	(0.018)***
Male aged 35-49 years	-0.068	(0.012)***	-0.068	(0.012)***	-0.030	(0.021)	-0.064	(0.020)**	-0.098	(0.019)***
Female aged 35-49 years	0.007	(0.012)	0.007	(0.012)	0.035	(0.019)°	0.016	(0.020)	-0.025	(0.019)
Male aged 50-64 years	0.001	(0.013)	0.001	(0.013)	0.039	(0.021)°	0.020	(0.023)	-0.055	(0.020)**
Female aged 50-64 years	0.034	(0.014)*	0.034	(0.014)*	0.061	(0.021)**	0.035	(0.022)	0.006	(0.020)
Male aged 65-79 years	0.039	(0.018)*	0.038	(0.018)*	0.085	(0.032)**	0.058	(0.031)°	-0.025	(0.032)
Female aged 65-79 years	0.070	(0.019)***	0.069	(0.019)***	0.115	(0.030)***	0.083	(0.032)**	0.018	(0.032)
Male aged 80 years or more	0.026	(0.028)	0.024	(0.028)	0.076	(0.049)	0.016	(0.046)	-0.006	(0.045)
Female aged 80 years or more	0.109	(0.026)***	0.106	(0.026)***	0.124	(0.040)**	0.149	(0.043)***	0.058	(0.045)
Self-assessed health (reference = very good)										
Self-assessed health - good	0.022	(0.008)**	0.022	(0.008)**	0.035	(0.014)*	0.017	(0.012)	0.021	(0.013)
Self-assessed health - fair	0.040	(0.012)***	0.041	(0.012)***	0.067	(0.021)**	0.046	(0.022)*	0.017	(0.020)
Self-assessed health - bad	0.027	(0.016)°	0.029	(0.016)°	0.061	(0.028)*	0.069	(0.029)*	-0.031	(0.028)
Self-assessed health - very bad	0.021	(0.030)	0.021	(0.029)	0.051	(0.051)	0.004	(0.053)	0.024	(0.048)
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	-0.021	(0.016)	-0.022	(0.016)	-0.025	(0.025)	-0.048	(0.025)°	-0.004	(0.026)
Chronic disorder, no limitations	0.028	(0.013)*	0.027	(0.013)*	0.040	(0.023)°	0.023	(0.018)	0.025	(0.026)
Chronic disorder, limitations	0.039	(0.012)**	0.036	(0.012)**	0.018	(0.019)	0.013	(0.021)	0.072	(0.019)***
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.039	(0.017)*	0.037	(0.017)*	0.019	(0.029)	0.068	(0.029)*	0.026	(0.031)
Incapacity to work	0.105	(0.013)***	0.105	(0.013)***	0.103	(0.023)***	0.105	(0.024)***	0.123	(0.024)***
Entitled to lump sum chronic illness	-0.012	(0.016)								
Clinical profile based on medication use (reference = no disorder)										

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 618)		Reduced model 2008 (Obs. = 10 675)		Reduced model 2012 (Obs. = 10 088)		Reduced model 2016 (Obs. = 9 855)	
Medication use - neurological disorder	0.058	(0.024)*	0.056	(0.024)*	0.056	(0.039)	0.066	(0.044)	0.041	(0.042)
Medication use - other disorder	0.027	(0.029)								
Medication use - cardiovascular disorder	0.135	(0.008)***	0.135	(0.008)***	0.131	(0.013)***	0.136	(0.014)***	0.133	(0.014)***
Medication use - thrombosis	0.046	(0.011)***	0.046	(0.011)***	0.058	(0.024)*	0.051	(0.016)**	0.047	(0.018)**
Medication use - chronic obstructive pulmonary disease (COPD)	0.046	(0.018)*	0.046	(0.018)*	0.015	(0.031)	0.040	(0.029)	0.082	(0.032)*
Medication use - asthma	0.098	(0.019)***	0.097	(0.020)***	0.052	(0.038)	0.102	(0.036)**	0.133	(0.037)***
Medication use - diabetes	0.077	(0.013)***	0.078	(0.013)***	0.074	(0.025)**	0.066	(0.021)**	0.098	(0.023)***
Medication use - epilepsy	0.052	(0.026)*	0.050	(0.026)°	-0.003	(0.046)	0.124	(0.047)**	0.037	(0.042)
Medication use - thyroid disorder	0.067	(0.013)***	0.067	(0.013)***	0.065	(0.026)*	0.084	(0.022)***	0.049	(0.023)*
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.277	(0.015)***	-0.290	(0.014)***	-0.317	(0.017)***	-0.275	(0.017)***	-0.246	(0.017)***
Region of residence - Brussels	-0.164	(0.036)***	-0.179	(0.037)***	-0.159	(0.056)**	-0.148	(0.046)**	-0.206	(0.036)***
Urbanization - medium	0.008	(0.013)								
Urbanization - thin	-0.022	(0.021)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.005	(0.010)	0.005	(0.010)	0.014	(0.016)	0.008	(0.018)	-0.007	(0.017)
Occupation - inactive	-0.001	(0.012)	-0.000	(0.012)	-0.014	(0.022)	0.023	(0.022)	-0.014	(0.021)
Occupation - self-employed in 2008	-0.101	(0.019)***	-0.101	(0.019)***	-0.095	(0.020)***				
Occupation - self-employed in 2012	-0.108	(0.022)***	-0.110	(0.022)***			-0.114	(0.024)***		
Occupation - self-employed in 2016	-0.081	(0.021)***	-0.081	(0.021)***					-0.080	(0.022)***
Occupation - unemployed	-0.013	(0.013)	-0.012	(0.013)	-0.009	(0.023)	-0.014	(0.024)	-0.010	(0.023)
Occupation - student	-0.035	(0.013)**	-0.036	(0.013)**	-0.003	(0.026)	-0.042	(0.025)°	-0.054	(0.020)**
Occupation - retired	0.053	(0.013)***	0.054	(0.013)***	0.070	(0.021)**	0.059	(0.022)**	0.028	(0.023)
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	0.021	(0.012)°	0.022	(0.012)°	0.029	(0.021)	0.005	(0.021)	0.021	(0.024)

Independent variables	Full model (Obs. = 30 618)		Reduced model (Obs. = 30 618)		Reduced model 2008 (Obs. = 10 675)		Reduced model 2012 (Obs. = 10 088)		Reduced model 2016 (Obs. = 9 855)	
Education degree - lower secondary	0.045	(0.009)***	0.045	(0.009)***	0.048	(0.015)**	0.043	(0.018)*	0.043	(0.016)**
Education degree - upper secondary	0.021	(0.007)**	0.021	(0.007)**	0.024	(0.013)°	0.016	(0.012)	0.021	(0.013)°
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.007	(0.008)	0.007	(0.008)	-0.000	(0.014)	0.009	(0.015)	0.015	(0.015)
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.063	(0.035)°	-0.065	(0.035)°	-0.110	(0.062)°	-0.024	(0.052)	-0.048	(0.056)
Household composition (reference = couple without children)										
Household composition - single without children	-0.031	(0.010)**	-0.031	(0.010)**	-0.046	(0.018)*	-0.032	(0.017)°	-0.013	(0.017)
Household composition - single with children	-0.006	(0.015)	-0.005	(0.015)	-0.042	(0.032)	0.007	(0.031)	0.014	(0.026)
Household composition - couple with children	0.000	(0.010)	-0.000	(0.010)	-0.037	(0.017)*	0.024	(0.015)	0.009	(0.016)
Household composition - other	-0.023	(0.012)*	-0.023	(0.012)*	-0.045	(0.019)*	-0.031	(0.021)	0.002	(0.019)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.033	(0.011)**	-0.031	(0.011)**	-0.014	(0.019)	-0.043	(0.018)*	-0.028	(0.017)
Insurance status										
Insurance - increased reimbursement in 2008	0.026	(0.017)	0.024	(0.017)	0.022	(0.020)				
Insurance - increased reimbursement in 2012	0.022	(0.016)	0.020	(0.016)			0.009	(0.019)		
Insurance - increased reimbursement in 2016	0.066	(0.016)***	0.066	(0.016)***					0.071	(0.018)***
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	-0.002	(0.002)								
Density of GPs in neighbouring municipalities	-0.003	(0.005)								
Density of specialists in municipality	-0.001	(0.001)°	-0.002	(0.001)**	-0.003	(0.001)**	-0.002	(0.001)*	-0.000	(0.001)
Density of specialists in neighbouring municipalities	-0.000	(0.001)	-0.001	(0.001)	0.000	(0.001)	-0.001	(0.001)	-0.001	(0.001)
Distance to nearest ED	0.003	(0.001)**	0.003	(0.001)*	0.004	(0.002)*	0.003	(0.002)*	0.002	(0.002)
Number of EDs within 10km radius	-0.006	(0.002)*	-0.005	(0.002)*	-0.006	(0.004)	-0.007	(0.003)*	-0.003	(0.003)
Time (reference = 2008)										

Independent variables	Full model (Obs. = 30 618)	Reduced model (Obs. = 30 618)	Reduced model 2008 (Obs. = 10 675)	Reduced model 2012 (Obs. = 10 088)	Reduced model 2016 (Obs. = 9 855)
Time: year 2012	0.057 (0.009)***	0.058 (0.009)***			
Time: year 2016	0.152 (0.009)***	0.153 (0.009)***			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.9.4. Overview inequity and evolution in the different scenarios

Figure 73 visualizes the absolute Gini coefficient for inequality in the probability to have a GMR (so without needs correction) as well as inequity in the fairness for the probability to have a GMR calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 73, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a decrease in inequity in the probability to have a GMR in all scenarios. For the baseline scenario, the absolute Gini coefficient decreased from about 0.26 in 2008 to about 0.24 in 2016. Hence, we find that the disparity between individuals in the probability of having a GMR that cannot be explained and justified by (observable) healthcare needs has decreased over time.

Table 50 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not having a GMR) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

The trends are quite similar to those of the probability to consult a GP, although in the latter case, the value of the Gini coefficients were lower. Based on the trends, we conclude that inequity as measured by the absolute and relative Gini coefficient has diminished over time. For the reversed indicator, on the other hand, inequity has increased over time. In the alternative approach, i.e. the baseline-residual scenario, all three inequity measures indicate a decrease in inequity.

Figure 73 – Evolution (2008-2016) of the absolute Gini index by scenario

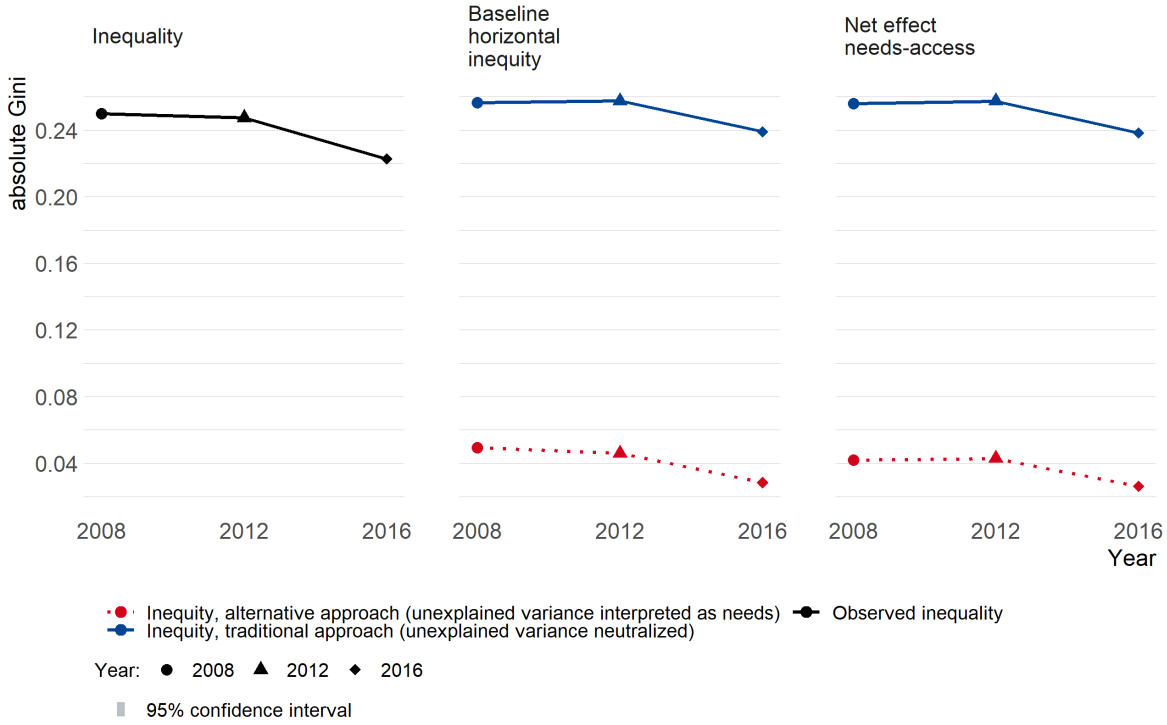


Table 51 – Evolution (2008-2016) of the inequity in the probability to have a global medical record for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.256	0.257	0.239^*	↓
	Relative	0.490	0.440^	0.349^*	↓
	Reversed relative	0.462	0.521^	0.605^*	↑
Net effect needs-access	Absolute	0.256	0.257^	0.238^*	↓
	Relative	0.487	0.439^	0.348^*	↓
	Reversed relative	0.460	0.519^	0.606^*	↑
Baseline-residual	Absolute	0.049	0.046^	0.028^*	↓
	Relative	0.102	0.083^	0.043^*	↓
	Reversed relative	0.095	0.102^	0.085^*	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.9.5. Overview inequity over time for different population subgroups

Figure 74 and Figure 75 show how the probability to have a GMR in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity scenarios**, both for the average population and subgroup value. In Figure 74, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 75, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower GMR-coverage than the population average. Values to the right of the vertical line, on the other hand, indicate a higher probability than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 74 and Figure 75 indicate that the inequalities with respect to the probability to have a GMR are quite pronounced and range between -20 and +25 percentage points. Once a correction is made for healthcare needs (various inequity scenarios), the disparities are less pronounced, i.e. the deviations from the population average are lower in the inequity scenario compared to inequality. This is especially true for subgroups based on age and (self-assessed) health status.

The inequity pattern is rather similar to the one observed for the probability to consult a GP (see section 1.3.2.4). After correcting for needs, there are lower coverage rates for individuals at risk of poverty, individuals with

material deprivation (in 2008 and 2012), singles aged between 18 and 65, the unemployed (in 2008 and 2012), individuals in the top middle class and the self-employed. The probabilities for individuals with material deprivation, the unemployed and the top middle class are evolving toward the population average. Higher coverage rates are found for the over-80 year olds, individuals with low educational attainment and individuals with increased reimbursement. The effects are going in the same direction when considering the baseline, baseline-residual and net effect needs-access scenario.

In the baseline inequity scenario, we find that:

- While there is a clear socioeconomic gradient in GMR-coverage by educational attainment, with higher coverage rates among individuals with low educational attainment (column inequality), this is no longer (or much less so) the case after correcting for healthcare needs (baseline horizontal inequity).
- There is a lower coverage among individuals at risk of poverty and in the top middle class. The latter group has, however, an important catch-up effect over time (see also section 1.9.2). The increased coverage among lower middle class individuals that existed before correcting for needs (column inequality), has levelled of once a correction for needs is made.
- Individuals in fair, bad and very bad self-reported health have a higher GMR-coverage (column inequality). This is no longer the case when correcting for healthcare needs (baseline horizontal inequity)
- Among the vulnerable groups, there is a lower coverage among individuals who are unemployed, self-employed, singles between 18 and 65 and individuals in households with material deprivation (baseline horizontal inequity). A positive finding is that in 2016 the gap in coverage with the population average has disappeared among the subgroups of unemployed and materially deprived individuals. Also for households with children at risk of poverty and single parent, the deviation with the population mean has decreased over time. Individuals who benefit from increased reimbursement and over-80 year olds have a coverage above the population mean after correcting for needs.

Figure 74 – Deviation in the needs-corrected probability to have a global medical record from population average for subgroups based on income, education and self-assessed health, by scenario and year

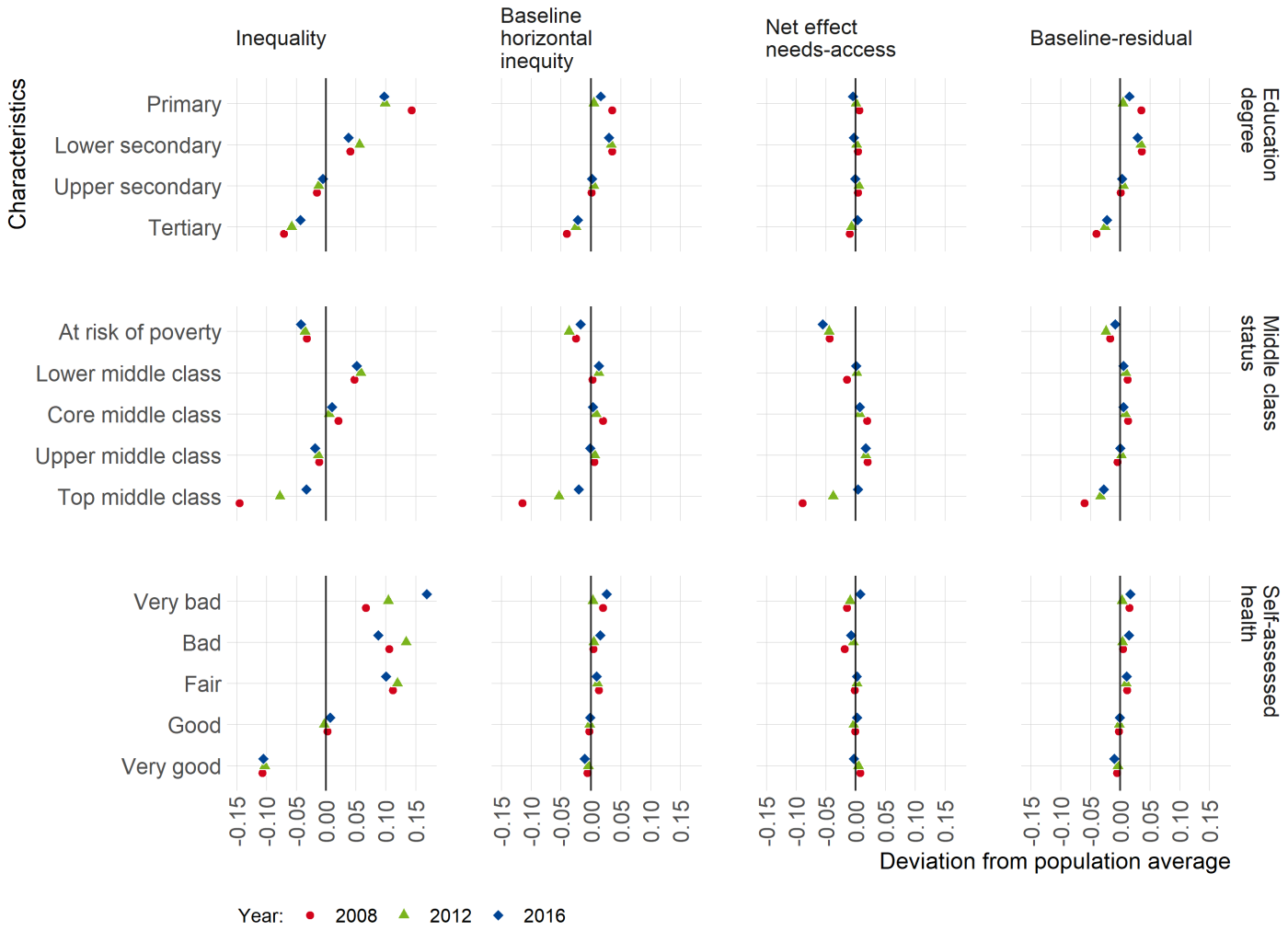


Figure 75 – Deviation in the needs-corrected probability to have a global medical record from population average for specific vulnerable subgroups, by scenario and year

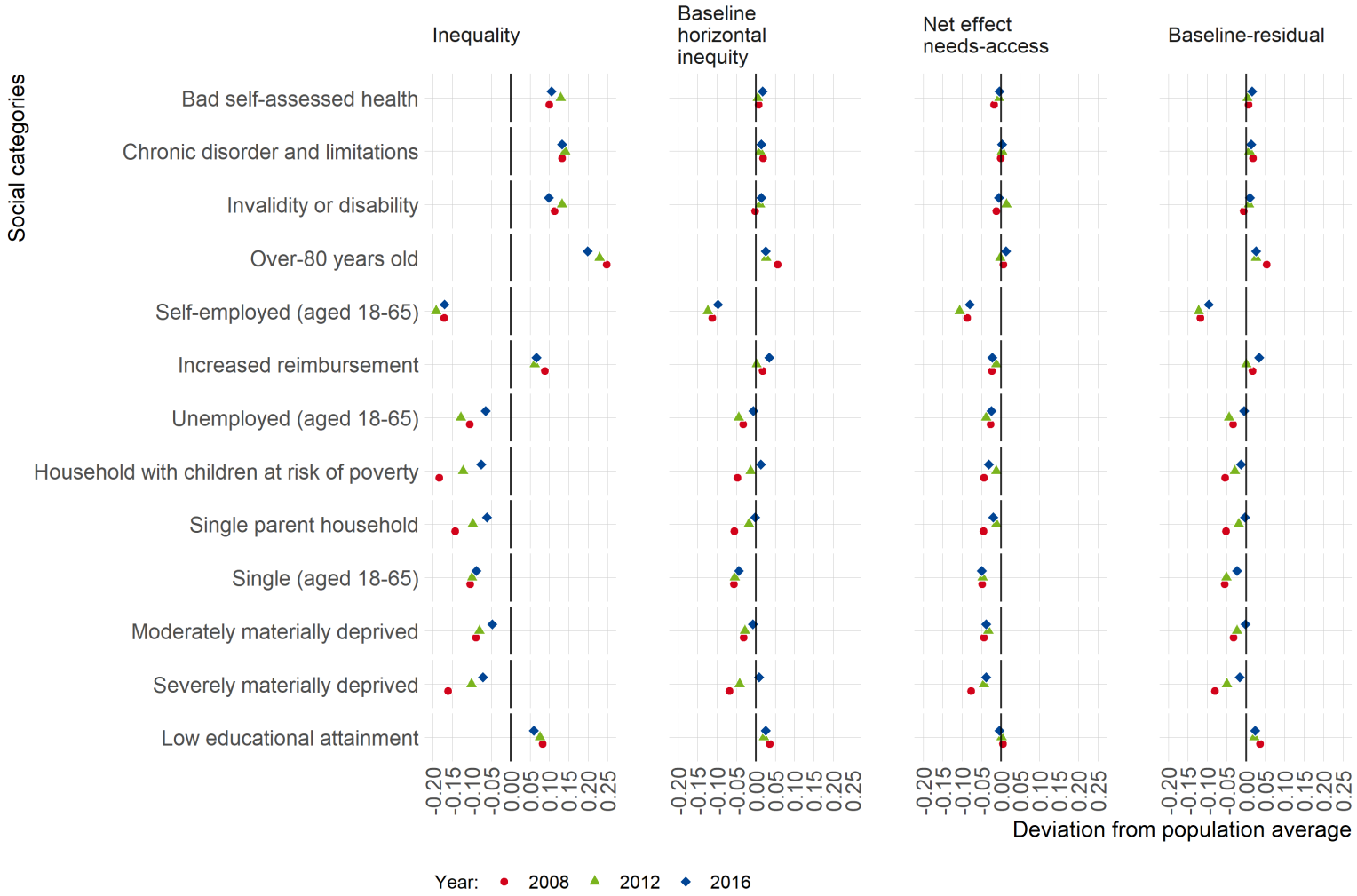
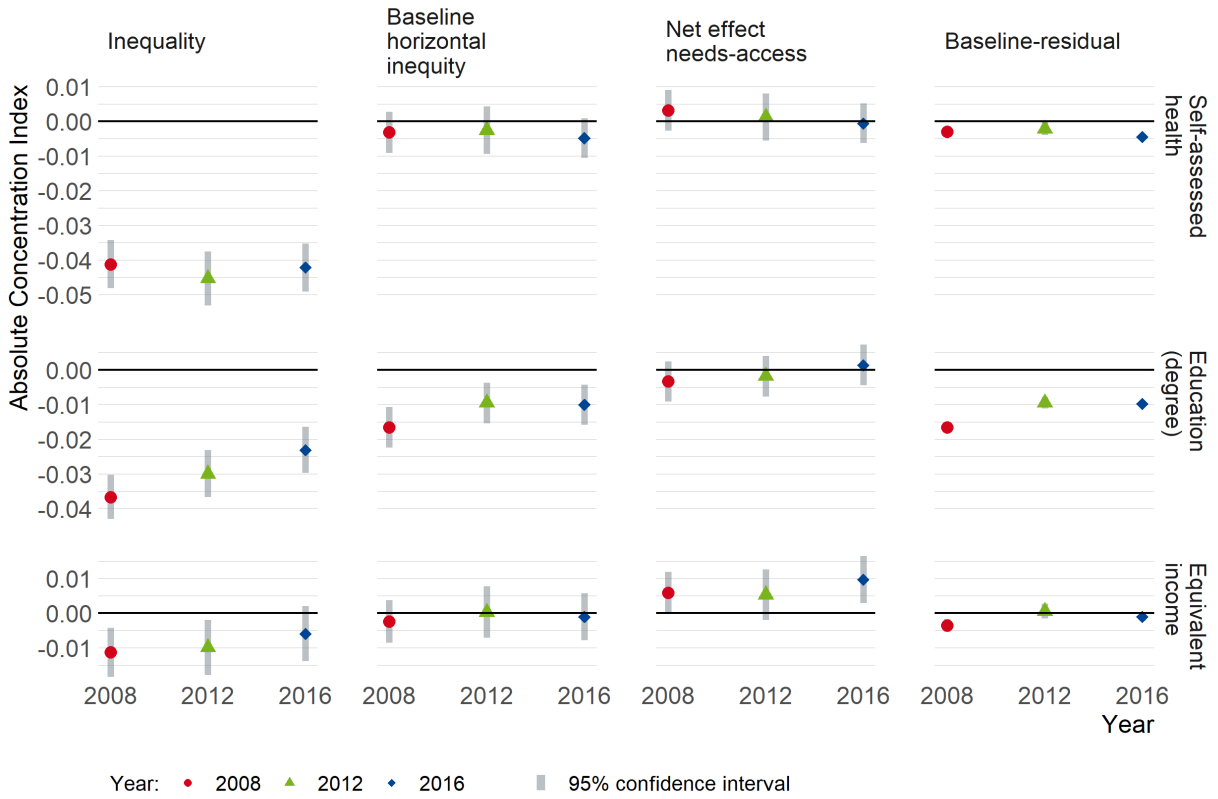


Figure 76 shows the absolute concentration index of the needs-corrected probability to have a GMR to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected GMR-coverage concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected coverage for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 76 show that there are inequalities in GMR-coverage, with a higher coverage among low educated individuals and individuals with a worse self-reported health status. Small inequalities are found by income level in 2008 and 2012. After correcting for needs, the concentration index indicates that there are no inequities based on self-reported health status or income and to a limited extent by obtained education degree in the baseline or baseline-residual inequity scenario. The inequities by educational attainment is potentially related to an age effect with relatively lower levels of educational attainment among the elderly who have higher coverage rates. No systematic socioeconomic inequities are found in the net effect needs-access scenario.

Figure 76 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.10. Use of antibiotics

1.10.1. Summary

We analyse inequity in the use of antibiotics in an ambulatory setting in the past year.

The use of antibiotics in the past year is determined based on the prescription of medication with anatomical therapeutic chemical (ATC) classification equal to "J01".

Key points inequity in the use of antibiotics in the past year

- EU-SILC/IMA-AIM survey value for the indicator closely matches population values.
- About 40% of the adult population has used antibiotics in the past year, with a small decrease over time; about 50%-60% among individuals with (very) bad self-assessed health.

Antibiotics usage rates

- Strong association with healthcare needs and some variation by socioeconomic status. **Main associations (regression):**
  - Health status: higher usage among individuals incapacitated from work; eligible for the lump sum chronic illness; with fair, bad or very bad self-assessed health; a large range of disorders as defined by prescribed medication use, particularly COPD and asthma; among females (declining usage by age).
  - Lower probabilities to use for individuals with tertiary education.
  - Higher probabilities to use for individuals in households with children; individuals at work (full-time and part-time employees, self-employed (except in 2008)), compared to individuals who are unemployed, inactive, retired or student; living in Wallonia and Brussels (only significant in 2008).
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic socioeconomic inequities by educational attainment, nor systematic inequities by self-assessed health.
  - Small, but increasing socioeconomic inequities by income, in favour of higher income individuals. Below-average usage rates are especially found among individuals at risk of poverty (gap with population mean increasing over time), but also the unemployed, individuals with increased reimbursement status. Few differences between other income groups.
  - Below-average usage among individuals with material deprivation, only if material deprivation is sufficiently severe (situation is improving over time, with evolution towards population mean); for higher care individuals (with invalidity/disability, over-80 year olds).

1.10.2. Evolution over time for the population and population subgroups

Table 52 reports the evolution over time of the probability to use antibiotics in the past year. Since the early 2000s, the authorities have been raising awareness among the public and the physicians concerning the issue of antibiotic resistance. In the KCE HSPA report, it was found that Belgium ranks poorly internationally for antibiotics consumption, with 39.6% of the insured population having consumed antibiotics in the past year, down from 41.5% in 2011.[18]

Among the individuals included in the EU-SILC/IMA-AIM sample in 2016, this fraction is similar with 40.1% of the interviewed individuals having used antibiotics in the past year. Also the downward trend over time is observed, with higher usage rates in 2008 (42.2%) and 2012 (41.9%) than in 2016. When restricting the sample to the population aged 18 or more, which is used in the regression and inequity analysis, the share of the population that consumes antibiotics in the past year is slightly higher, with 42.5%, 41.7% and 40.4% in 2008, 2012 and 2016, respectively. This is in line with the

findings in the KCE HSPA report, where it was found that the fraction of children that uses antibiotics is lower than the fraction of adults, and especially the elderly.

The reversed value is given as well, i.e. the probability of not using antibiotics. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up (see section 1.1.5.1).

Table 52 – Evolution (2008-2016) in the use of antibiotics in the past year

Sample	Definition	2008	2011	2012	2013	2016
Population	Indicator		41.5%		41.4%	39.6%
Survey (all)	Indicator	42.2%		41.9%		40.1%
	Reverse	57.8%		58.1%		59.9%
Survey (18+)	Indicator	42.5%		41.7%		40.4%
	Reverse	57.5%		58.3%		59.6%

Figure 77 shows the evolution of the probability to use antibiotics in the past year for a variety of population subgroups (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.10.3.

About 40% of the population has used antibiotics in the past year, with a downward trend over time (see Table 52). Given the limited sample size, there might be some random variation that interferes with the observed trends when zooming in on particular subgroups. This should be borne in mind when analysing the results in Figure 77, e.g. the evolution of the over-80 year olds (panel F).

The results indicate that the downward evolution in the use of antibiotics in the past year applies to most population subgroups, with the exception of certain subgroups reflecting higher care needs. There is, however, important variation between subgroups.

A first conclusion is that the probability to use antibiotics is strongly associated with (self-assessed) health status (panel E): the usage rate ranges between 57% and 61% for individuals with very bad self-assessed health; it increased from 52% to 57% for individuals with bad self-assessed health, it is about 48% for individuals with fair self-assessed health and below the population average for individuals with good and very good self-assessed health. For other subgroups reflecting higher care needs, such as individuals with a chronic disorder, invalidity, or high age, we find probabilities well above the population average, and for the latter 2 subgroups with quite some variation over time. Second, we find small differences related to the education level and financial situation of individuals, but with a clear gradient (panel A, B, C). Individuals with lower educational attainment, with lower income, with moderate material deprivation, with increased reimbursements have usage rates above the population average, whereas individuals with higher income and educational attainment have usage rates below the population average. This might be related to differences in healthcare needs between population groups defined on income and education level (see Scientific report section 2.4.1). It is, however, striking that individuals at the bottom of the income distribution (at risk of poverty and severe material deprivation) have a usage rate around the population average and below the usage rate in e.g. the lower and core middle class. Third, individuals who are self-employed have a lower probability to use antibiotics; while individuals who are unemployed had a remarkable downward evolution in the use of antibiotics over time, with a usage rate of 4 percentage points above the population average in 2008 and 5 percentage points below the population average in 2016 (panel D). Fourth, individuals in single parent households have a usage above the population average, while single have a usage rate below the population average (panel B).

In addition, we have the following findings:

- Panel A: There is limited variation in the probability to use antibiotics in the past year by income level (range 2016: 0.36 – 0.43). There is gradient by income with higher probabilities associated with lower income. Nonetheless, the probability in 2012 and 2016 is lower for

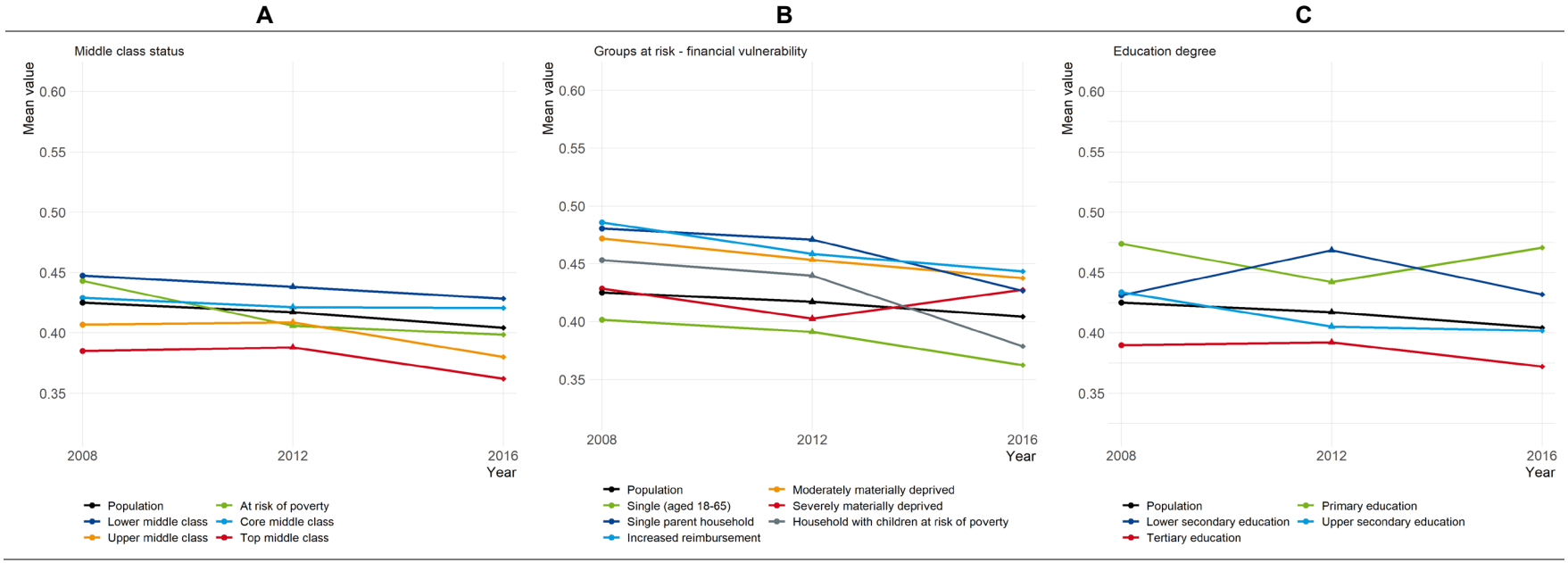
individuals at risk of poverty compared to individuals in the lower and core middle class.

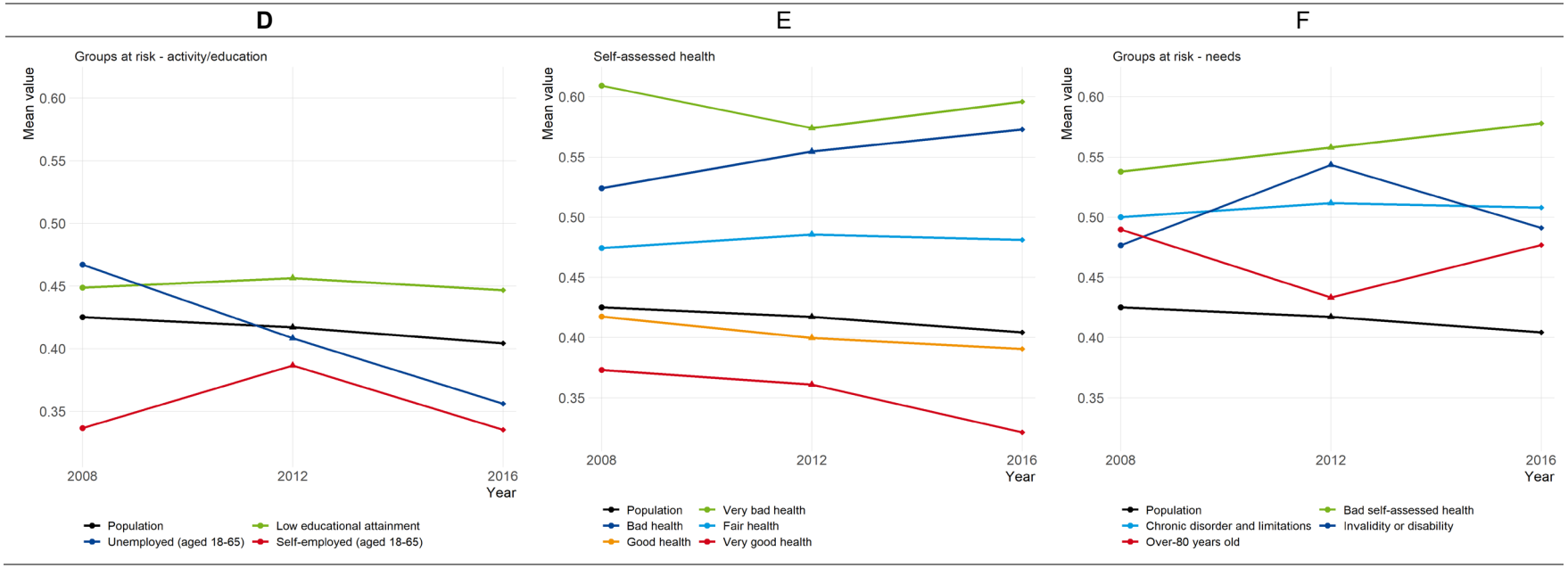
- Panel B: individuals with moderate material deprivation or with increased reimbursement have a probability to use antibiotics in the past year clearly above the population in general, following the downward trend over time from about 47%-49% in 2008 to about 44% in 2016. Single parents also have an increased use of antibiotics, bit with a sharper decrease between 2012 and 2016. Antibiotics use of individuals with severe material deprivation or individuals in households with children at risk of poverty fluctuates around the population average. Single adults between 18 and 65 have a below-average use of antibiotics.
- Panel C: There is variation in the probability to use antibiotics in the past year by obtained education degree (range 2016: 0.37 – 0.47). There is gradient by education with higher probabilities generally associated with lower educational attainment.

Panel D: The probability to use antibiotics in the past year of individuals who self-employed is below the population average. For unemployed individuals, there is a remarkable downward evolution over time. In 2008, the usage rate was 4 percentage points above the population average, whereas in 2016 it was 5 percentage points below the population average.

- Panel E and F: There is quite some variation in the probability to use antibiotics in the past year by self-assessed health status (range 2016: 0.32 – 0.60). Individuals in (very) good health (about 32%-42%) have a lower probability than individuals in fair (about 48%) or (very) bad health (about 52%-61%). Other subgroups with higher care needs have usage rates (45% to 55%) well above the population average.

Figure 77 – Evolution (2008-2016) of the probability to use antibiotics in the past year for different subgroups and populations groups at risk





1.10.3. Regression output

Table 53 reports the average marginal effects of a probit regression of the indicator of having used antibiotics in the past year (value = 1) or not (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 53):

- There is a negative time trend, indicating a general derease in the probability to use antibiotics.
- The probability to use antibiotics is strongly associated with **healthcare needs**:
  - Age and sex: when controlling for health status needs, we find that the usage rate among females is highest in the age category 18-35 and declines thereafter, with a 4 to 8 and 7 to 11 percentage points lower use among individuals aged 18-64 and the over-65 year olds, respectively. Among males, the antibiotics use is more or less constant by age, and the usage rate is about 3 to 15 percentage points lower compared to females.
  - Self-reported health status: There is a clear gradient in the fraction of individuals who have used antibiotics by subgroup of self-assessed health. When correcting for other characteristics, the probability of using antibiotics in the past year increases as the self-reported health status deteriorates. Compared to individuals with very good self-assessed health, the increase amounts to 3-6, 4-12,

5-18 and 11-20 percentage points for individuals reporting, respectively, good health, fair health, bad health and very bad health. The difference with individuals reporting very good health is increasing over time. No systematic increase is found for either the presence of a chronic disorder or limitation to daily activities.

- Administrative health information: There are positive associations between the use of antibiotics in the past year and being incapacitated from work (increase of 5 to 12 percentage points) or eligibility for the lump sum chronic illness (increase of 5 to 7 percentage points).
- Medication use: The probability to use antibiotics is strongly associated with various disorders defined on the use of prescribed. For most disorders, an increase of about 2 to 8 percentage points is recorded in the reduced pooled model, but the effect is particularly strong for individuals with COPD or asthma, which is associated with an increase in antibiotics use of 15 to 20 percentage points
- No difference is found between individuals who are or are not registered in a community health centre.

- There is some variation in the probability to use antibiotics by **socioeconomic profile**.
  - There is no systematic association between the probability to use antibiotics in the past year and material deprivation or country of birth.
  - Education degree: When correcting for other characteristics, we find that individuals with a degree in primary education, lower secondary and higher secondary education have a 3 to 5 percentage points higher use of antibiotics than individuals with a degree in tertiary education, without further gradient between the different education levels.
  - Activity status: Compared to full-time and part-time employees, other subgroups based on activity status have generally a lower usage rate. For individuals who are self-employed, the lower use of about 6 percentage points only applies to 2008, the effects in the other years are small and not significant. In the reduced pooled model, the decrease in use amounts to 5, 4, 4, and 9 percentage points for individuals who are, respectively, inactive, unemployed, or retired and for students. The size and significance of the associations fluctuate over time
  - Income level: There is a weak positive association between the use of antibiotics and income that is only significant in 2012, suggesting a somewhat higher use among higher income families, all else equal.
  - Household composition: individuals in households with children (i.e. single parents or couples with children) have a somewhat higher probability to use antibiotics (increase by 2 to 5 percentage points)
- After correcting for healthcare needs, there is no effect of increased reimbursement status on the probability to use antibiotics.
- There is some effect of the variables reflecting healthcare supply on the probability to use antibiotics. A lower use of antibiotics is for example associated with a higher number of hospital sites with ED within a 10km radius. The effect is small. We found some suggestive evidence of substitution effects between types of care, e.g. GP care, specialist care and hospital care with a lower number of GP visits for individuals having more hospital sites with ED in a 10km radius (see section 1.3.3.2). The current indicator only reflects antibiotics use in an ambulatory setting and does not capture antibiotics use prescribed and administered in the hospital. Hence the negative correlation can be related to the place of prescription and delivery, i.e. in or out the hospital.
- There are some regional differences: The probability to use antibiotics is about 3 to 5 percentage points higher among individuals living in Wallonia, compared to individuals living in Flanders; in Brussels, there was a higher use of about 13 percentage points compared to Flanders in 2008 but with a clear downward trend towards 6 and 4 percentage points (both non-significant) in 2012 and 2016, respectively. There is no effect of urbanization.

Table 53 – Regression output for the probability to use antibiotics in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 476)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.149	(0.013)***	-0.149	(0.013)***	-0.133	(0.019)***	-0.128	(0.022)***	-0.178	(0.024)***
Male aged 35-49 years	-0.155	(0.013)***	-0.155	(0.013)***	-0.147	(0.022)***	-0.149	(0.022)***	-0.165	(0.023)***
Female aged 35-49 years	-0.059	(0.012)***	-0.059	(0.012)***	-0.040	(0.020)*	-0.075	(0.023)**	-0.055	(0.023)*
Male aged 50-64 years	-0.158	(0.014)***	-0.158	(0.014)***	-0.149	(0.023)***	-0.128	(0.025)***	-0.189	(0.024)***
Female aged 50-64 years	-0.082	(0.014)***	-0.082	(0.014)***	-0.084	(0.024)***	-0.071	(0.023)**	-0.084	(0.023)***
Male aged 65-79 years	-0.122	(0.020)***	-0.123	(0.020)***	-0.130	(0.031)***	-0.115	(0.037)**	-0.113	(0.035)**
Female aged 65-79 years	-0.090	(0.020)***	-0.089	(0.020)***	-0.113	(0.030)***	-0.070	(0.033)*	-0.078	(0.035)*
Male aged 80 years or more	-0.155	(0.027)***	-0.155	(0.027)***	-0.126	(0.051)*	-0.173	(0.042)***	-0.150	(0.047)**
Female aged 80 years or more	-0.098	(0.027)***	-0.099	(0.027)***	-0.089	(0.044)*	-0.113	(0.042)**	-0.085	(0.042)*
Self-assessed health (reference = very good)										
Self-assessed health - good	0.040	(0.008)***	0.040	(0.008)***	0.032	(0.013)*	0.030	(0.014)*	0.057	(0.013)***
Self-assessed health - fair	0.078	(0.012)***	0.078	(0.012)***	0.042	(0.020)*	0.074	(0.020)***	0.117	(0.022)***
Self-assessed health - bad	0.121	(0.018)***	0.121	(0.017)***	0.054	(0.028)°	0.118	(0.031)***	0.179	(0.028)***
Self-assessed health - very bad	0.152	(0.030)***	0.153	(0.029)***	0.113	(0.046)*	0.131	(0.054)*	0.197	(0.044)***
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.018	(0.015)	0.018	(0.015)	0.035	(0.026)	0.016	(0.027)	0.002	(0.025)
Chronic disorder, no limitations	0.033	(0.012)**	0.033	(0.012)**	0.069	(0.020)***	0.015	(0.023)	0.011	(0.022)
Chronic disorder, limitations	0.014	(0.012)	0.014	(0.011)	0.030	(0.020)	0.010	(0.020)	-0.003	(0.021)
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	-0.006	(0.019)								
Incapacity to work	0.084	(0.016)***	0.084	(0.016)***	0.048	(0.024)*	0.121	(0.027)***	0.080	(0.025)**
Entitled to lump sum chronic illness	0.064	(0.016)***	0.061	(0.015)***	0.053	(0.026)*	0.076	(0.027)**	0.049	(0.024)*
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	-0.027	(0.025)								

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 476)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Medication use - other disorder	0.081	(0.031)**	0.081	(0.031)**	0.051	(0.058)	0.128	(0.047)**	0.062	(0.043)
Medication use - cardiovascular disorder	0.064	(0.009)***	0.064	(0.009)***	0.085	(0.014)***	0.055	(0.016)***	0.056	(0.015)***
Medication use - thrombosis	0.024	(0.012)*	0.024	(0.012)*	0.020	(0.023)	0.017	(0.018)	0.025	(0.019)
Medication use - chronic obstructive pulmonary disease (COPD)	0.193	(0.018)***	0.193	(0.018)***	0.192	(0.033)***	0.200	(0.034)***	0.173	(0.028)***
Medication use - asthma	0.166	(0.025)***	0.166	(0.025)***	0.158	(0.046)***	0.153	(0.037)***	0.172	(0.038)***
Medication use - diabetes	0.034	(0.014)*	0.033	(0.014)*	0.020	(0.024)	0.034	(0.025)	0.042	(0.023)°
Medication use - epilepsy	0.055	(0.026)*	0.053	(0.026)*	0.062	(0.050)	0.058	(0.047)	0.037	(0.036)
Medication use - thyroid disorder	0.038	(0.013)**	0.038	(0.013)**	0.046	(0.025)°	0.064	(0.024)**	0.005	(0.021)
Community health centre										
Registered in community health centre	-0.014	(0.022)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	0.039	(0.010)***	0.042	(0.009)***	0.040	(0.015)**	0.053	(0.015)***	0.034	(0.013)*
Region of residence - Brussels	0.071	(0.024)**	0.073	(0.023)**	0.126	(0.036)***	0.057	(0.036)	0.043	(0.038)
Urbanization - medium	0.011	(0.009)								
Urbanization - thin	0.013	(0.014)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	-0.010	(0.011)	-0.010	(0.011)	-0.031	(0.020)	0.007	(0.019)	-0.009	(0.016)
Occupation - inactive	-0.049	(0.014)***	-0.051	(0.013)***	-0.078	(0.022)***	-0.024	(0.022)	-0.054	(0.023)*
Occupation - self-employed in 2008	-0.058	(0.020)**	-0.058	(0.020)**	-0.071	(0.021)***				
Occupation - self-employed in 2012	0.005	(0.024)	0.004	(0.024)			0.010	(0.024)		
Occupation - self-employed in 2016	-0.033	(0.024)	-0.033	(0.024)					-0.029	(0.026)
Occupation - unemployed	-0.038	(0.014)**	-0.037	(0.014)**	-0.022	(0.024)	-0.021	(0.024)	-0.063	(0.026)*
Occupation - student	-0.087	(0.015)***	-0.087	(0.015)***	-0.097	(0.028)***	-0.064	(0.027)*	-0.103	(0.026)***
Occupation - retired	-0.037	(0.014)**	-0.037	(0.014)**	-0.047	(0.024)*	-0.015	(0.023)	-0.054	(0.026)*
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	0.027	(0.012)*	0.028	(0.012)*	0.048	(0.019)*	-0.002	(0.021)	0.045	(0.021)*

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 476)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 352)		Reduced model 2016 (Obs. = 10 277)	
Education degree - lower secondary	0.043	(0.010)***	0.044	(0.010)***	0.033	(0.017)°	0.055	(0.017)**	0.048	(0.018)**
Education degree - upper secondary	0.025	(0.008)**	0.026	(0.008)**	0.042	(0.013)**	0.005	(0.013)	0.032	(0.014)*
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.023	(0.008)**	0.022	(0.008)**	0.010	(0.013)	0.029	(0.014)*	0.028	(0.017)
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	0.029	(0.031)								
Household composition (reference = couple without children)										
Household composition - single without children	-0.015	(0.010)	-0.015	(0.010)	-0.004	(0.018)	-0.004	(0.018)	-0.035	(0.016)*
Household composition - single with children	0.050	(0.017)**	0.051	(0.017)**	0.047	(0.029)	0.075	(0.033)*	0.029	(0.028)
Household composition - couple with children	0.022	(0.010)*	0.023	(0.010)*	0.030	(0.016)°	0.038	(0.018)*	0.001	(0.016)
Household composition - other	0.001	(0.010)	0.001	(0.010)	-0.003	(0.016)	0.010	(0.018)	-0.006	(0.019)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.006	(0.011)								
Insurance status										
Insurance - increased reimbursement in 2008	0.015	(0.017)	0.016	(0.016)	0.021	(0.019)				
Insurance - increased reimbursement in 2012	-0.003	(0.017)	-0.002	(0.017)			-0.003	(0.019)		
Insurance - increased reimbursement in 2016	-0.010	(0.018)	-0.010	(0.017)					-0.016	(0.020)
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	-0.000	(0.002)								
Density of GPs in neighbouring municipalities	0.000	(0.004)								
Density of specialists in municipality	-0.001	(0.001)*	-0.002	(0.001)**	-0.001	(0.001)°	-0.002	(0.001)°	-0.001	(0.001)°
Density of specialists in neighbouring municipalities	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.002)	-0.003	(0.002)°	0.001	(0.001)
Density of dentists in municipality	0.001	(0.002)	0.001	(0.001)	0.004	(0.002)°	0.001	(0.002)	-0.001	(0.002)
Density of dentists in neighbouring municipalities	-0.001	(0.003)	0.000	(0.003)	-0.003	(0.005)	0.010	(0.005)*	-0.007	(0.004)°
Distance to nearest ED	0.000	(0.001)								
Number of EDs within 10km radius	-0.003	(0.002)*	-0.004	(0.001)**	-0.008	(0.002)***	-0.005	(0.002)*	0.000	(0.002)

Independent variables	Full model (Obs. = 31 473)	Reduced model (Obs. = 31 476)	Reduced model 2008 (Obs. = 10 847)	Reduced model 2012 (Obs. = 10 352)	Reduced model 2016 (Obs. = 10 277)
Time (reference = 2008)					
Time: year 2012	-0.016 (0.008)°	-0.016 (0.008)°			
Time: year 2016	-0.030 (0.009)***	-0.031 (0.009)***			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.10.4. Overview inequity and evolution in the different scenarios

Figure 78 visualizes the absolute Gini coefficient for inequality in the probability to use antibiotics in the past year (so without needs correction) as well as inequity in the fairness for the probability to use antibiotics calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 78, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a stable or slightly downward trend in inequity in the probability to use antibiotics in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient remained at about 0.26. Hence, we find that the disparity between individuals in the probability of using antibiotics that cannot be explained and justified by (observable) healthcare needs has not changed over time.

Table 54 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not using antibiotics in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

When following the traditional approach, the reversed relative Gini coefficients indicate that inequity has decreased over time, while the absolute Gini coefficient indicates a very small, but significant decrease in inequity and the relative Gini indicates an increase in inequity over time. When following the alternative approach, there is an unambiguous decrease in inequity (baseline-residual scenario).

Figure 78 – Evolution (2008-2016) of the absolute Gini index by scenario

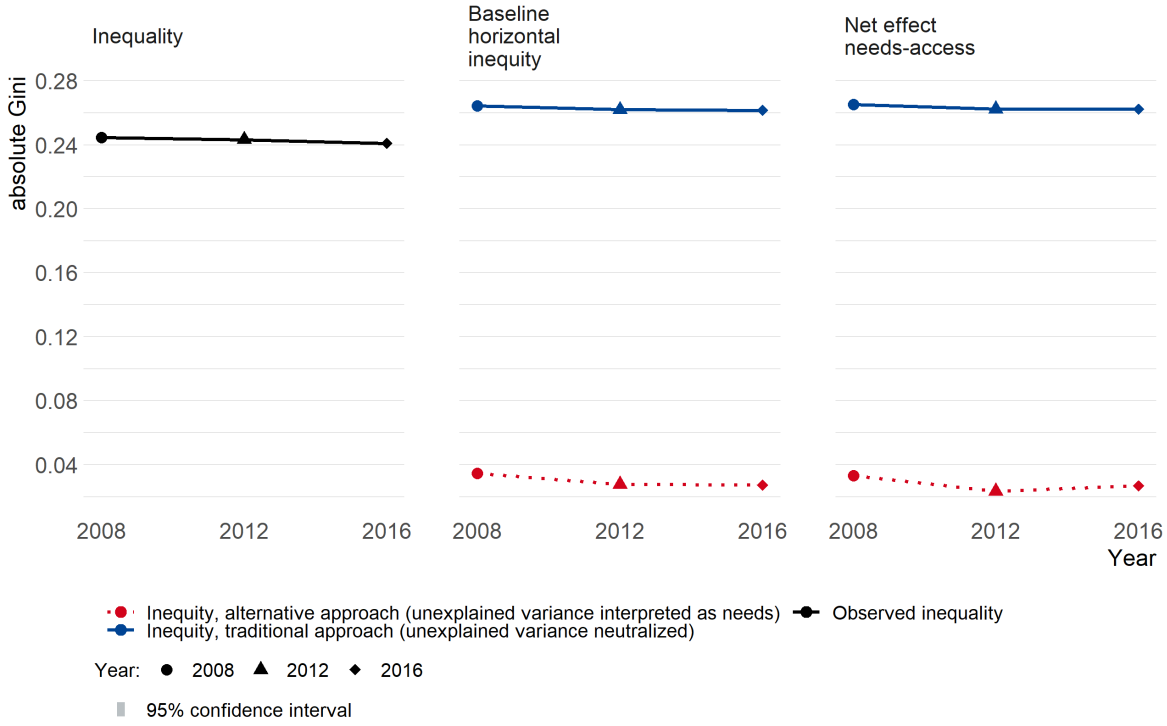


Table 54 – Evolution (2008-2016) of the inequity in the probability to use antibiotics in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.264	0.262	0.261^	↓
	Relative	0.572	0.578	0.586^*	↑
	Reversed relative	0.438	0.429^	0.419^*	↓
Net effect needs-access	Absolute	0.265	0.262^	0.262^	↓
	Relative	0.572	0.577^	0.585^*	↑
	Reversed relative	0.439	0.429^	0.419^*	↓
Baseline-residual	Absolute	0.034	0.028^	0.027^	↓
	Relative	0.081	0.066^	0.067^	↓
	Reversed relative	0.060	0.047^	0.046^*	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.10.5. Overview inequity over time for different population subgroups

Figure 79 and Figure 80 show how the probability to use antibiotics in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 79, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 80, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower usage of antibiotics than the population average. Values to the right of the vertical line, on the other hand, indicate a higher usage than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 79 and Figure 80 indicate that the inequalities with respect to the probability to use antibiotics are quite pronounced and range between -10 and +20 percentage points. Once a correction is made for healthcare needs (various inequity scenarios), disparities are much smaller, with most deviations with 5 percentage points from the population average.

A first observation is that inequalities are especially pronounced for subgroups based on healthcare needs. The usage rates are above average for individuals with fair, bad and very bad self-assessed health, for

individuals with invalidity or disability, for individuals with a chronic disorder and limitation to daily activities, and to a lesser extent for the over-80 year olds (but for the latter group the deviations have increased over time) (panel inequality). The usage rates are below average for individuals reporting very good self-assessed health. After correcting for needs, the deviations are smaller and slightly negative, indicating a lower probability to use antibiotics for subgroups with higher care needs. This might be related to lower use among socioeconomic vulnerable groups.

Second, there are differences by financial situation and education, i.e. a usage rate above the population average for individuals with primary or lower secondary education, who benefit from increased reimbursement, in the lower middle class, or who are materially deprived (unable to afford 2 items out of a list of 9 items) (inequality panel), and a usage rate below the population average for individuals in the top or upper middle class or with tertiary education. These differences are partially, but not entirely related to differences in healthcare needs in these subgroups. After correcting for healthcare needs (panel baseline horizontal inequity), differences based on the financial situation remain, with lower usage rate among individuals at risk of poverty, with increased reimbursement, the unemployed and with severe material deprivation (unable to afford 4 items out of a list of 9 items). Third, we find that individuals in single parent households have a usage rate of antibiotics above the population average while singles aged between 18 and 65 have a usage rate below the population average. These results are robust to correcting for healthcare needs.

In the baseline inequity scenario, we find that:

- While there is a clear socioeconomic gradient in antibiotics use by educational attainment, with higher usage rates among individuals with low educational attainment (column inequality), this is no longer the case after correcting for healthcare needs (baseline horizontal inequity).
- There is a higher usage rate among individuals in the lower and core middle class (panel inequality) than the population average and lower usage in the top middle class. After correcting for healthcare needs (panel baseline horizontal inequity), there is a gradient by income, with clearly lower usage rate among individuals at risk of poverty.
- Individuals in fair, bad and very bad self-reported health have an above-average usage rate of antibiotics (column inequality). After correcting for healthcare needs, the effect has reversed with a usage rate below the population average (baseline horizontal inequity)
- Among the vulnerable groups, there is a lower usage rate among individuals who are unemployed, singles between 18 and 65, individuals with increased reimbursement, individuals in households with children at risk of poverty and individuals in households with sever material deprivation (baseline horizontal inequity). For the unemployed, individuals with increased reimbursement and individuals in households with children at risk of poverty the deviations from the population mean are increasing over time.
- The results are generally similar in the baseline scenario, the baseline-residual scenario and the net effect needs-access scenario, with the exception of the results for singles, single parents and households with children at risk of poverty.

Figure 79 – Deviation in the needs-corrected probability to use antibiotics in the past year from population average for subgroups based on income, education and self-assessed health, by scenario and year

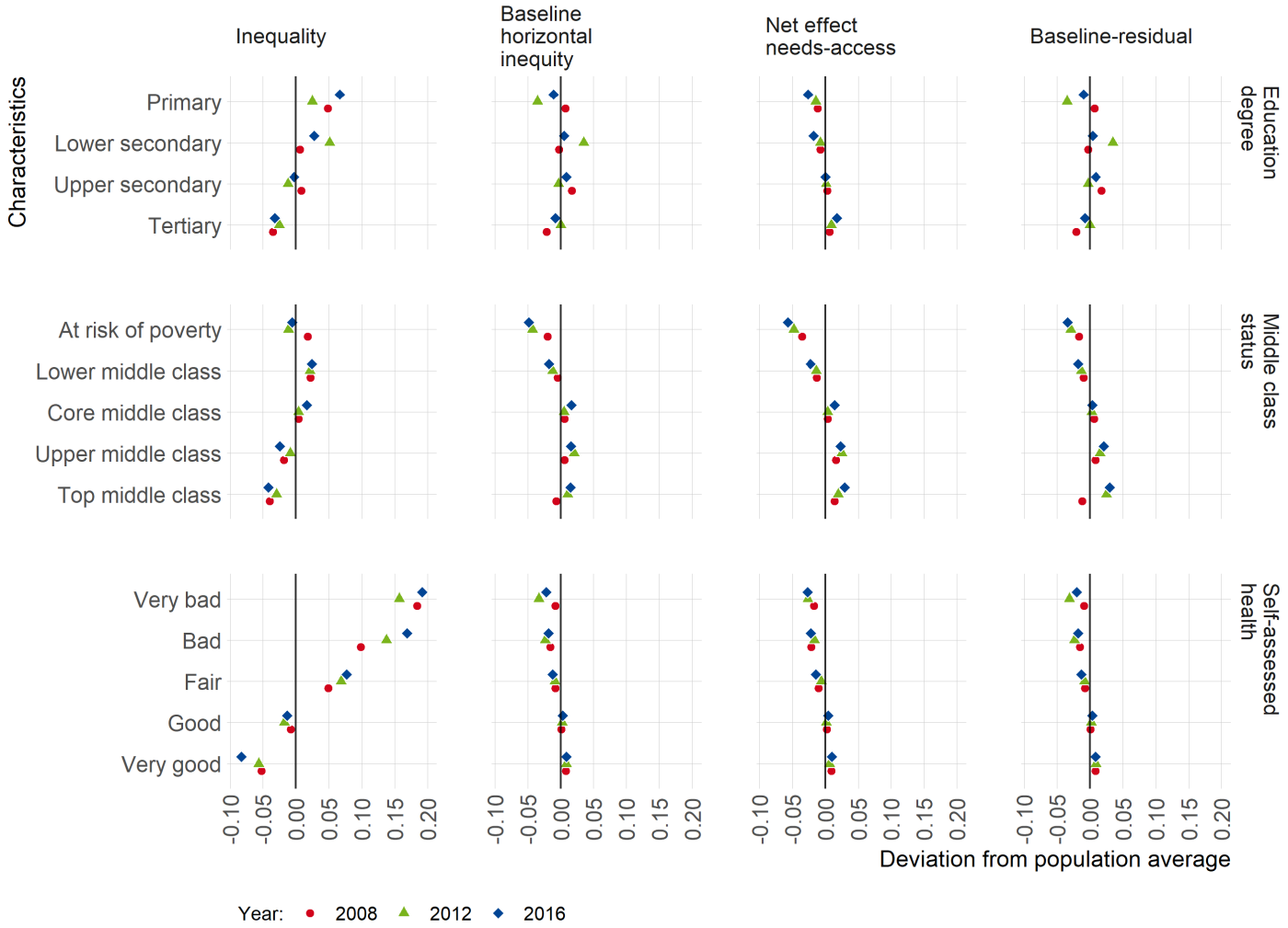


Figure 80 – Deviation in the needs-corrected the probability to use antibiotics in the past year from population average for specific vulnerable subgroups, by scenario and year

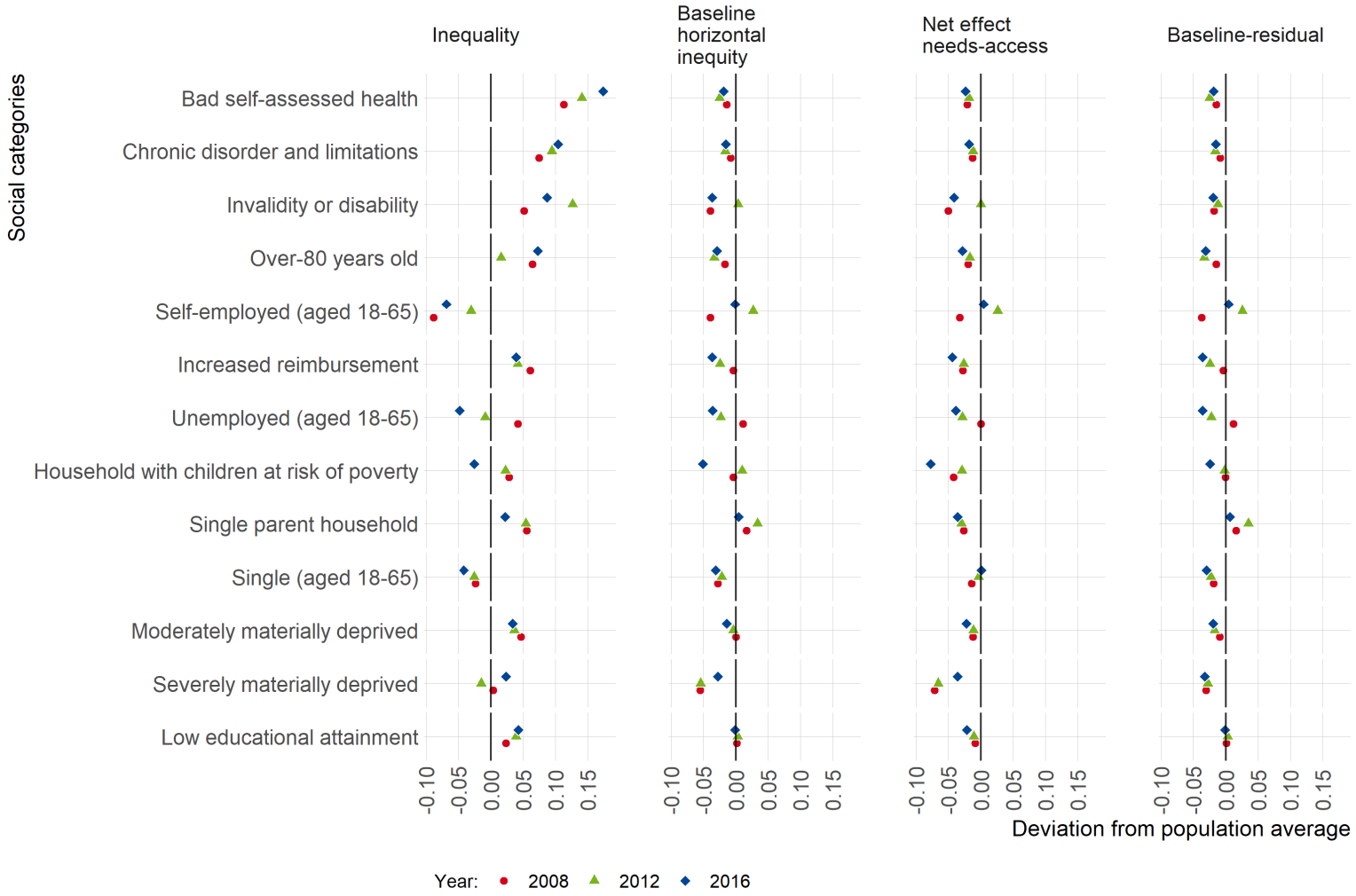
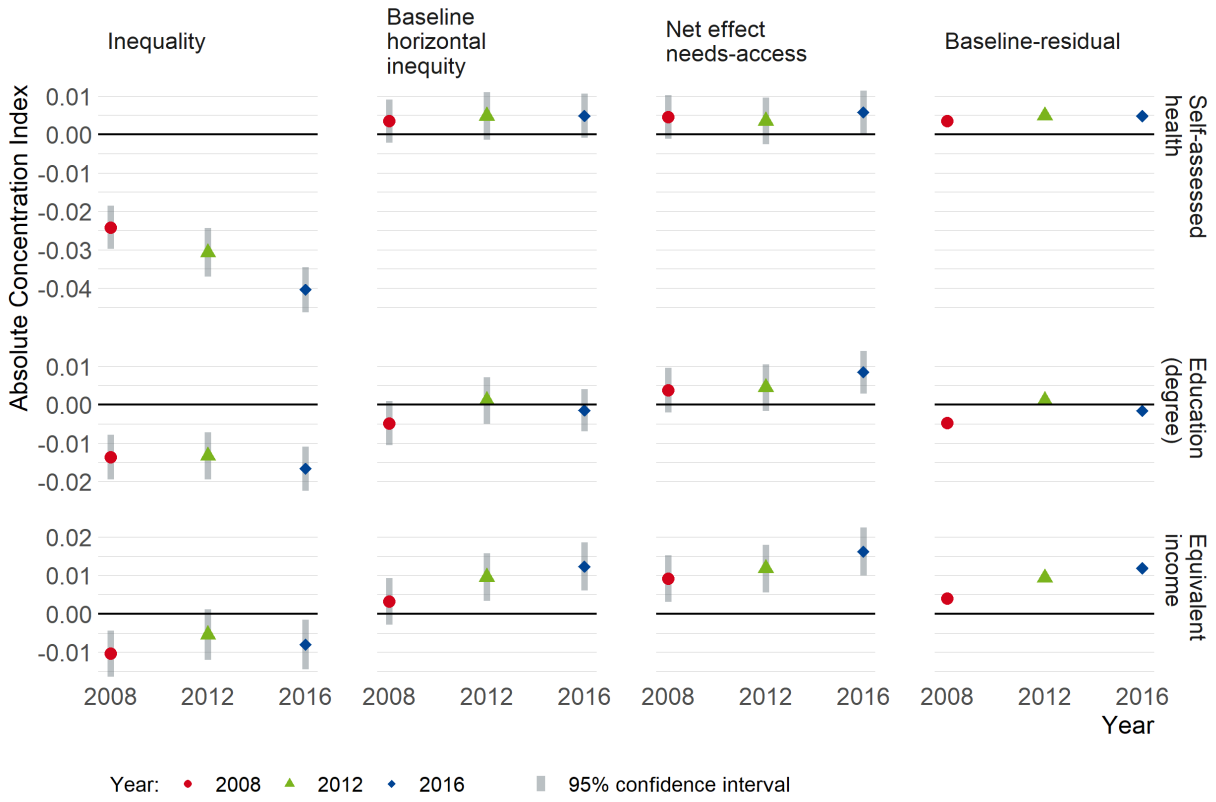


Figure 81 shows the absolute concentration index of the needs-corrected probability to use antibiotics in the past year to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of using antibiotics concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 81 show that there are systematic socioeconomic inequalities in the probability to use antibiotics in the past year with regard to self-assessed health, i.e. antibiotics use more concentrated among individuals with worse self-assessed health; education, i.e. antibiotics use more concentrated among individuals with low educational attainment; and to a lesser extent income, i.e. antibiotics use somewhat more concentrated among low income individuals.

After correcting for needs, the concentration index indicates that there are no systematic socioeconomic inequities with respect to self-assessed health and education in the various inequity scenarios. However, there are small, but growing inequities with respect to income, suggesting higher use of antibiotics concentrated among individuals with higher incomes. The income inequities are more pronounced in the net effect needs-access scenario compared to the baseline horizontal inequity scenario.

Figure 81 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.11. Use of antidepressants

1.11.1. Summary

We analyse inequity in the use of antidepressants among adults (18+) in the past year.

The use of antidepressants in the past year is determined based on the prescription of medication with anatomical therapeutic chemical (ATC) classification equal to “N06A”.

Key points inequity in the use of antidepressants in the past year

- EU-SILC/IMA-AIM survey value for the indicator closely matches population values.
- About 13% of the adult population has used antidepressants in the past year; about 35%-45% among individuals with (very) bad self-assessed health.

Antidepressant usage rates

- Strong association with healthcare needs and minor variation by socioeconomic status. **Main associations (regression):**
  - Health status: higher usage among individuals incapacitated from work; with invalidity/disability; with fair, bad or very bad self-assessed health; taking medication for neurological disorders (Alzheimer, Parkinson, and psychosis) and epilepsy; females; in the age range 35-79.
  - Lower probabilities to use for individuals not borne in Belgium.
  - Higher probabilities to use for single parents.
  - No association with income, material deprivation, educational attainment, activity status, increased reimbursement status, or region. This is a positive finding.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic socioeconomic inequities by educational attainment or income, nor systematic inequities by self-assessed health.
  - Above-average usage rates among single parents.

1.11.2. Evolution over time for the population and population subgroups

Table 55 reports the evolution over time of the probability to use antidepressants among adults in the past year. The number of adults using antidepressant medication was stable in the period 2008-2016 with a fraction of 13.3% of the insured adult population consuming antidepressant in 2008 and 2012 and 13.1% in 2016.[18] Among the individuals aged 18 or more included in the EU-SILC/IMA-AIM sample, the fraction of interviewed individuals with antidepressant use is similar and has equally remained stable over time, amounting to 13.0%, 13.7% and 13.3% of the sample in 2008, 2012 and 2016, respectively.

The reversed value is given as well, i.e. the probability of not using antidepressants. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up (see section 1.1.5.1).

Table 55 – Evolution (2008-2016) in the use of antidepressants in the past year

Sample	Definition	2008	2012	2016
Population (18+)	Indicator	13.3%	13.3%	13.1%
Survey (18+)	Indicator	13.0%	13.7%	13.3%
	Reverse	87.0%	86.3%	86.7%

Figure 82 shows the evolution of the probability to use antidepressants in the past year for a variety of population subgroups (see section 1.1.2).

These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.11.3.

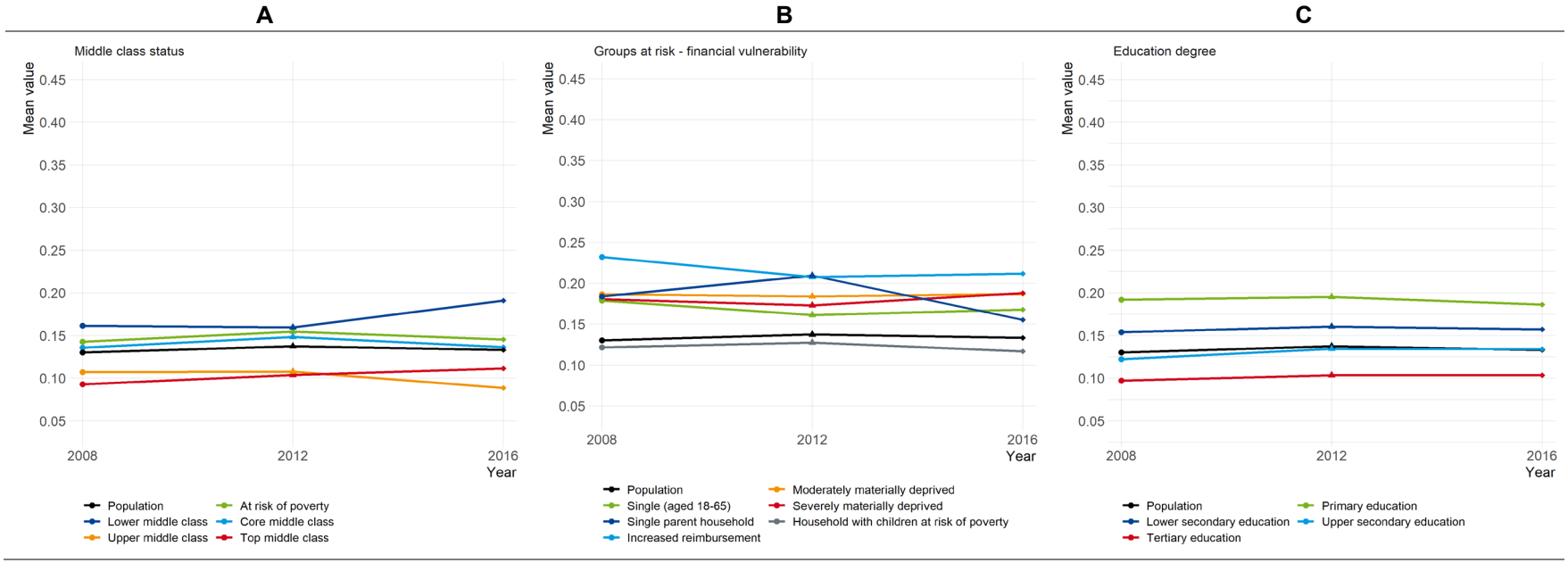
About 13% of the population has used antidepressants in the past year (see Table 55). Given the limited sample size, there might be some random variation that interferes with the observed trends when zooming in on particular subgroups. This should be borne in mind when analysing the results in Figure 82, e.g. the evolution of single parent households (panel G).

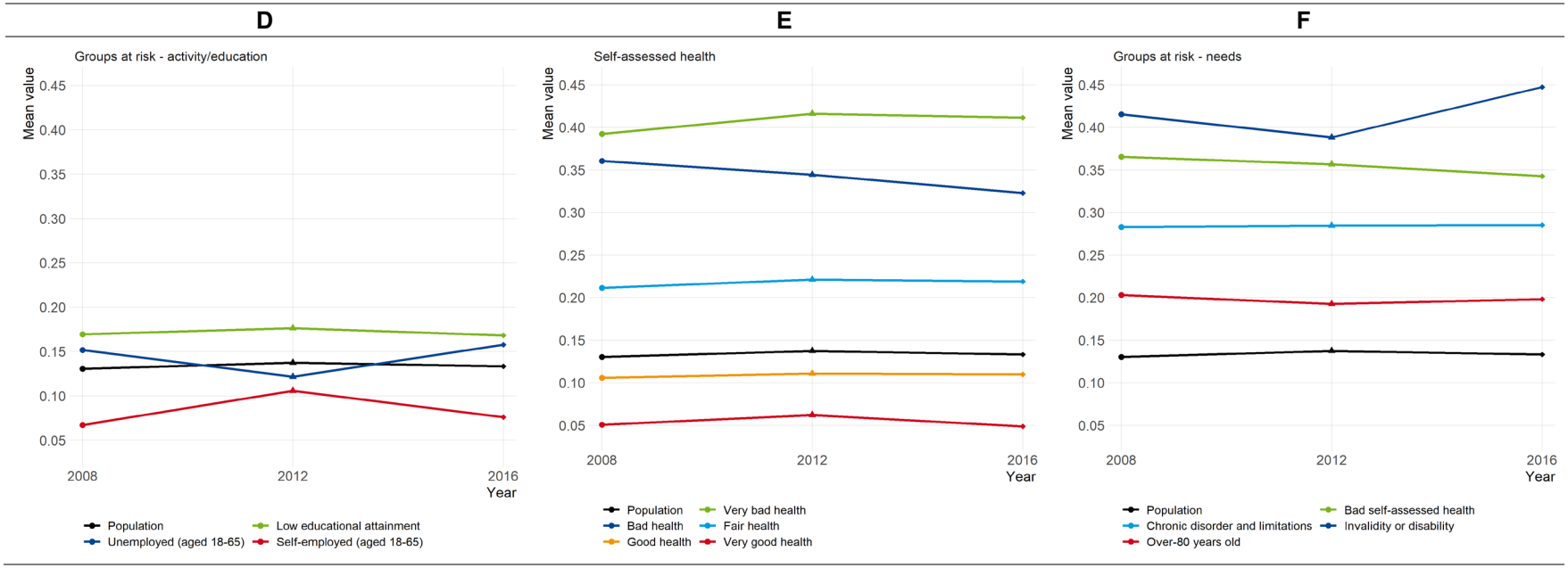
The results indicate that for most population subgroup, there is a stable trend over time, but with important variation between population subgroups based on healthcare needs. A first conclusion is that the probability to use antidepressants is strongly associated with (self-assessed) health status. We find probabilities between 32% and 42% for individuals with bad and very bad self-assessed health compared to 5% to 11% for individuals with good and very good self-assessed health (panel E). There is a downward trend in use for individuals reporting bad self-assessed health. Higher rates of antidepressant use are observed for different subgroups based on needs (panel F), but the rates are very different between the different groups, with a usage rate of about 20%, 28% and 40%-45 of, respectively, the over-80 year olds, individuals with chronic disorders and limitations and individuals with invalidity or disability. Second, we find small differences related to the education level and financial situation of individuals, but with a clear gradient (panel A, B, C). Individuals with lower educational attainment, with lower income, with material deprivation, with increased reimbursements have usage rates above the population average, whereas individuals with higher income and educational attainment have usage rates below the population average. This might be related to differences in healthcare needs between population groups defined on income and education level (see Scientific report section 2.4.1). It is, however, striking that individuals in the lower middle class have a higher probability to use antidepressant than individuals at risk of poverty. Moreover, it is notable that the subgroup of individuals who benefit from increased reimbursement has a higher probability of antidepressant use. Third, individuals who are self-employed have a lower probability to use antidepressant, while for individuals who are unemployed, the usage rate is around the population average (panel D). For an important set of indicators we found that individuals who are unemployed have a probability that is below the population average (see amongst others sections 1.2.2.1, 1.3.2.1, 1.4.2.1, 1.6.2.1, 1.7.2.1, and 1.8.2.1).

In addition, we have the following findings:

- Panel A: There is limited variation in the probability to use antidepressants in the past year by income level (range 2016: 0.11 – 0.19). There is a gradient by income with higher probabilities associated with lower income. Nonetheless, the probability is lower for individuals at risk of poverty compared to individuals in the lower middle class.
- Panel B: individuals with material deprivation, or with increased reimbursement status, adult singles between 18 and 65, and single parents have a probability to use antidepressants in the past year clearly above the population in general, with about 17% for singles and single parents, 19% for individuals with material deprivation and 21% for individuals with increased reimbursement in 2016 compared to 13% for the general population.
- Panel C: There is variation in the probability to use antidepressants in the past year by obtained education degree (range 2016: 0.10 – 0.19). There is a gradient by education with higher probabilities associated with lower educational attainment.
- Panel D: The probability to use antidepressants in the past year of individuals who are self-employed is below the population average. For unemployed individuals, the probability fluctuates around the population mean.
- Panel E and F: There is quite some variation in the probability to use antidepressants in the past year by self-assessed health status (range 2016: 0.05 – 0.41). Individuals in (very) good health (about 5%-11%) have a lower probability than individuals in fair (about 22%) or (very) bad health (about 32%-42%). There is a clear difference in usage rates by type of healthcare need: probabilities of about 20% are found for individuals over 80 years old, about 39%-45% for individuals with disability or in invalidity, and about 28% for individuals reporting chronic disorders in combination with limitation to daily activities.

Figure 82 – Evolution (2008-2016) of the probability to use of antidepressants in the past year for different subgroups and populations groups at risk





1.11.3. Regression output

Table 56 reports the average marginal effects of a probit regression of the indicator of having used antidepressants in the past year (value = 1) or not (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 56):

- The probability to use antidepressants is strongly associated with **healthcare needs**:
  - Age and sex: Individuals in the age category 18-34 have the lowest antidepressant use, whereas individuals in the age category 35-79 have the highest (6 to 8 percentage points higher than the age category 18-34). Males have a lower use of antidepressants than females, about 4 to 8 percentage points lower.
  - Self-reported health status: There is a clear gradient in the fraction of individuals who have used antidepressant by subgroup of self-assessed health. When correcting for other characteristics, the probability of using antidepressant in the past year increases as the self-reported health status deteriorates. Compared to individuals with very good self-assessed health, the increase amounts to 3-5, 7-8, 8-13 and 11-14 percentage points for individuals reporting, respectively, good health, fair health, bad health and very bad health. No systematic increase is found for either the presence of

a chronic disorder or limitation to daily activities. In case both are simulataneously reported, the probability ot use antidepressant increases by 2 to 4 percentage points.

- Administrative health information: There are strong positive associations between the use of antidepressants in the past year and the receipt of an allowance for invalidity or disability or being incapacitated from work. The increase in antidepressant use is between 5 and 9 percentage points and this on top of the effect for self-assessed health.
- Medication use: The probability to use antidepressants is associated with medication use for specific other disorders, certainly not all disorders. The association is particularly strong with respect to prescribed medication for various neurological disorders (i.e. Alzheimer, Parkinson and psychosis) (increase of 14 to 17 percentage points) and epilepsy (increase of 7 to 11 percentage points).
- There is a small, borderline significant negative association between the probability to use antidepressant and membership of a community health centre with a 2 to 5 percentage point lower use of antidepressants.

- There is little variation in the probability to use antidepressant by **socioeconomic profile**.
  - There is no systematic association between the probability to use antidepressants in the past year and activity status, educational attainment, income, or material deprivation.
  - Household composition: there are only weakly significant and small association by household composition. They suggest that couples have a lower probability to use antidepressants than singles and single parents.
  - Country of birth: Individuals who were not born in Belgium have a 4 percentage points lower probability use antidepressant.
- After correcting for healthcare needs, there is no effect of increased reimbursement status on the probability to use antidepressant. Hence the higher probability observed in the univariate analysis (see section 1.11.2) should be explained by other variables in the multivariate analysis, reflecting healthcare needs or socioeconomic characterstics.
- There is no systematic association between the variables reflecting healthcare supply and the probability to use antidepressants.
- There are some regional differences: The probability to use antidepressants is about 2 to 3 percentage points higher among individuals living in Wallonia, compared to individuals living in Flanders; in Brussels, there was a higher use of about 8 percentage points compared to Flanders in 2008 but with a clear downward trend towards 4 and 0 percentage points (both non-significant) in 2012 and 2016, respectively. There is no effect of urbanization.

Table 56 – Regression output for the probability to use of antidepressants in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Age and Sex (reference = female aged 18-34 years)										
Male aged 18-34 years	-0.037	(0.009)***	-0.037	(0.009)***	-0.074	(0.017)***	-0.036	(0.017)*	-0.042	(0.019)*
Male aged 35-49 years	-0.001	(0.009)	-0.000	(0.008)	0.008	(0.016)	-0.004	(0.015)	-0.006	(0.017)
Female aged 35-49 years	0.066	(0.010)***	0.070	(0.009)***	0.070	(0.014)***	0.067	(0.013)***	0.056	(0.014)***
Male aged 50-64 years	-0.005	(0.009)	-0.002	(0.009)	0.002	(0.016)	0.002	(0.015)	-0.014	(0.017)
Female aged 50-64 years	0.076	(0.011)***	0.081	(0.010)***	0.066	(0.015)***	0.086	(0.013)***	0.065	(0.016)***
Male aged 65-79 years	-0.010	(0.012)	-0.004	(0.010)	-0.022	(0.018)	-0.006	(0.020)	0.007	(0.019)
Female aged 65-79 years	0.061	(0.013)***	0.067	(0.011)***	0.041	(0.015)**	0.073	(0.016)***	0.070	(0.019)***
Male aged 80 years or more	-0.034	(0.014)*	-0.029	(0.012)*	-0.021	(0.027)	-0.057	(0.030)°	-0.031	(0.026)
Female aged 80 years or more	0.037	(0.015)*	0.043	(0.014)**	0.033	(0.024)	0.047	(0.022)*	0.046	(0.023)*
Self-assessed health (reference = very good)										
Self-assessed health - good	0.036	(0.005)***	0.036	(0.005)***	0.046	(0.010)***	0.032	(0.010)**	0.045	(0.011)***
Self-assessed health - fair	0.074	(0.008)***	0.075	(0.008)***	0.087	(0.013)***	0.076	(0.013)***	0.066	(0.015)***
Self-assessed health - bad	0.118	(0.013)***	0.119	(0.012)***	0.132	(0.017)***	0.118	(0.018)***	0.084	(0.020)***
Self-assessed health - very bad	0.136	(0.022)***	0.138	(0.021)***	0.110	(0.026)***	0.144	(0.028)***	0.110	(0.027)***
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.013	(0.009)	0.013	(0.010)	0.005	(0.015)	0.014	(0.016)	0.023	(0.016)
Chronic disorder, no limitations	0.012	(0.008)	0.013	(0.008)°	0.004	(0.012)	0.022	(0.013)°	0.013	(0.014)
Chronic disorder, limitations	0.031	(0.008)***	0.032	(0.008)***	0.023	(0.011)*	0.029	(0.012)*	0.042	(0.012)***
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.082	(0.014)***	0.084	(0.013)***	0.067	(0.019)***	0.047	(0.016)**	0.093	(0.014)***
Incapacity to work	0.102	(0.013)***	0.102	(0.013)***	0.092	(0.014)***	0.088	(0.017)***	0.073	(0.014)***
Entitled to lump sum chronic illness	0.022	(0.009)*	0.022	(0.009)*	0.025	(0.014)°	0.017	(0.016)	0.022	(0.014)
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.230	(0.020)***	0.229	(0.020)***	0.144	(0.020)***	0.174	(0.021)***	0.163	(0.020)***

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Medication use - other disorder	0.016	(0.018)								
Medication use - cardiovascular disorder	0.037	(0.006)***	0.037	(0.006)***	0.044	(0.008)***	0.037	(0.009)***	0.025	(0.009)**
Medication use - thrombosis	0.002	(0.007)								
Medication use - chronic obstructive pulmonary disease (COPD)	0.012	(0.011)								
Medication use - asthma	0.023	(0.016)	0.027	(0.015)°	0.035	(0.025)	0.014	(0.022)	0.023	(0.021)
Medication use - diabetes	-0.000	(0.008)								
Medication use - epilepsy	0.113	(0.019)***	0.114	(0.019)***	0.072	(0.023)**	0.077	(0.027)**	0.115	(0.021)***
Medication use - thyroid disorder	0.026	(0.009)**	0.026	(0.009)**	0.014	(0.014)	0.027	(0.013)*	0.029	(0.013)*
Community health centre										
Registered in community health centre	-0.030	(0.012)*	-0.030	(0.012)*	-0.020	(0.024)	-0.047	(0.027)°	-0.030	(0.020)
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	0.023	(0.006)***	0.026	(0.005)***	0.032	(0.009)***	0.020	(0.008)*	0.028	(0.008)***
Region of residence - Brussels	0.028	(0.020)	0.038	(0.018)*	0.079	(0.027)**	0.043	(0.029)	-0.006	(0.027)
Urbanization - medium	-0.003	(0.006)								
Urbanization - thin	0.008	(0.009)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.008	(0.008)								
Occupation - inactive	0.006	(0.009)								
Occupation - self-employed in 2008	-0.017	(0.015)								
Occupation - self-employed in 2012	0.022	(0.020)								
Occupation - self-employed in 2016	-0.006	(0.016)								
Occupation - unemployed	0.006	(0.010)								
Occupation - student	-0.008	(0.012)								
Occupation - retired	0.008	(0.008)								
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.001	(0.007)	-0.000	(0.007)	0.013	(0.013)	0.001	(0.012)	-0.013	(0.013)

Independent variables	Full model (Obs. = 31 473)		Reduced model (Obs. = 31 473)		Reduced model 2008 (Obs. = 10 847)		Reduced model 2012 (Obs. = 10 349)		Reduced model 2016 (Obs. = 10 277)	
Education degree - lower secondary	0.007	(0.007)	0.008	(0.007)	0.012	(0.010)	0.009	(0.012)	0.002	(0.011)
Education degree - upper secondary	0.013	(0.005)*	0.013	(0.005)*	0.014	(0.008)°	0.012	(0.009)	0.012	(0.009)
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.010	(0.006)°	0.009	(0.006)	0.025	(0.010)*	0.004	(0.009)	-0.001	(0.010)
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	0.038	(0.020)°	0.038	(0.019)°	0.024	(0.029)	0.040	(0.033)	0.042	(0.031)
Household composition (reference = couple without children)										
Household composition - single without children	0.014	(0.006)*	0.013	(0.006)*	0.018	(0.010)°	0.023	(0.010)*	-0.003	(0.010)
Household composition - single with children	0.040	(0.012)***	0.037	(0.012)**	0.034	(0.017)°	0.057	(0.018)**	0.007	(0.017)
Household composition - couple with children	-0.015	(0.006)*	-0.016	(0.006)**	-0.015	(0.010)	-0.004	(0.011)	-0.029	(0.011)**
Household composition - other	-0.007	(0.007)	-0.008	(0.007)	-0.015	(0.011)	0.000	(0.013)	-0.010	(0.011)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.035	(0.006)***	-0.036	(0.006)***	-0.041	(0.012)***	-0.038	(0.011)**	-0.039	(0.011)***
Insurance status										
Insurance - increased reimbursement in 2008	0.004	(0.011)	0.005	(0.011)	0.011	(0.012)				
Insurance - increased reimbursement in 2012	-0.006	(0.009)	-0.006	(0.009)			-0.009	(0.011)		
Insurance - increased reimbursement in 2016	0.004	(0.010)	0.004	(0.010)					0.003	(0.011)
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.001	(0.001)	0.001	(0.001)	-0.002	(0.001)	0.000	(0.001)	0.003	(0.001)*
Density of GPs in neighbouring municipalities	0.002	(0.002)	0.002	(0.001)	0.004	(0.002)°	0.003	(0.002)	-0.000	(0.002)
Density of specialists in municipality	0.000	(0.000)								
Density of specialists in neighbouring municipalities	-0.000	(0.001)								
Density of psychiatrists in municipality	-0.002	(0.002)								
Density of psychiatrists in neighbouring municipalities	0.002	(0.004)								
Distance to nearest ED	0.000	(0.001)								
Number of EDs within 10km radius	-0.001	(0.001)	-0.002	(0.001)*	-0.004	(0.002)*	-0.003	(0.002)	0.000	(0.002)

Independent variables	Full model (Obs. = 31 473)	Reduced model (Obs. = 31 473)	Reduced model 2008 (Obs. = 10 847)	Reduced model 2012 (Obs. = 10 349)	Reduced model 2016 (Obs. = 10 277)
Time (reference = 2008)					
Time: year 2012	0.006 (0.006)	0.009 (0.006)			
Time: year 2016	-0.006 (0.006)	-0.005 (0.006)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.11.4. Overview inequity and evolution in the different scenarios

Figure 83 visualizes the absolute Gini coefficient for inequality in the probability to use antidepressants in the past year (so without needs correction) as well as inequity in the fairness gap for the probability to use antidepressants in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 83, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a stable trend in inequity in the probability to use antidepressants in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient remained at about 0.14. Hence, we find that the disparity between individuals in the probability of using antidepressants that cannot be explained and justified by (observable) healthcare needs has not changed over time.

Table 57 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not using antidepressants in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

When following the traditional approach, all Gini coefficients indicate that inequity has remained constant over time. When following the alternative approach, there is an unambiguous decrease in inequity (baseline-residual scenario).

Figure 83 – Evolution (2008-2016) of the absolute Gini index by scenario

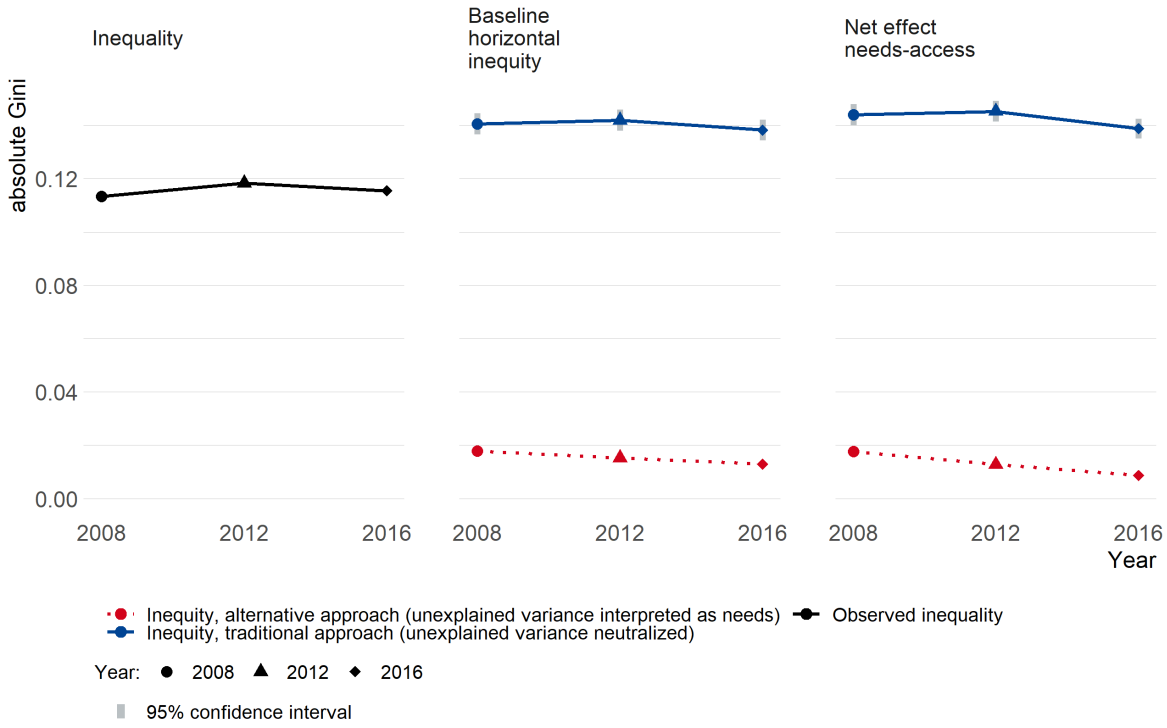


Table 57 – Evolution (2008-2016) of the inequity in the probability to use of antidepressants in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.141	0.142	0.138	→
	Relative	0.752	0.751	0.745	→
	Reversed relative	0.161	0.164	0.159	→
Net effect needs-access	Absolute	0.144	0.145	0.139	→
	Relative	0.740	0.739	0.741	→
	Reversed relative	0.165	0.167	0.159	→
Baseline-residual	Absolute	0.018	0.015^	0.013^*	↓
	Relative	0.136	0.111^	0.097^*	↓
	Reversed relative	0.020	0.018^	0.015^*	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.11.5. Overview inequity over time for different population subgroups

Figure 84 and Figure 85 show how the probability to use antidepressants in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 84, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 85, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower usage of antidepressants than the population average. Values to the right of the vertical line, on the other hand, indicate a higher usage than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 84 and Figure 85 indicate that the inequalities with respect to the probability to use antidepressants are quite pronounced and range between -10 and +25 percentage points. Once a correction is made for healthcare needs (various inequity scenarios), most disparities have disappeared.

A first observation is that inequalities are especially pronounced for subgroups based on healthcare needs. The usage rates are above average for individuals with fair, bad and very bad self-assessed health, for individuals with invalidity or disability, for individuals with a chronic disorder and limitation to daily activities, and to a lesser extent for the over-80 year

olds (panel inequality). The usage rates are below average for individuals reporting good and very good self-assessed health. After correcting for needs, there are no more deviations from the population average. Second, there are small differences by financial situation and education, i.e. a usage rate above the population average for individuals with primary education, who benefit from increased reimbursement or who are materially deprived (inequality panel), and a usage rate below the population average for individuals in the top middle class or with tertiary education. However, it is likely that these differences are related to differences in healthcare needs in these subgroups and hence, we find no important disparities after correcting for healthcare needs. Third, we find that individuals in single parent households have a usage rate of antidepressant above the population average, a result that is robust to correcting for healthcare needs.

The results are similar in the baseline scenario, the baseline-residual scenario and the net effect needs-access scenario. In the baseline-residual, the deviations are even smaller. In the net effect needs-access scenario, there is a somewhat lower probability to use among individuals with bad and very bad self-assessed health, single parents and individuals at risk of poverty compared to the baseline inequity scenario.

Figure 84 – Deviation in the needs-corrected probability to use of antidepressants in the past year from population average for subgroups based on income, education and self-assessed health, by scenario and year

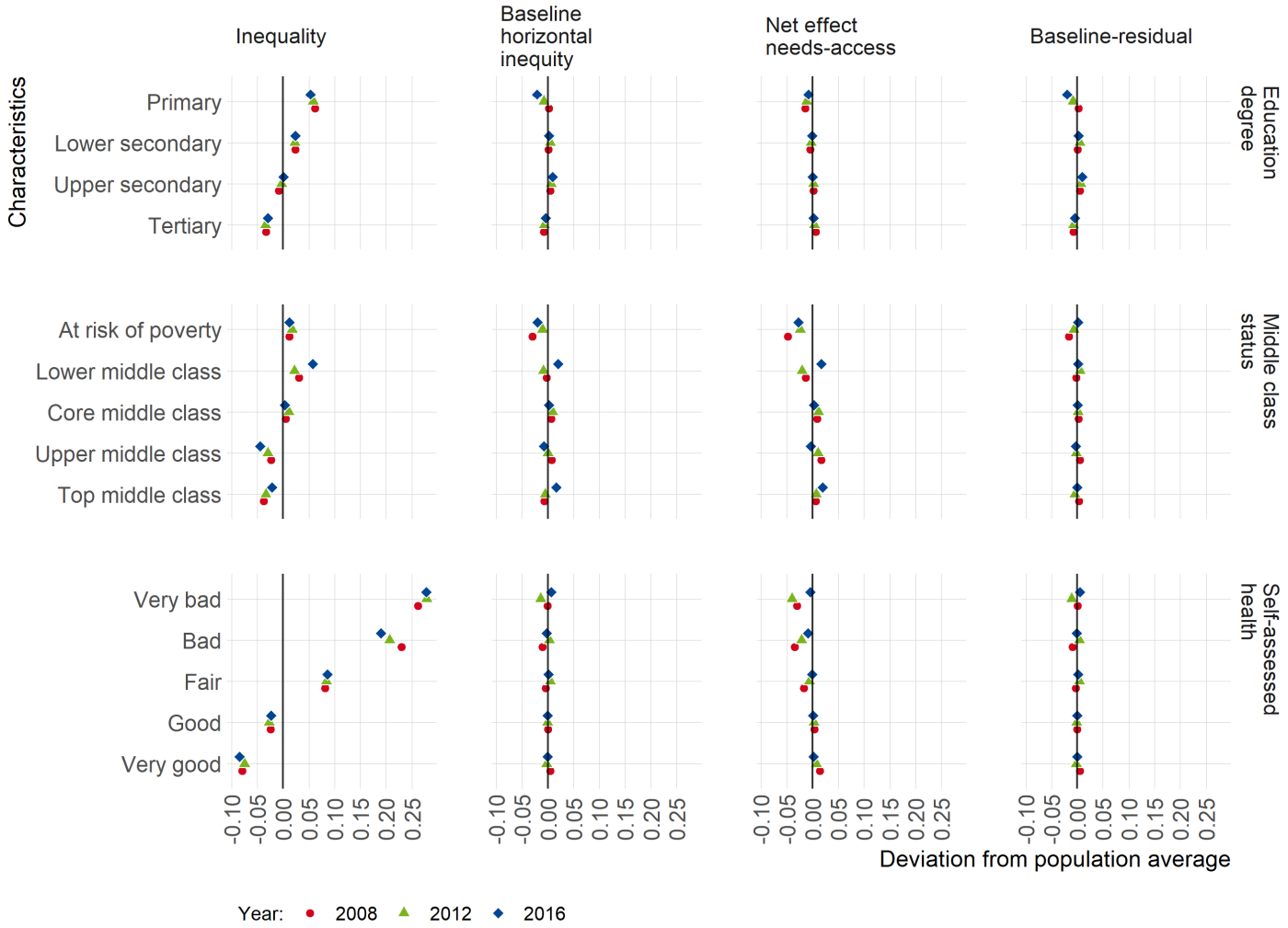


Figure 85 – Deviation in the needs-corrected probability to use of antidepressants in the past year from population average for specific vulnerable subgroups, by scenario and year

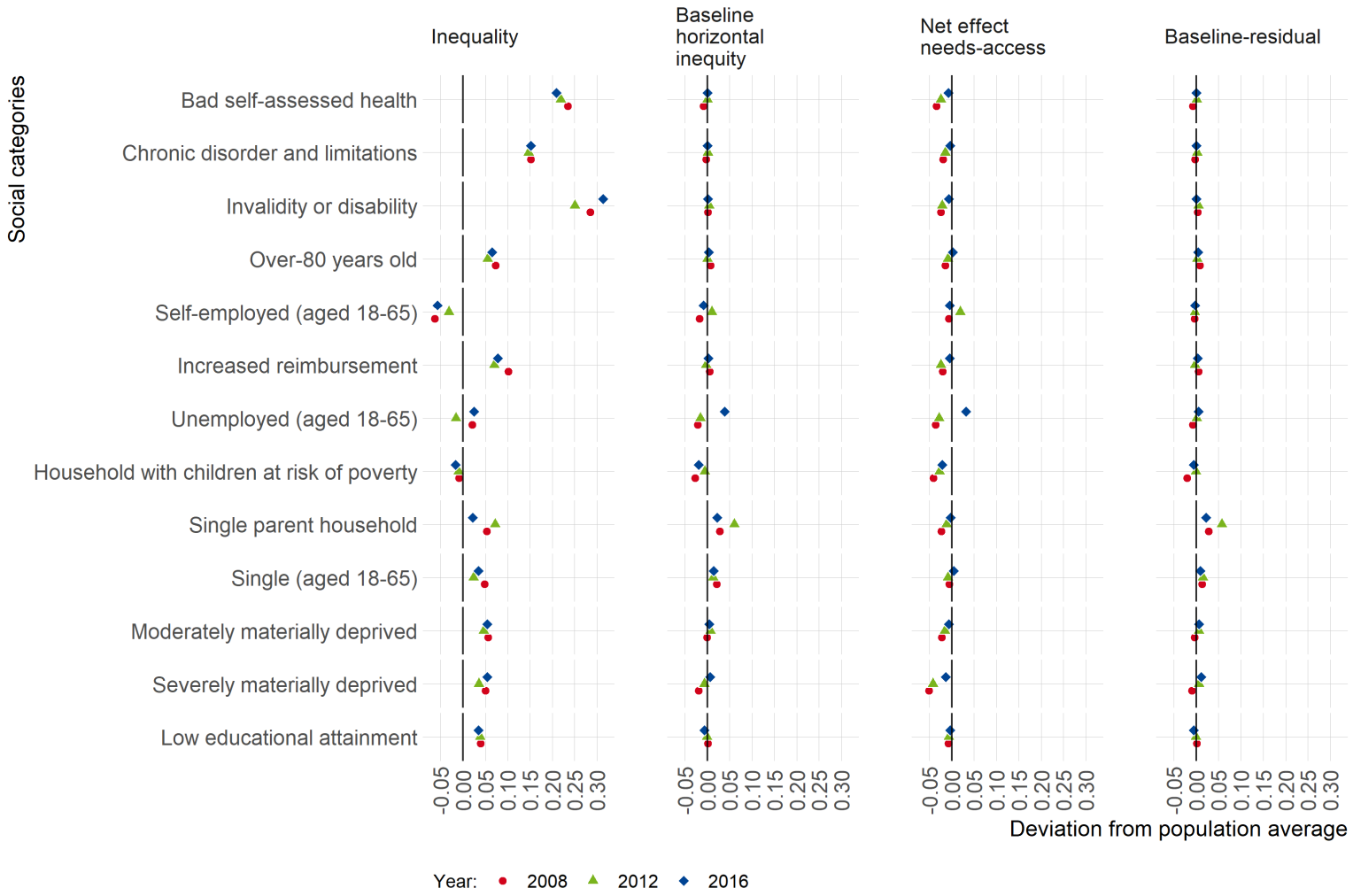
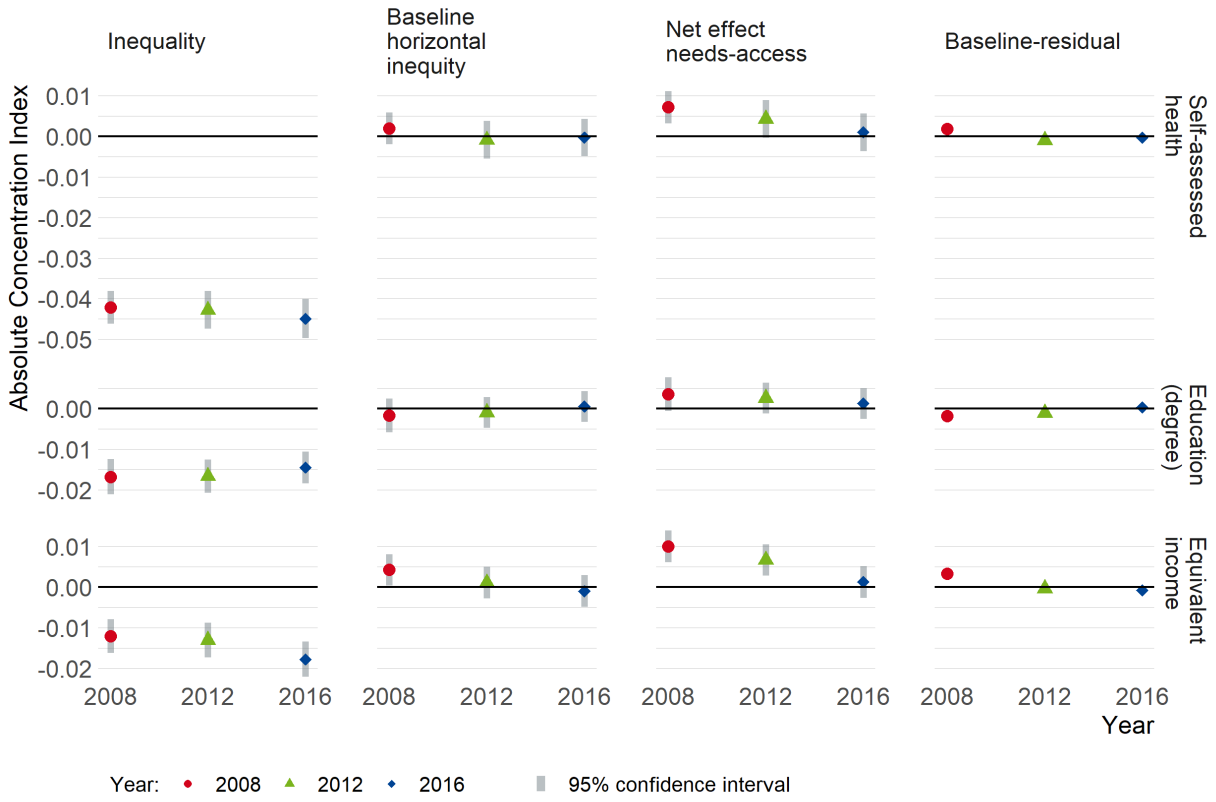


Figure 86 shows the absolute concentration index of the needs-corrected probability to use antidepressants in the past year to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected probabilities of using antidepressant concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected probabilities for individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 86 show that there are systematic socioeconomic inequalities in the probability to use antidepressants in the past year in all three dimension, with a higher probability among individuals with worse self-assessed health, a lower educational degree or lower income. However, after correcting for needs, the concentration index indicates that there are no systematic socioeconomic inequities in the baseline horizontal inequity, the baseline-residual and the extended needs scenarios. In the net effect needs-access scenario, there is small socioeconomic inequity in favour of individuals with better self-assessed health and higher income, that is however decreasing over time and not significant in 2016.

Figure 86 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.12. Polymedication (population 65+)

1.12.1. Summary

We analyse inequity in the probability of polymedication in the past year among the population aged 65 or more, excluding residents of nursing homes.

Polymedication is defined as the consumption of 5 or more different prescribed medications of more than 80 daily defined doses (DDD) per year. [18] The key points are summarized in the box below.

Key points inequity in the probability of polymedication in the past year

- EU-SILC/IMA-AIM survey value for the indicator closely matches population values in 2016.
- The probability of polymedication in the past year increased from 30% in 2008 to 38% in 2012 and 2016 in the survey sample (65+); rates above 55% for individuals with (very) bad self-assessed health; about 10% to 25% of individuals with (very) good self-assessed health used at least five different medications for a sustained period of time.

Polymedication rates

- Association with healthcare needs and minor variation by socioeconomic status. **Main associations (regression):**
  - Health status: higher usage among individuals with fair, bad or very bad self-assessed health; eligible for the lump sum chronic illness. Very strong association with various disease profiles based on prescribed medication, in particular asthma, COPD, thrombosis and cardiovascular problems.
  - Lower probabilities of polylmedication for individuals not borne in Belgium.
  - No systematic association with income, material deprivation, educational attainment, increased reimbursement status, or region. This is a positive finding.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic socioeconomic inequities by educational attainment or income, nor systematic inequities by self-assessed health.
  - Below-average polymedication rates for individuals with severe material deprivation (situation is improving over time with evolution to population mean).

1.12.2. Evolution over time for the population and population subgroups

Table 58 reports the evolution over time of the probability of polymedication in the past year. The KCE HSPA report indicates that the rate of polymedication among the insured population aged 65 or more was 39% in 2014 and 2016. [18] This rate is closely matched among the individuals aged 65 or above included in the EU-SILC/IMA-AIM sample (excluding residents in nursing homes), with a rate of 38.8% in 2012 and 38.4% in 2016. Moreover, according to the EU-SILC/IMA-AIM sample, the rate of polymedication has increased strongly between 2008 and 2012 from 30.1% to 38.8%.

The reversed value is given as well, i.e. the probability of no polymedication in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 58 – Evolution (2008-2016) in the probability of polymedication in the past year (population 65+)

Sample	Definition	2008	2012	2014	2016
Population (65+)	Indicator			39.0%	39.0%
Survey (65+)	Indicator	30.1%	38.8%		38.4%
	Reverse	69.9%	61.2%		61.6%

Figure 87 shows the evolution of the probability of polymedication in the past year for a variety of population subgroups (65+) (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.12.3.

In most subgroups the fraction of individuals with polymedication is higher in 2016 than in 2008. Given the limited sample size, there might be some random variation that interferes with the observed trends when zooming in on particular subgroups. This should be borne in mind when analysing the results in Figure 87, e.g. the evolution of individuals with invalidity or disability (panel F).

A first conclusion is that the probability of polymedication is strongly associated with (self-assessed) health status (panel E). There is a clear increase in the rate of polymedication as health status deteriorates. Nonetheless, we find that for individuals reporting very good and good self-assessed health, respectively, about 10% to 16% and 19% to 26% have used at least five different medications for a sustained period of time. The rate of polymedication increases to 35%-50% for individuals reporting fair self-assessed health and to 58%-67% for individuals reporting bad or very bad self-assessed health. Hence the majority of individuals with (very) bad health status are chronic users of five or more different types of medication. Other subgroups reflecting higher care needs, such as the over-80 year olds, individuals with a chronic disorder or with invalidity/disability also have polymedication rates above the population average, but below the rates observed for individuals with bad or very bad self-assessed health (panel F).

Second, we find relatively small differences related to the education level and financial situation of individuals, but with a clear gradient (panel A, B, C). Individuals with lower educational attainment, with lower income, with moderate material deprivation, with increased reimbursements have polymedication rates above the population average, whereas individuals with higher income and educational attainment have polymedication rates below the population average. This might be related to differences in healthcare needs between population groups defined on income and education level (see Scientific report section 2.4.1). Individuals at the bottom of the income distribution (at risk of poverty and severe material deprivation) have a polymedication rate below other groups with a slightly better financial situation, i.e. the lower middle class and individuals with moderate material deprivation.

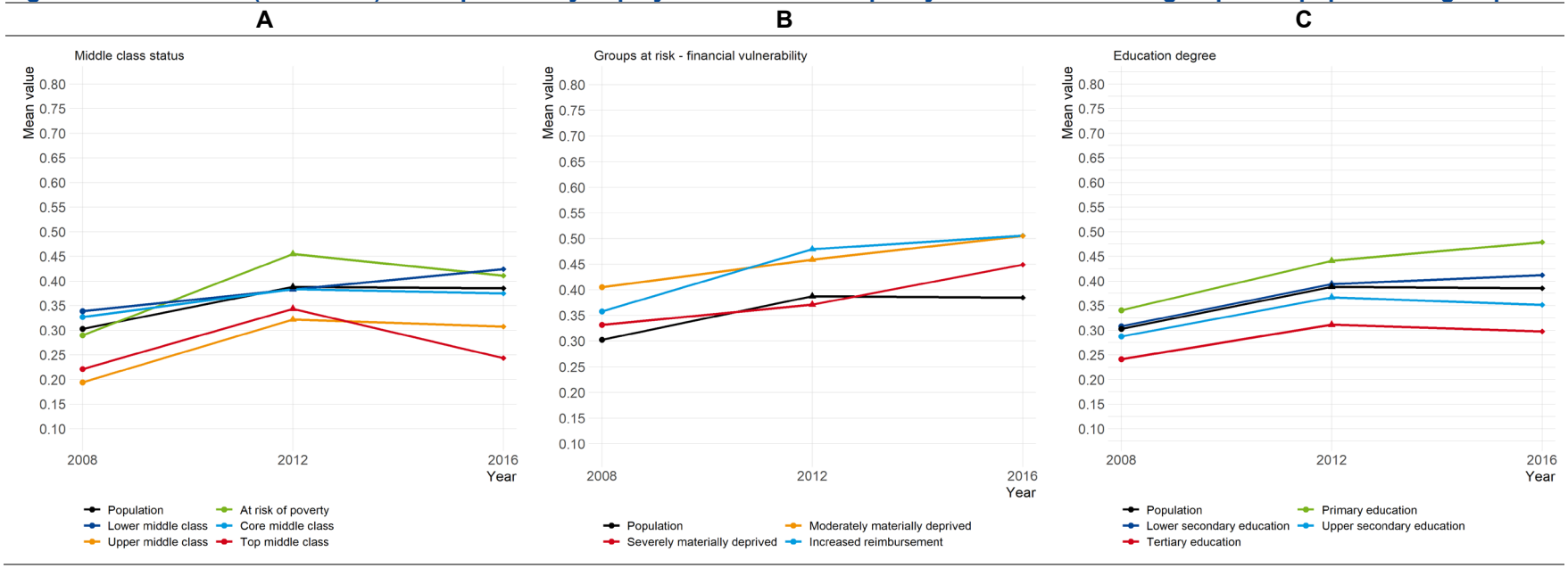
In addition, we have the following findings:

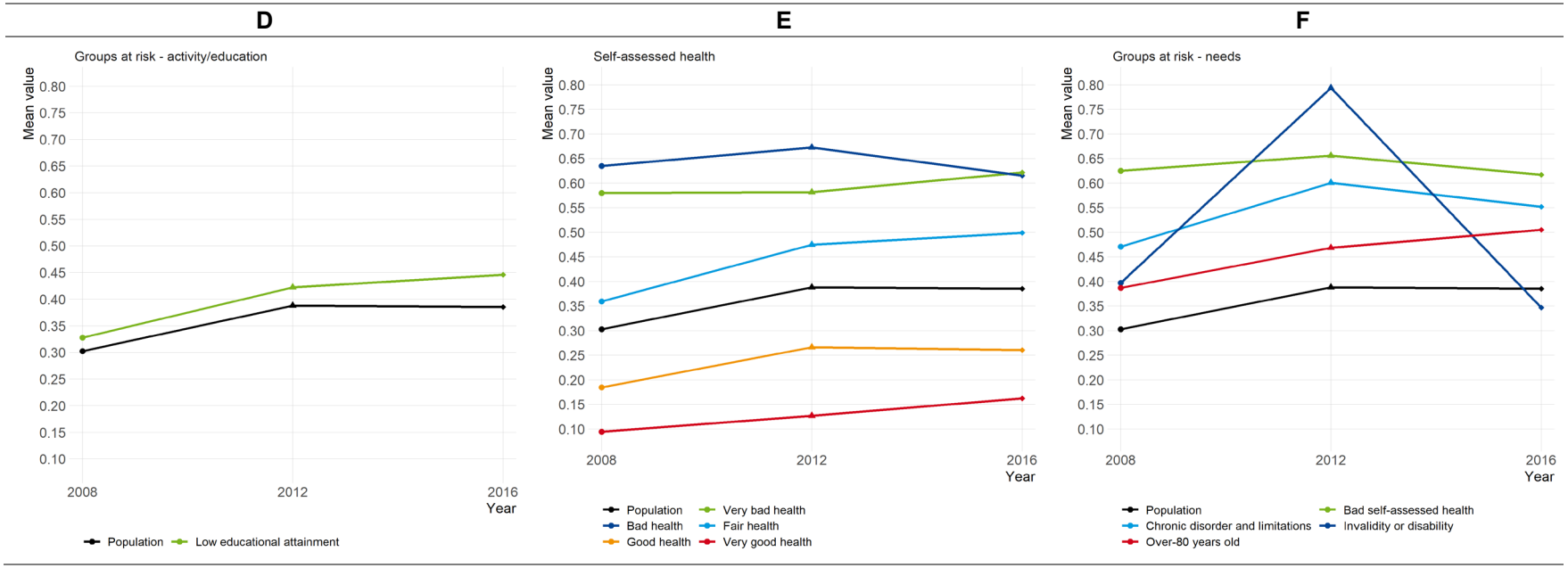
- Panel A: There is variation in the probability of polymedication in the past year by income level (range 2016: 0.24 – 0.42). There is gradient by income with higher probabilities associated with lower income. Nonetheless, the probability is lower for individuals at risk of poverty compared to individuals in the lower (in 2008 and 2016) and core middle class (in 2008).
- Panel B: individuals in difficult financial situations have a polymedication rate above the population average. The rate is particularly higher for Individuals with increased reimbursement and individuals with moderate material deprivation.
- Panel C and D: There is variation in the probability of polymedication in the past year by obtained education degree (range 2016: 0.30 – 0.48). There is gradient by education with higher probabilities generally associated with lower educational attainment.

Panel E and F: There is important variation in the probability of polymedication in the past year by self-assessed health status (range 2016: 0.16 – 0.62). Individuals in very good health (about 10%-16%) have a markedly lower probability than individuals in good (about 19%-26%), fair (about 35%-50%) or (very) bad health (about 58%-67%).

Self-assessed health is more strongly association with medication usage than other types of care needs, such as high age, presence of chronic disorders or invalidity. Nonetheless, subgroups based on these other types of healthcare needs generally have polymedication rates above the population average.

Figure 87 – Evolution (2008-2016) of the probability of polymedication in the past year for different subgroups and populations groups at risk





1.12.3. Regression output

Table 59 reports the average marginal effects of a probit regression of the indicator of polymedication in the past year (value = 1) or not (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 59):

- The polymedication is strongly associated with **healthcare needs,** especially the presence of specific disorders identified on prescribed medication use and self-assessed health status:
  - Age and sex: when controlling for health status, we find that the polymedication rate is more or less similar among the population aged 65 or more; there is a 3 to 6 percentage points lower probability among males in the age category 65-79 compared to females in the same age category; the effect is only significant in 2008.
  - Self-reported health status: there is strong positive association between self-assessed health and the probability of polymedication. The effect is decreasing over time. Compared to individuals with very good self-assessed health, the increase amounts to 2-7, 9-15, and 10-24 percentage points for individuals reporting, respectively, good health, fair health, and bad or very bad

health. The presence of a chronic disorder in combination with limitations to daily activities tend to increase the polymedication rate by 6 percentage points (reduced pooled model), with a particularly strong association in 2012.

- Administrative health information: Eligibility for the lump sum chronic illness is associated with a 2 to 6 percentage points increase in the probability of polymedication. There no systematic association with the receipt of an invalidity or disability allowance and the probability of polymedication.
- Medication use: The probability of polymedication is strongly associated with all disorders that we identify based on medication use. This could be expected, as prescribed medication is used to identify the disorder on the one hand and counts in the assessment of polymedication on the other hand. We find a 9 to 32 percentage points increase in the polymedication rate depending on the disorder, with particularly important effects (20 percentage points or more) for individuals with asthma, COPD, diabetes, thrombosis and cardiovascular disease.
- No different effect is found for individuals registered in a community health centre.

- There is almost no variation in the vaccination rate by **socioeconomic profile**.
  - There is no systematic association between the probability of polymedication in the past year and income, material deprivation, education and household composition.
  - Country of birth: Individuals who were not born in Belgium have a 3 to 5 percentage points lower probability of polymedication; the effect is only borderline significant in 2016.
- After correcting for healthcare needs, there is no effect of increased reimbursement status on the probability of polymedication in the past year.
- There is a weak and small negative association between the density of specialists and the probability of polymedication indicating lower rates of polymedication if the density of specialists in the municipality or neighbouring municipalities is lower.
- There are no important regional differences: the probability of polymedication in the past year is 6 percentage points higher in Brussels in 2016, compared to individuals living in Flanders. There are no other regional differences, nor is there any systematic effect of urbanization.

Table 59 – Regression output for the probability of polymedication in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 6 819)		Reduced model (Obs. = 6 821)		Reduced model 2008 (Obs. = 2 129)		Reduced model 2012 (Obs. = 2 269)		Reduced model 2016 (Obs. = 2 423)	
Age and Sex (reference = female aged 65-74 years)										
Male aged 65-79 years	-0.038	(0.011)***	-0.037	(0.011)***	-0.063	(0.017)***	-0.031	(0.018)°	-0.025	(0.016)
Male aged 80 years or more	-0.007	(0.016)	-0.009	(0.016)	-0.041	(0.031)	-0.036	(0.028)	0.034	(0.028)
Female aged 80 years or more	0.010	(0.016)	0.007	(0.016)	0.016	(0.027)	-0.008	(0.027)	0.012	(0.023)
Self-assessed health (reference = very good)										
Self-assessed health - good	0.045	(0.019)*	0.043	(0.019)*	0.067	(0.032)*	0.060	(0.031)°	0.016	(0.033)

Independent variables	Full model (Obs. = 6 819)		Reduced model (Obs. = 6 821)		Reduced model 2008 (Obs. = 2 129)		Reduced model 2012 (Obs. = 2 269)		Reduced model 2016 (Obs. = 2 423)	
Self-assessed health - fair	0.109	(0.021)***	0.107	(0.021)***	0.146	(0.032)***	0.088	(0.034)*	0.087	(0.037)*
Self-assessed health - bad	0.165	(0.026)***	0.163	(0.025)***	0.236	(0.040)***	0.145	(0.042)***	0.102	(0.040)*
Self-assessed health - very bad	0.116	(0.035)***	0.116	(0.034)***	0.243	(0.054)***	0.018	(0.058)	0.092	(0.050)°
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.025	(0.018)	0.023	(0.018)	0.044	(0.027)	0.033	(0.031)	-0.010	(0.031)
Chronic disorder, no limitations	0.035	(0.016)*	0.033	(0.016)*	0.007	(0.027)	0.060	(0.030)*	0.022	(0.026)
Chronic disorder, limitations	0.056	(0.014)***	0.057	(0.014)***	0.027	(0.022)	0.108	(0.023)***	0.029	(0.022)
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	-0.006	(0.061)								
Entitled to lump sum chronic illness	0.047	(0.016)**	0.048	(0.016)**	0.023	(0.025)	0.064	(0.028)*	0.057	(0.023)*
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	0.166	(0.027)***	0.167	(0.027)***	0.162	(0.043)***	0.144	(0.045)**	0.159	(0.042)***
Medication use - other disorder	0.145	(0.046)**	0.141	(0.046)**	0.086	(0.077)	0.149	(0.055)**	0.163	(0.082)*
Medication use - cardiovascular disorder	0.282	(0.011)***	0.282	(0.011)***	0.262	(0.021)***	0.293	(0.019)***	0.286	(0.018)***
Medication use - thrombosis	0.234	(0.011)***	0.234	(0.012)***	0.202	(0.017)***	0.195	(0.016)***	0.222	(0.012)***
Medication use - chronic obstructive pulmonary disease (COPD)	0.256	(0.018)***	0.255	(0.018)***	0.252	(0.023)***	0.283	(0.027)***	0.192	(0.030)***
Medication use - asthma	0.267	(0.047)***	0.272	(0.047)***	0.296	(0.081)***	0.187	(0.072)*	0.316	(0.056)***
Medication use - diabetes	0.285	(0.015)***	0.283	(0.015)***	0.251	(0.022)***	0.233	(0.026)***	0.274	(0.019)***
Medication use - epilepsy	0.153	(0.031)***	0.153	(0.031)***	0.191	(0.052)***	0.121	(0.049)*	0.152	(0.044)***
Medication use - thyroid disorder	0.163	(0.019)***	0.164	(0.019)***	0.174	(0.033)***	0.162	(0.028)***	0.139	(0.024)***
Community health centre										
Registered in community health centre	-0.000	(0.048)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	0.011	(0.014)	0.016	(0.011)	0.026	(0.019)	0.013	(0.021)	0.009	(0.018)
Region of residence - Brussels	-0.024	(0.032)	0.014	(0.019)	-0.024	(0.028)	0.001	(0.031)	0.057	(0.029)*
Urbanization - medium	0.026	(0.013)*								

Independent variables	Full model (Obs. = 6 819)		Reduced model (Obs. = 6 821)		Reduced model 2008 (Obs. = 2 129)		Reduced model 2012 (Obs. = 2 269)		Reduced model 2016 (Obs. = 2 423)	
Urbanization - thin	0.039	(0.021)°								
Self-reported current occupation (reference = full-time employee)										
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	0.002	(0.015)								
Education degree - lower secondary	0.020	(0.016)								
Education degree - upper secondary	0.004	(0.015)								
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.021	(0.013)								
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	0.033	(0.049)								
Household composition (reference = couple without children)										
Household composition - single without children	-0.002	(0.011)								
Household composition - single with children	-0.066	(0.141)								
Household composition - couple with children	0.046	(0.059)								
Household composition - other	-0.018	(0.017)								
Country of birth (reference = Belgium)										
Country of birth other than Belgium	-0.034	(0.020)°	-0.039	(0.020)*	-0.040	(0.043)	-0.030	(0.033)	-0.051	(0.030)°
Insurance status										
Insurance - increased reimbursement in 2008	-0.003	(0.020)	-0.009	(0.018)	-0.014	(0.018)				
Insurance - increased reimbursement in 2012	0.003	(0.019)	-0.002	(0.018)			-0.004	(0.018)		
Insurance - increased reimbursement in 2016	0.001	(0.020)	-0.004	(0.018)					0.002	(0.019)
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.001	(0.002)								
Density of GPs in neighbouring municipalities	-0.003	(0.005)								
Density of specialists in municipality	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)	-0.000	(0.001)	-0.002	(0.001)*
Density of specialists in neighbouring municipalities	-0.001	(0.001)	-0.001	(0.001)	0.001	(0.001)	-0.004	(0.002)*	-0.001	(0.001)

Independent variables	Full model (Obs. = 6 819)	Reduced model (Obs. = 6 821)	Reduced model 2008 (Obs. = 2 129)	Reduced model 2012 (Obs. = 2 269)	Reduced model 2016 (Obs. = 2 423)
Distance to nearest ED	0.001 (0.001)				
Number of EDs within 10km radius	0.004 (0.002)°				
Time (reference = 2008)					
Time: year 2012	0.000 (0.014)	0.002 (0.014)			
Time: year 2016	-0.013 (0.013)	-0.009 (0.012)			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.12.4. Overview inequity and evolution in the different scenarios

Figure 88 visualizes the absolute Gini coefficient for inequality in the probability of polymedication in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of polymedication in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 88, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a small increase in inequity in the probability of polymedication in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient increased from about 0.18 in 2008 to about 0.19 in 2016. Hence, we find that the disparity between individuals in the probability of polymedication in the past year that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 60 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of no polymedication in the past year) (see section 1.1.5). For each inequity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Based on the trends of the baseline inequity scenario and the net effect needs-access scenario, we conclude that inequity in the probability of polymedication has increased over time when measured by the absolute Gini coefficient or the reversed relative Gini coefficient; and decreased over time when measured by the relative Gini coefficient. Following the alternative approach (the baseline-residual scenario), we find an unambiguous increase in inequity for all three Gini coefficients.

Figure 88 – Evolution (2008-2016) of the absolute Gini index by scenario

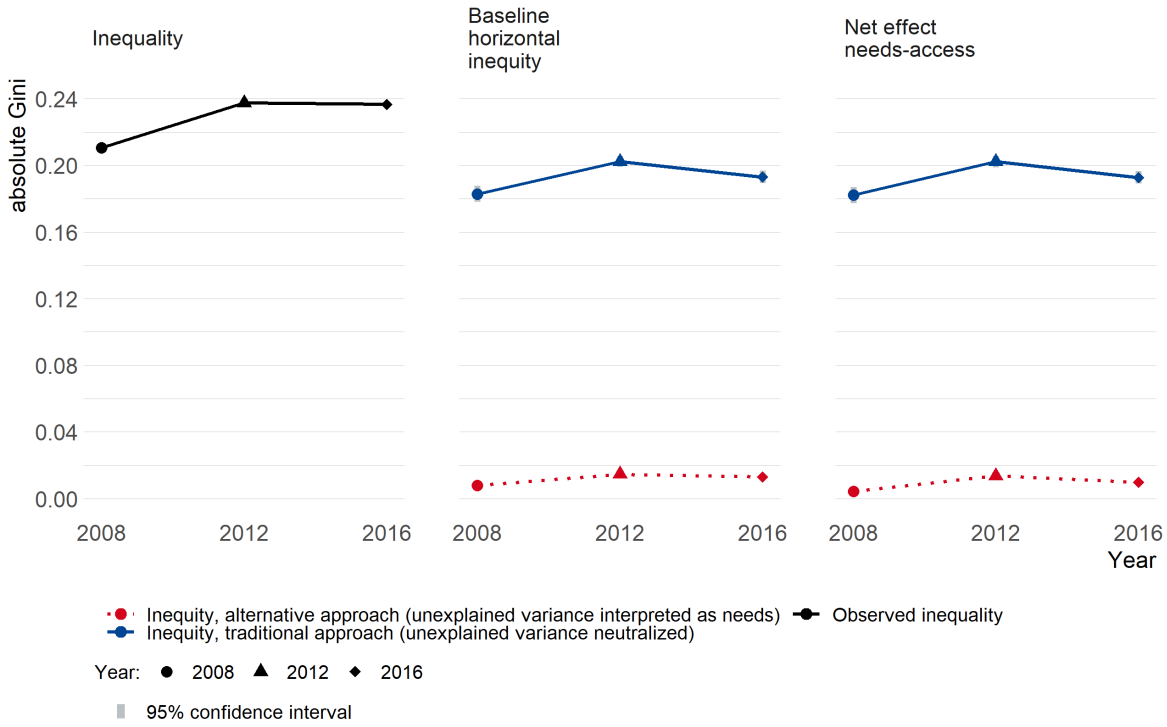


Table 60 – Evolution (2008-2016) of the inequity in the probability of polymedication in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.183	0.202^	0.193^*	↑
	Relative	0.505	0.456^	0.438^*	↓
	Reversed relative	0.256	0.320^	0.304^*	↑
Net effect needs-access	Absolute	0.182	0.202^	0.193^*	↑
	Relative	0.505	0.456^	0.439^*	↓
	Reversed relative	0.256	0.320^	0.304^*	↑
Baseline-residual	Absolute	0.008	0.015^	0.013^	↑
	Relative	0.026	0.038^	0.034^	↑
	Reversed relative	0.011	0.024^	0.021^	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.12.5. Overview inequity over time for different population subgroups

Figure 89 and Figure 90 show how the probability of polymedication in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 89, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 90, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower polymedication rate than the population average. Values to the right of the vertical line, on the other hand, indicate a higher polymedication rate than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 89 and Figure 90 indicate that the inequalities with respect to the probability of polymedication are quite pronounced and range between -30 and +40 percentage points. Once a correction is made for healthcare needs (various inequity scenarios), the disparities are much smaller and for most population subgroups close to zero. This is especially true for subgroups based on age and (self-assessed) health status.

A first observation is that inequalities are especially pronounced for subgroups based on healthcare needs (panel inequality). The probability of polymedication is about 30 percentage points above the population average for individuals reporting very bad and bad health, and individuals with

chronic disorders and limitation to daily activities. It is also above the population average for individuals reporting fair health, individuals who receive an invalidity or disability allowance (except 2016) and the over-80 year olds. The polymedication rate is below the population average for individuals with good and very good self-assessed health. After correcting for needs (panel baseline horizontal inequity), nearly all deviations from the population mean have disappeared for the subgroups based on healthcare needs, except for the subgroup with invalidity or disability allowance. The strong variation in this groups is likely related to the unexplained variance, because the deviations relative to the population mean have disappeared in the baseline-residual scenario where the impact of the unexplained variance is neutralized.

Second, there are inequalities and inequities with respect to income. When looking at inequalities, we find that the probability of polymedication is lower among individuals in the top and upper middle class and somewhat higher for individuals with material deprivation, with increased reimbursement and in the lower income groups. After correcting for healthcare needs, most differences relative to the population mean have disappeared. The exceptions are the slightly lower probability of polymedication among individuals at risk of poverty and the lower probability of polymedication among individuals with severe material deprivation (i.e. unable to afford at least 4 items out of a list of 9 items), although the gap with the population mean is decreasing over time. For both groups, the negative deviations may be related to the unexplained variance, because the gap relative to the population mean has decreased in the baseline-residual scenario where the impact of the unexplained variance is neutralized.

Third, there is a small gradient by educational attainment before correcting for healthcare needs, with a higher probability of polymedication among individuals with lower educational attainment (panel inequality). The effect has disappeared after correcting for healthcare needs (panel baseline horizontal inequity).

Figure 89 – Deviation in the needs-corrected probability of polymedication in the past year from population average for subgroups based on income, education and self-assessed health, by scenario and year

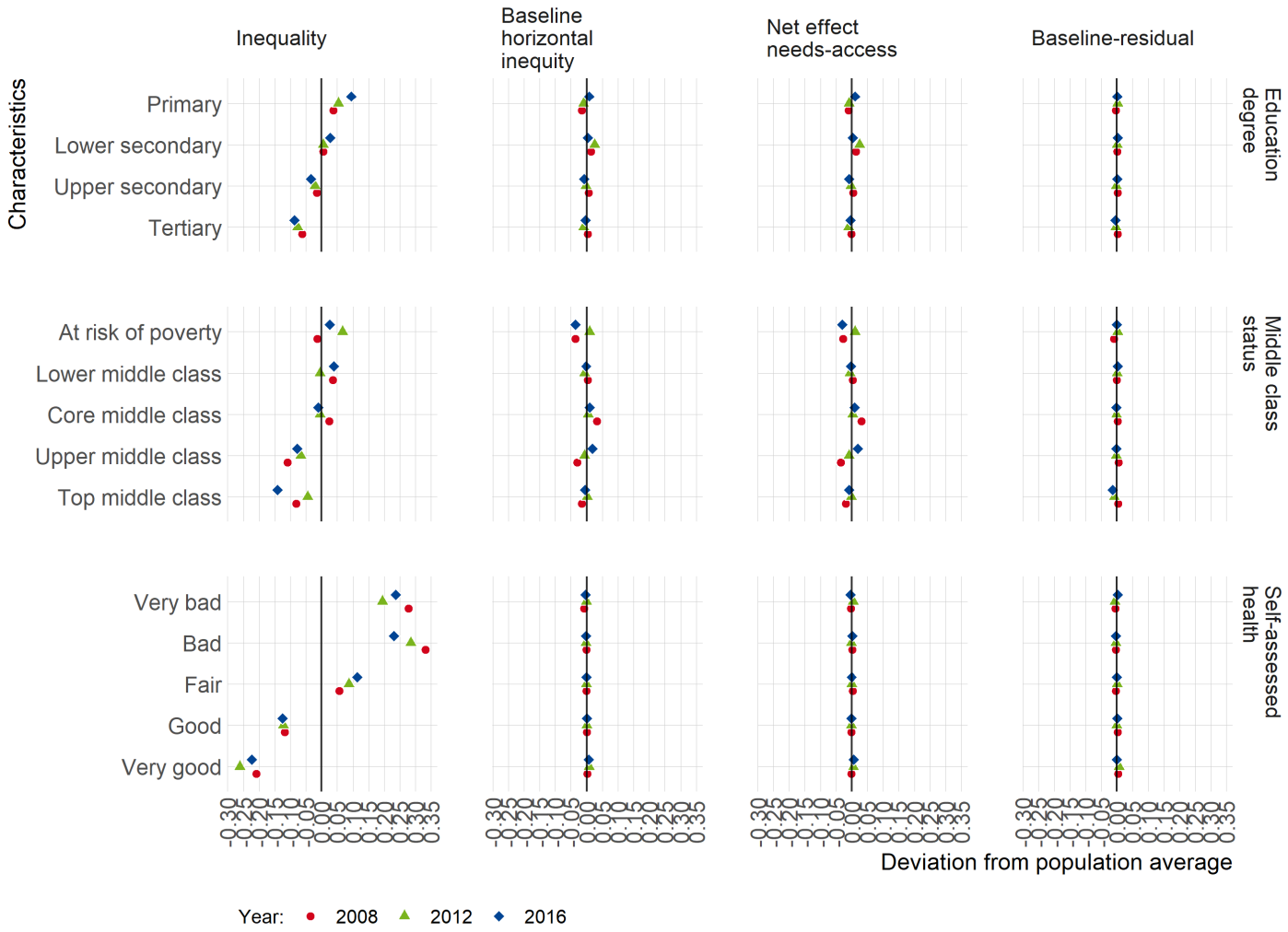


Figure 90 – Deviation in the needs-corrected probability of polymedication in the past year from population average for specific vulnerable subgroups, by scenario and year

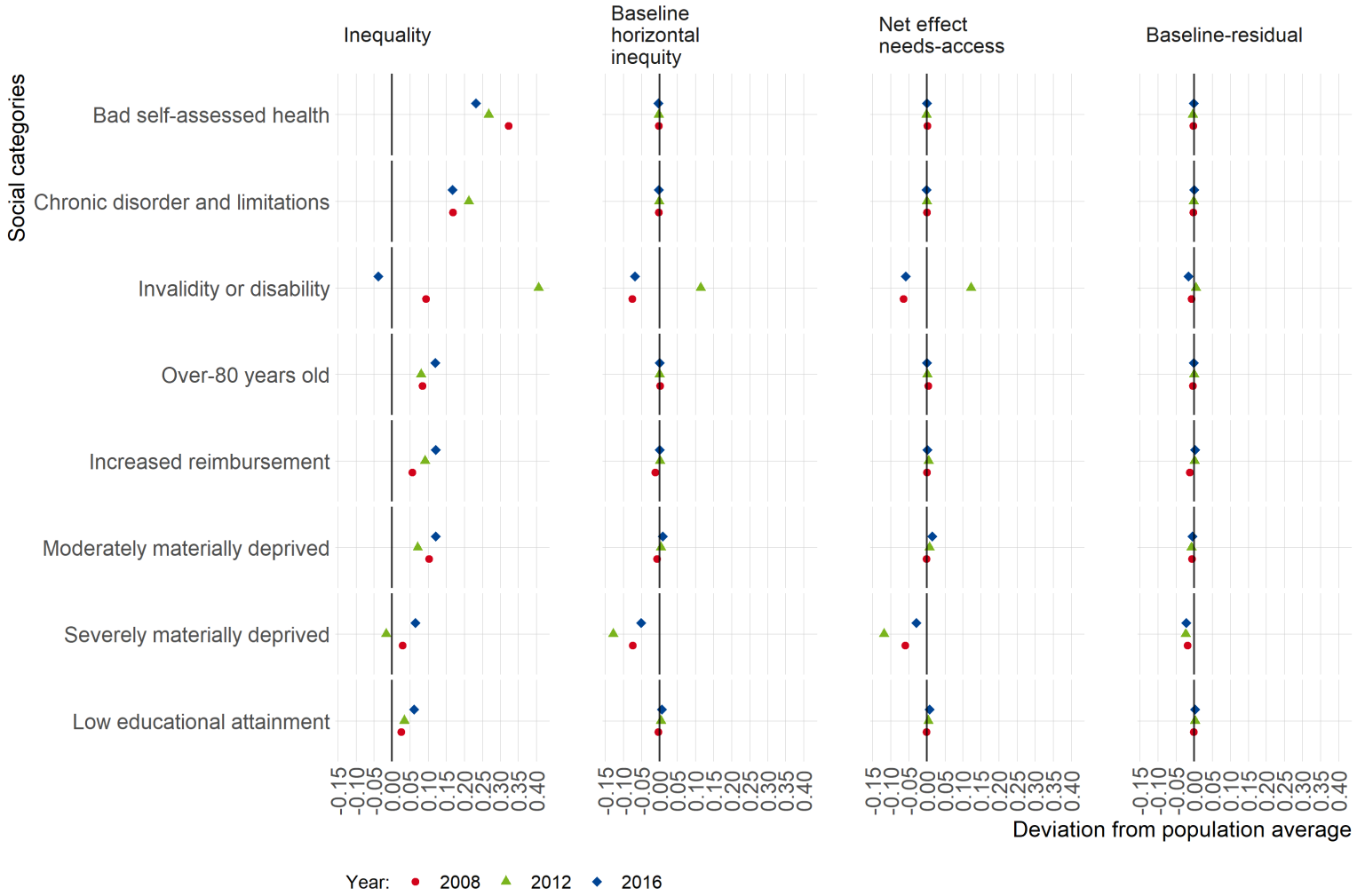
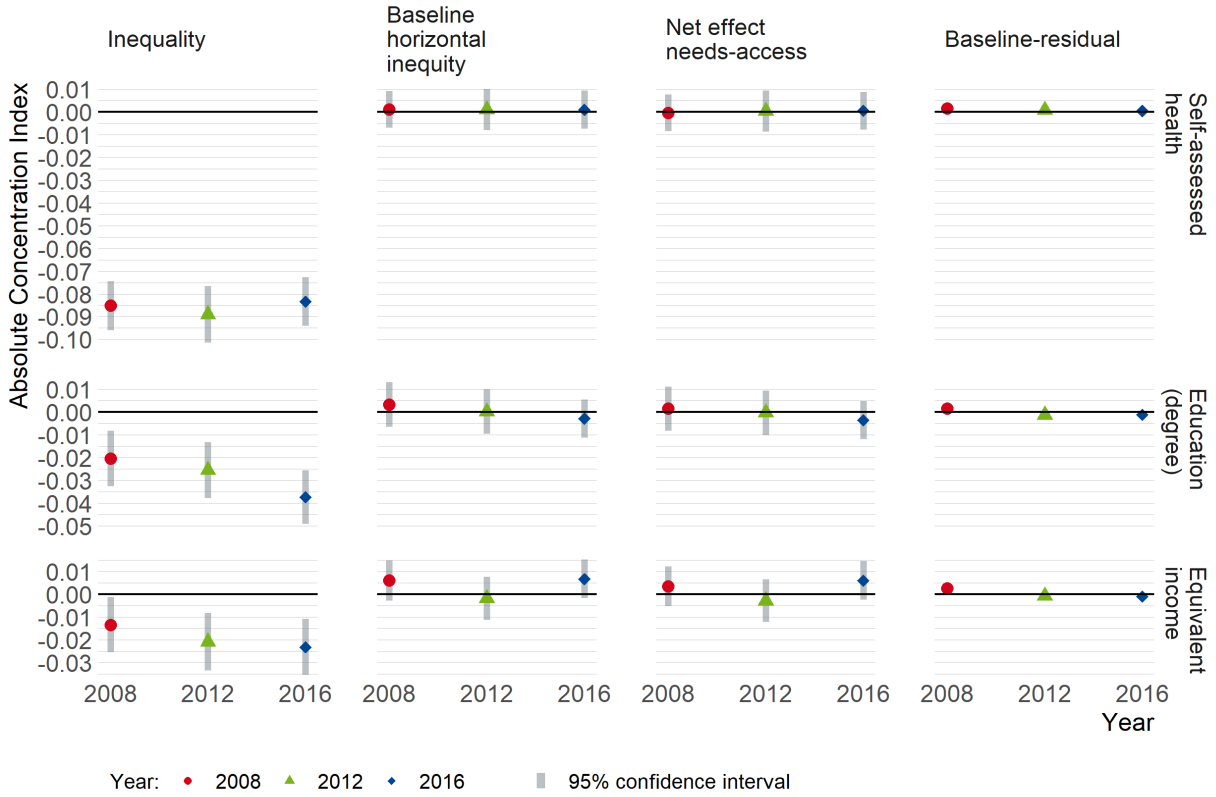


Figure 91 shows the absolute concentration index of the needs-corrected probability of polymedication in the past year to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as a higher needs-corrected probability of polymedication concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate a higher needs-corrected probability of polymedication among individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 91 show that there are systematic inequalities in the probability of polymedication in all three dimension, but most pronounced with respect to self-assessed health. Polymedication is systematically higher among individuals with worse self-assessed health, a lower educational degree and lower income. After correcting for needs, no systematic socioeconomic inequities are found.

Figure 91 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.13. Influenza vaccination (population 65+)

1.13.1. Summary

We analyse inequity in influenza vaccination in the past year among the population aged 65 or more, excluding residents of nursing homes.

Influenza vaccination is determined based on the prescription of medication with anatomical therapeutic chemical (ATC) classification equal to "J07BB".

Influenza vaccination is a type of primary preventive care recommended for individuals aged 65 or more and individuals with specific health risks (e.g. chronic disorders such as cardiovascular disease, COPD, asthma, diabetes) and partially reimbursed. In case of preventive care, the role of healthcare needs and the interpretation of needs-corrected probabilities can be different in the assessment of inequities (see Scientific report section 1.1). With respect to preventive care, one could argue that differences in healthcare needs are irrelevant, as prevention is important and valuable irrespective of needs in order to preserve one's health status. Therefore, the results from the inequality scenario (without any correction for healthcare needs) are at least as important to consider as those from the various inequity scenarios (with correction for healthcare needs). Nonetheless, the inequity scenarios are still relevant, because influenza vaccination is not only recommended for individuals aged 65 or more, but also for individuals with healthcare risks. Hence a differential use related to health status can be justified.

Key points inequity in the probability of influenza vaccination in the past year

- EU-SILC/IMA-AIM survey value and trend for the indicator are a relatively good match to the population results.
- The probability of influenza vaccination in the past year among the population aged 65+ has decreased over time from 67% in 2008 to 57% in 2016 in the survey sample; vaccination rate above 70% among the over-80 year olds.

Vaccination rates

- Strong association with healthcare needs and minor variation by socioeconomic status. **Main associations (regression):**
  - Health status: higher vaccination rates among the over-80 year olds; individuals with chronic disorder or limitations to daily activities; with invalidity or disability; and for various disease profiles based on prescribed medication, in particular asthma, COPD, cardiovascular diseases, diabetes and other disorders (includes amongst other kidney failure). Males have a slightly lower vaccination rate.
  - Higher vaccination rates among individuals registered in a community healthcare centre; individuals with tertiary education (in 2016).
  - Lower vaccination rates among individuals living in Wallonia and Brussels (relative to Flanders); singles (relative to individuals living in couple); individuals with severe material deprivation (particularly in 2012).
- There are systematic inequalities with respect to self-assessed health (higher rates among individuals with worse self-assessed health, in particular bad or fair health compared to good or very good); no systematic socioeconomic inequalities with respect to income or education.
- After correcting for healthcare needs, **inequities** indicate (baseline horizontal inequity scenario):
  - No systematic socioeconomic inequities by educational attainment or income, nor systematic inequities by self-assessed health. However, the gradient with respect to educational attainment is increasing over time, with above-average vaccination rates among individuals with tertiary education in 2016 and below-average rates among lower-educated individuals.

- Below-average influenza vaccination rates for individuals with severe material deprivation (situation is deteriorating over time) and to a lesser extent for individuals at risk of poverty (situation is improving with evolution to population mean), increased reimbursement and invalidity/disability.

1.13.2. Evolution over time for the population and population subgroups

Table 61 reports the evolution over time of the probability to have an influenza vaccination in the past year. There is a downward trend over time with 62.3% in 2008, 57.7% in 2012 and 54.7% in 2016 of the insured population aged 65 or above (excluding residents in nursing homes) with an influenza vaccination the past year. [18] This is likely to be an underestimation of the real vaccination rate among the 65+, as the vaccination coverage of elderly in the residential sector (nursing homes or homes for the elderly), is much higher (82%).[18]

Among the individuals aged 65 or above included in the EU-SILC/IMA-AIM sample (i.e. the sample used in the regression and inequity analysis), the vaccination coverage is somewhat higher with 66.7% in 2008, 58.9% in 2012 and 57.4% in 2016 of the interviewed individuals with influenza vaccination in the past year. The decrease in coverage is less gradual over time and concentrated in the period 2008-2012.

The reversed value is given as well, i.e. the probability of not having had an influenza vaccination in the past year. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 61 – Evolution (2008-2016) in the influenza vaccination rate in the past year (population 65+)

Sample	Definition	2008	2012	2016
Population (65+)	Indicator	62.3%	57.7%	54.7%
Survey (65+)	Indicator	66.7%	58.9%	57.4%
	Reverse	33.3%	41.1%	42.6%

Figure 92 shows the evolution of the probability to have an influenza vaccination in the past year for a variety of population subgroups (65+) (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. Such a multivariate regression analysis follows in section 1.13.3.

About 67% of the sample population aged 65 or more had an influenza vaccination in 2008, decreasing to 57% in 2016 (see Table 61). In most subgroups the fraction of individuals with influenza vaccination follow the downward trend over time. There is, however, important variation between subgroups. Given the limited sample size, there might be some random variation that interferes with the observed trends when zooming in on particular subgroups. This should be borne in mind when analysing the results in Figure 92, e.g. the evolution of individuals with invalidity or disability (panel F).

A first conclusion is that the probability to have influenza vaccination is strongly associated with (self-assessed) health status (panel E), although there is no uniform increase in vaccination rate as self-assessed health deteriorates. We find a vaccination rate above the population average for individuals with fair or bad self-assessed health, around the population average for individuals with very bad self-assessed health and below the population average for individuals with very good and good self-assessed health. Other subgroups reflecting higher care needs, such as the over-80 year olds, individuals with a chronic disorder or with invalidity/disability also have a vaccination rate above the population average (panel F). Second, we find small differences related to the education level of individuals, without a clear gradient (panel C and D). Third, there is some variation according to

the financial situation of the individual, again without a clear correlation between the income level and the vaccination rate (panel A). It is clear, however, that individuals with material deprivation have a vaccination rate below the population average (panel B). Individuals who benefit from increased reimbursement, on the other hand, have a vaccination rate above the population average.

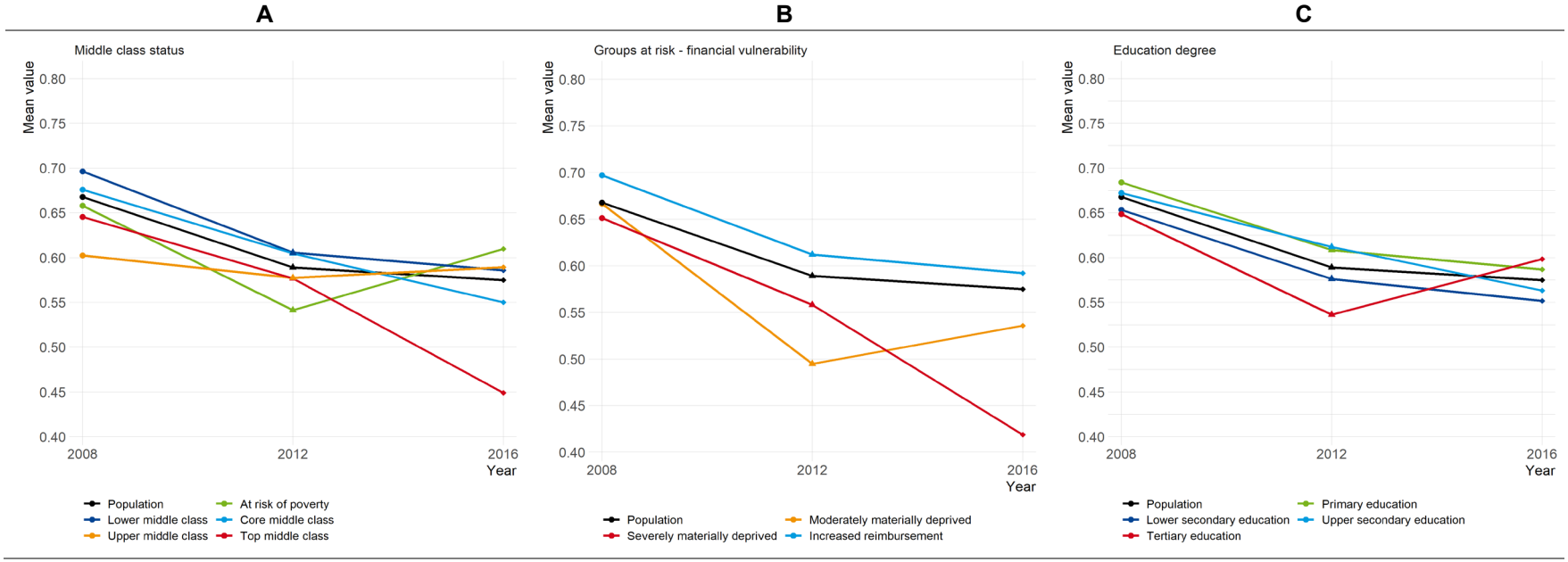
In addition, we have the following findings:

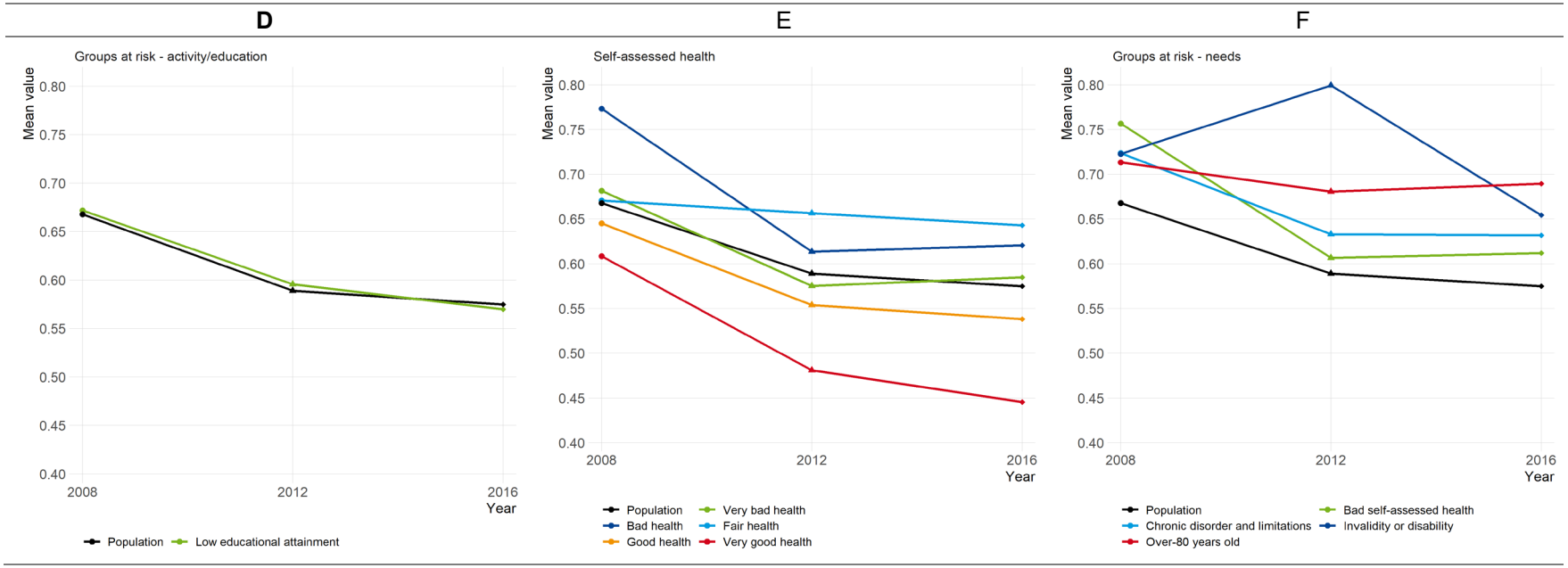
- Panel A: There is variation in the probability to have an influenza vaccination in the past year by income level (range 2016: 0.45 – 0.61). The evolution varies in the different income groups, which may be partly due to random variation related to the small sample size. We find that the decrease in vaccination rate is most pronounced in in the top middle class, whereas individuals at risk of poverty where just below the population average in 2008 to end as the income group with the highest vaccination rate in 2016.
- Panel B: individuals with material deprivation have a vaccination rate below the population average and experienced a sharper decline than the population in general. Individuals with increased reimbursement have a probability to be vaccinated against influenza in the past year that is above the population average.

Panel C and D: There is little variation in the probability to have an influenza vaccination in the past year by obtained education degree (range 2016: 0.55 – 0.60). There is no clear gradient in vaccination rate by educational attainment.

- Panel E and F: There is quite some variation in the probability to have an influenza vaccination in the past year by self-assessed health status (range 2016: 0.45 – 0.64). Individuals in very good health have a markedly lower vaccination rate than other individuals. Moreover individuals in very bad health have a vaccination rate around the population average and below the rate of individuals reporting fair or bad health. The over-80 year olds have a higher vaccination rate, well above the population average and more or less constant over time, between 68% and 71%. Subgroups of individuals with an invalidity or disability allowance or with chronic illness and limitations also have a vaccination rate above the population average.

Figure 92 – Evolution (2008-2016) of the probability to have an influenza vaccination in the past year for different subgroups and populations groups at risk





1.13.3. Regression output

Table 62 reports the average marginal effects of a probit regression of the indicator of being vaccinated against influenza in the past year (value = 1) or not (value = 0) (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 62):

- There is a negative time trend, indicating a general derease in the probability to have an influenza vaccination, the effect is especially pronounced between 2008 and 2012.
- The probability to have an influenza vaccination is strongly associated with **healthcare needs,** especially high age (80+), the presence of a chronic illness, invalidity/disability and specific disorders identified on prescribed medication use:
  - Age and sex: when controlling for health status, we find that the vaccination rate among females is higher than for males in the same age category. In addition, as age increases, more individuals vaccinate.
  - Self-reported health status: there is no systematic association between self-assessed health and the probability to have an influenza vaccination. The presence of either a chronic disorder or

limitations to daily activities tend to increase vaccination coverage by 4 to 7 percentage points (reduced pooled model). The association is most pronounced in 2016 with a vaccination rate that is 7 to 13 percentage points higher.

- Administrative health information: There no systematic association with the receipt of an invalidity or disability allowance nor eligibility of the lump sum chronic illness and the probability to have an influenza vaccination.
- Medication use: The probability to be vaccinated against influenza is strongly associated with various disorders that are included as risk factors for vaccination take-up: higher vaccination rates for individuals who take medication for COPD (+13-19 percentage points), asthma (+13-16 percentage points), cardiovascular disease (+10-15 percentage points), diabetes (+7-10 percentage points) and other diseases (a category that includes amongst others kidney failure). It is definitely a positive finding that individuals that belong to the risk group have higher vaccination rates. Also the use of medication against thrombosis is associated with an increased vaccination rate of 5 to 10 percentage points.
- The vaccination rate is about 7 to 17 percentage points higher for individuals registered in a community health centre.

- There is little variation in the vaccination rate by **socioeconomic profile**.
  - There is no systematic association between the probability to be vaccinated against influenza in the past year and income.
  - Education degree: When correcting for other characteristics, no systematic association between the probability to be vaccinated against influenza in the past year and obtained education degree was found in 2008 and 2012. In 2016, the vaccination rate was 6 to 8 percentage points lower among individuals not having a degree of tertiary education.
  - Individuals who are materially deprived have a lower vaccination rate, but the effect is only significant in 2012.
  - Household composition: singles have a 5 to 8 percentage point lower vaccination rate than individuals living in couple.
- After correcting for healthcare needs, there is no effect of increased reimbursement status on the probability to have an influenza vaccination in the past year.
- There is no effect of the variables reflecting healthcare supply on the probability to be vaccinated.
- There are some regional differences: The probability to have an influenza vaccination in the past year is about 3 to 9 percentage points lower among individuals living in Wallonia, compared to individuals living in Flanders; in Brussels, the vaccination rate is, ceteris paribus, about 8 to 11 percentage points lower compared to Flanders. There is no effect of urbanization.

Table 62 – Regression output for the probability to have an influenza vaccination in the past year, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 6 819)		Reduced model (Obs. = 6 819)		Reduced model 2008 (Obs. = 2 129)		Reduced model 2012 (Obs. = 2 265)		Reduced model 2016 (Obs. = 2 421)	
Age and Sex (reference = female aged 65-74 years)										
Male aged 65-79 years	-0.040	(0.012)***	-0.040	(0.012)***	-0.038	(0.021)°	-0.048	(0.021)*	-0.033	(0.020)°
Male aged 80 years or more	0.053	(0.022)*	0.056	(0.022)**	0.024	(0.037)	0.035	(0.041)	0.103	(0.037)**
Female aged 80 years or more	0.086	(0.021)***	0.087	(0.021)***	0.027	(0.037)	0.099	(0.036)**	0.121	(0.035)***
Self-assessed health (reference = very good)										
Self-assessed health - good	0.017	(0.023)	0.019	(0.023)	0.001	(0.038)	0.019	(0.036)	0.030	(0.045)
Self-assessed health - fair	0.035	(0.028)	0.039	(0.028)	-0.014	(0.044)	0.057	(0.043)	0.059	(0.051)
Self-assessed health - bad	0.019	(0.034)	0.025	(0.033)	0.063	(0.058)	-0.003	(0.054)	0.032	(0.062)
Self-assessed health - very bad	-0.027	(0.047)	-0.023	(0.046)	-0.005	(0.076)	-0.022	(0.083)	-0.050	(0.078)
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	0.072	(0.023)**	0.067	(0.022)**	0.026	(0.036)	0.030	(0.042)	0.131	(0.039)***
Chronic disorder, no limitations	0.062	(0.023)**	0.062	(0.024)**	0.004	(0.039)	0.085	(0.044)°	0.091	(0.042)*
Chronic disorder, limitations	0.048	(0.020)*	0.044	(0.019)*	0.042	(0.033)	0.021	(0.030)	0.066	(0.032)*
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	0.110	(0.067)	0.107	(0.068)	0.012	(0.102)	0.166	(0.167)	0.170	(0.114)
Entitled to lump sum chronic illness	-0.009	(0.023)								
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	-0.010	(0.034)								
Medication use - other disorder	0.080	(0.056)	0.080	(0.057)	-0.179	(0.093)°	0.180	(0.084)*	0.208	(0.111)°
Medication use - cardiovascular disorder	0.127	(0.015)***	0.126	(0.015)***	0.112	(0.021)***	0.147	(0.023)***	0.101	(0.022)***
Medication use - thrombosis	0.081	(0.014)***	0.080	(0.014)***	0.049	(0.029)°	0.096	(0.023)***	0.086	(0.023)***
Medication use - chronic obstructive pulmonary disease (COPD)	0.151	(0.021)***	0.150	(0.020)***	0.190	(0.045)***	0.130	(0.040)**	0.171	(0.038)***
Medication use - asthma	0.117	(0.051)*	0.124	(0.051)*	0.134	(0.136)	0.134	(0.086)	0.157	(0.087)°
Medication use - diabetes	0.080	(0.019)***	0.083	(0.019)***	0.099	(0.036)**	0.090	(0.032)**	0.074	(0.031)*

Independent variables	Full model (Obs. = 6 819)	Reduced model (Obs. = 6 819)	Reduced model 2008 (Obs. = 2 129)	Reduced model 2012 (Obs. = 2 265)	Reduced model 2016 (Obs. = 2 421)
Medication use - epilepsy	-0.004 (0.040)				
Medication use - thyroid disorder	0.023 (0.022)	0.026 (0.022)	0.038 (0.043)	0.003 (0.036)	0.035 (0.036)
Community health centre					
Registered in community health centre	0.114 (0.062)°	0.112 (0.067)°	0.096 (0.115)	0.072 (0.166)	0.168 (0.075)*
Place of residence (reference = Flanders, dense)					
Region of residence - Wallonia	-0.055 (0.020)**	-0.066 (0.017)***	-0.030 (0.030)	-0.085 (0.026)**	-0.078 (0.027)**
Region of residence - Brussels	-0.210 (0.051)***	-0.095 (0.026)***	-0.114 (0.040)**	-0.078 (0.049)	-0.084 (0.038)*
Urbanization - medium	0.002 (0.020)				
Urbanization - thin	-0.021 (0.028)				
Self-reported current occupation (reference = full-time employee)					
Highest obtained educational degree (reference = tertiary education)					
Education degree - primary	-0.027 (0.021)	-0.033 (0.020)°	-0.015 (0.038)	0.013 (0.034)	-0.078 (0.033)*
Education degree - lower secondary	-0.033 (0.022)	-0.038 (0.021)°	-0.014 (0.036)	0.010 (0.039)	-0.089 (0.033)**
Education degree - upper secondary	-0.006 (0.020)	-0.007 (0.020)	0.010 (0.034)	0.053 (0.036)	-0.063 (0.030)*
Equivalized disposable household income					
Income (natural logarithm - linear & squared)	-0.001 (0.023)				
Socioeconomic status (reference = not materially deprived)					
Severe material deprivation index	-0.167 (0.074)*	-0.154 (0.069)*	-0.146 (0.116)	-0.302 (0.106)**	-0.069 (0.144)
Household composition (reference = couple)					
Household composition - single	-0.075 (0.015)***	-0.071 (0.016)***	-0.047 (0.029)	-0.066 (0.027)*	-0.087 (0.025)***
Household composition - other	-0.071 (0.024)**	-0.072 (0.024)**	-0.109 (0.042)*	-0.031 (0.044)	-0.078 (0.042)°
Country of birth (reference = Belgium)					
Country of birth other than Belgium	-0.052 (0.024)*	-0.051 (0.025)*	0.008 (0.047)	-0.033 (0.045)	-0.090 (0.035)*
Insurance status					
Insurance - increased reimbursement in 2008	0.054 (0.026)*	0.046 (0.026)°	0.044 (0.028)		
Insurance - increased reimbursement in 2012	0.028 (0.026)	0.018 (0.026)		0.024 (0.029)	
Insurance - increased reimbursement in 2016	0.006 (0.030)	0.000 (0.029)			-0.002 (0.032)

Independent variables	Full model (Obs. = 6 819)		Reduced model (Obs. = 6 819)		Reduced model 2008 (Obs. = 2 129)	Reduced model 2012 (Obs. = 2 265)	Reduced model 2016 (Obs. = 2 421)
Healthcare supply (density per 10 000 population, distance in km)							
Density of GPs in municipality	0.003	(0.003)					
Density of GPs in neighbouring municipalities	0.008	(0.006)					
Density of specialists in municipality	0.000	(0.001)					
Density of specialists in neighbouring municipalities	-0.003	(0.002)°					
Distance to nearest ED	-0.000	(0.002)					
Number of EDs within 10km radius	0.008	(0.003)*					
Time (reference = 2008)							
Time: year 2012	-0.092	(0.020)***	-0.097	(0.020)***			
Time: year 2016	-0.106	(0.020)***	-0.110	(0.019)***			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.13.4. Overview inequity and evolution in the different scenarios

Figure 93 visualizes the absolute Gini coefficient for inequality in the probability of being vaccinated against influenza in the past year (so without needs correction) as well as inequity in the fairness gap for the probability of being vaccinated against influenza in the past year calculated using different inequity scenarios (see section 1.1.4.1). For each scenario, two assessments of inequity are presented:

1. The traditional approach in which the unexplained variance of the regression model (residual) is considered as a source of unfair differences in care use between individuals and hence is neutralized. This situation is represented by the blue solid line.
2. An alternative approach in which the unexplained variance is considered as unmeasured healthcare needs, which does not lead to inequity in care use. This situation is represented by the red dotted line.

As can be seen in Figure 93, there is an important gap between both situations. If we consider this unexplained variance as fair and not contributing to inequity in care use, the measured Gini coefficient is significantly lower and close to zero, suggesting the absence of inequity.

If we follow the traditional approach, we observe a small increase in inequity in the probability to have received an influenza vaccination in the past year in all scenarios. For the baseline scenario, the absolute Gini coefficient increased from about 0.24 in 2008 to about 0.26 in 2016. Hence, we find that the disparity between individuals in the probability of being vaccinated against influenza in the past year that cannot be explained and justified by (observable) healthcare needs has increased over time.

Table 63 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of not being vaccinated against influenza in the past year) (see section 1.1.5). For each inequity

measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Based on the trends of the baseline scenario and the net effect needs-access scenario, we conclude that inequity in the probability of being vaccinated against influenza has increased over time when measured by the absolute Gini coefficient or the relative Gini coefficient; and decreased over time when measured by the reversed relative Gini coefficient. Following the alternative approach (the baseline-residual scenario), we find an unambiguous increase in inequity for all three Gini coefficients.

Figure 93 – Evolution (2008-2016) of the absolute Gini index by scenario

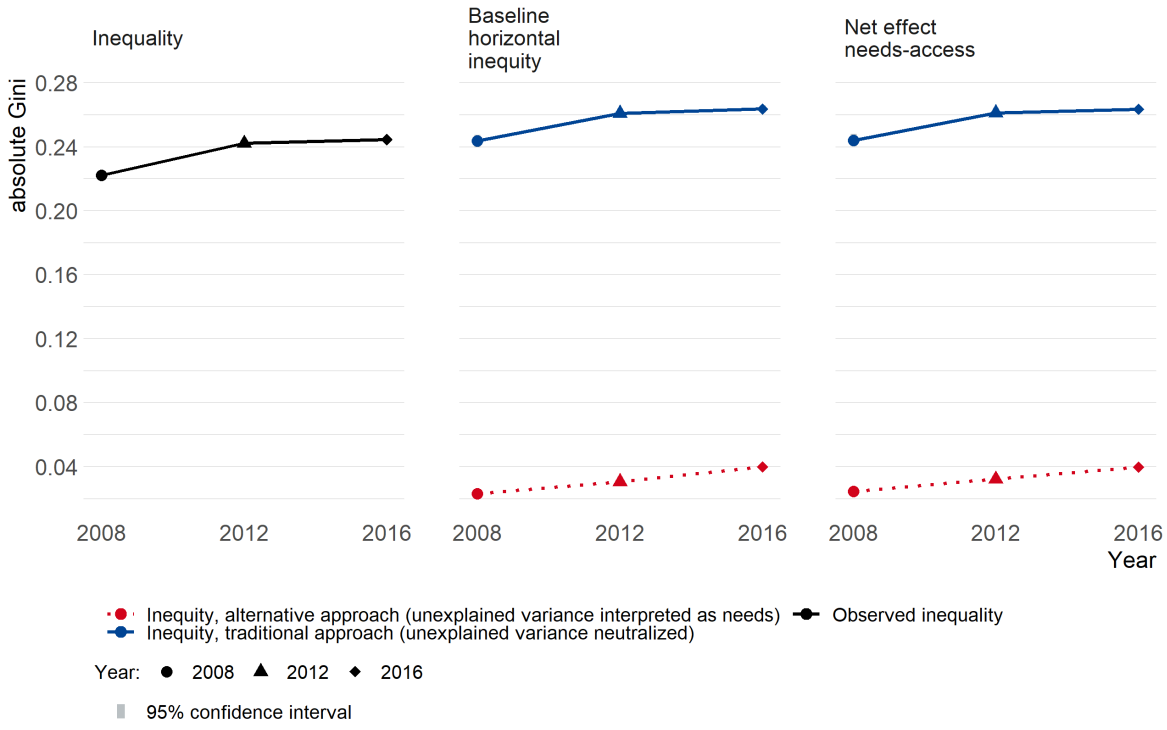


Table 63 – Evolution (2008-2016) of the inequity in the probability to have an influenza vaccination in the past year for different scenarios

Scenario	Inequality (Gini)	2008	2012	2016	Trend§
Baseline horizontal inequity	Absolute	0.244	0.261^	0.264^	↑
	Relative	0.356	0.420^	0.435^*	↑
	Reversed relative	0.642	0.568^	0.559^*	↓
Net effect needs-access	Absolute	0.244	0.261^	0.264^	↑
	Relative	0.356	0.420^	0.435^*	↑
	Reversed relative	0.642	0.568^	0.559^*	↓
Baseline-residual	Absolute	0.023	0.030^	0.040^*	↑
	Relative	0.035	0.052^	0.069^*	↑
	Reversed relative	0.069	0.074^	0.094^*	↑

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.13.5. Overview inequity over time for different population subgroups

Figure 94 and Figure 95 show how the probability of being vaccinated against influenza in the past year in various population subgroups differs from the population average when looking at inequality as well as inequity. **When analysing inequity, a correction is made for healthcare needs according to the different inequity-scenarios**, both for the average population and subgroup value. In Figure 94, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 95, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower vaccination rate than the population average. Values to the right of the vertical line, on the other hand, indicate a higher vaccination rate than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 94 and Figure 95 indicate that the inequalities with respect to the probability of being vaccinated against influenza range between -15 and +20 percentage points. Once a correction is made for healthcare needs (various inequity scenarios), the disparities are less pronounced, i.e. the deviations from the population average are lower in the inequity scenario compared to inequality. This is especially true for subgroups based on age and (self-assessed) health status.

A first observation is that inequalities are especially pronounced for subgroups based on healthcare needs (panel inequality). The vaccination rates are above the population average for individuals reporting bad and fair health, individuals with chronic disorders and limitation to daily activities, individuals who receive an invalidity or disability allowance and the over-80 year olds. The vaccination rates are around the population average for individuals reporting very bad health and below the population average for individuals with good and very good self-assessed health. After correcting for needs (panel baseline horizontal inequity), the vaccination rates of individuals reporting bad or very bad health or with invalidity/disability is below the population average, while vaccination in other subgroups is around the population average.

Second, there are inequalities and inequities with respect to income. The deviations are generally small and are not systematic, i.e. the deviations are both positive and negative changing from one year to another. However, when looking more closely, we can discern a gradient in the vaccination rate by income level in 2012 in the baseline horizontal inequity scenario (and net effect needs- access scenario), and in 2016 in the baseline-residual scenario.

Third, there is a small gradient by educational attainment after correcting for healthcare needs, especially in 2016, with a higher vaccination rate among individuals with higher educational attainment.

Fourth, there is a lower vaccination rate among individuals with material deprivation which is worsening over time relative to the population average; a results that is robust to the correction for healthcare needs.

The results are quite similar in the baseline horizontal inequity scenario, the net effect needs- access scenario and the baseline-residual scenario (except for the results with respect to income).

Figure 94 – Deviation in the needs-corrected probability to have an influenza vaccination in the past year from population average for subgroups based on income, education and self-assessed health, by scenario and year

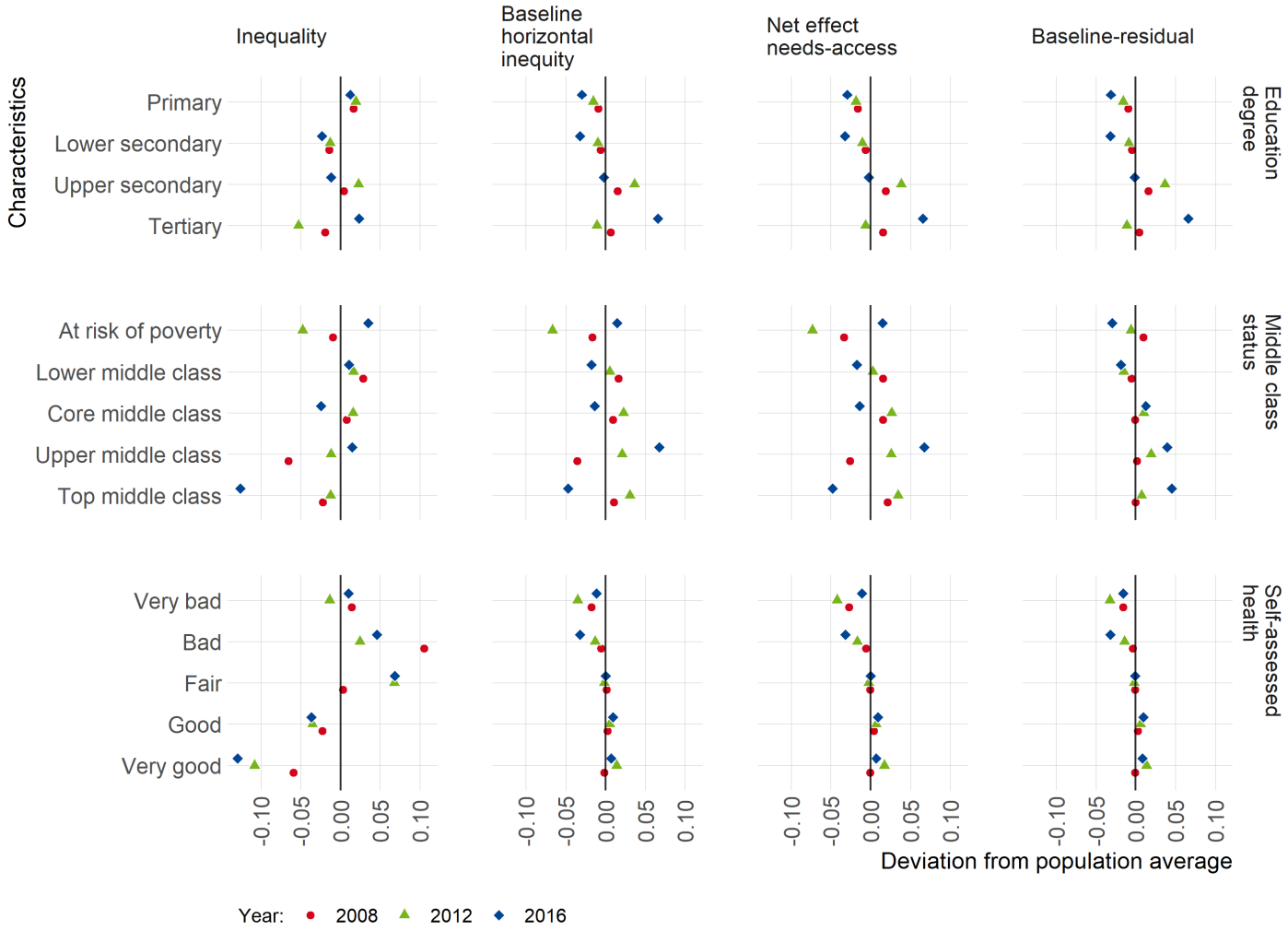


Figure 95 – Deviation in the needs-corrected probability to have an influenza vaccination in the past year from population average for specific vulnerable subgroups, by scenario and year

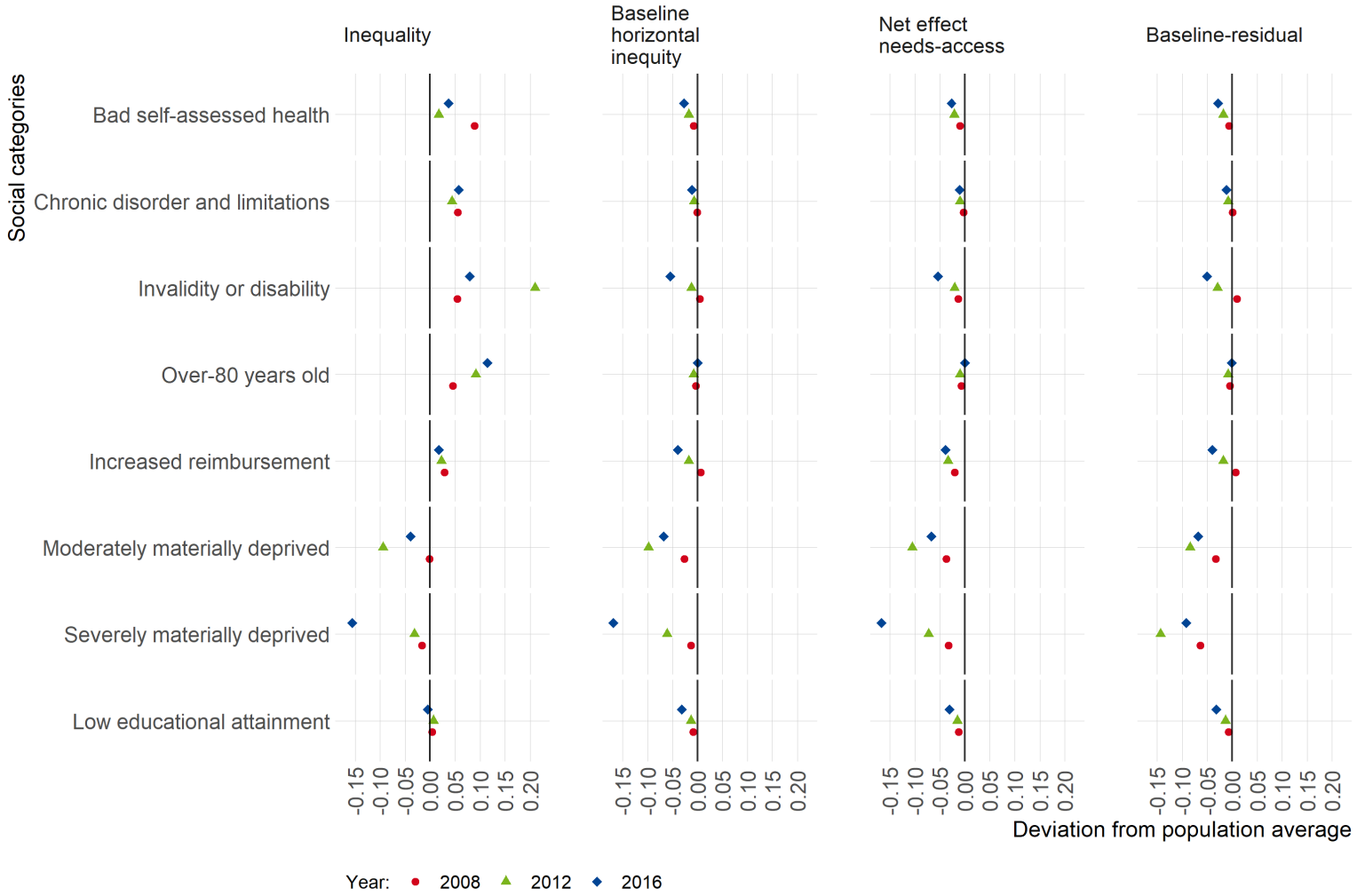
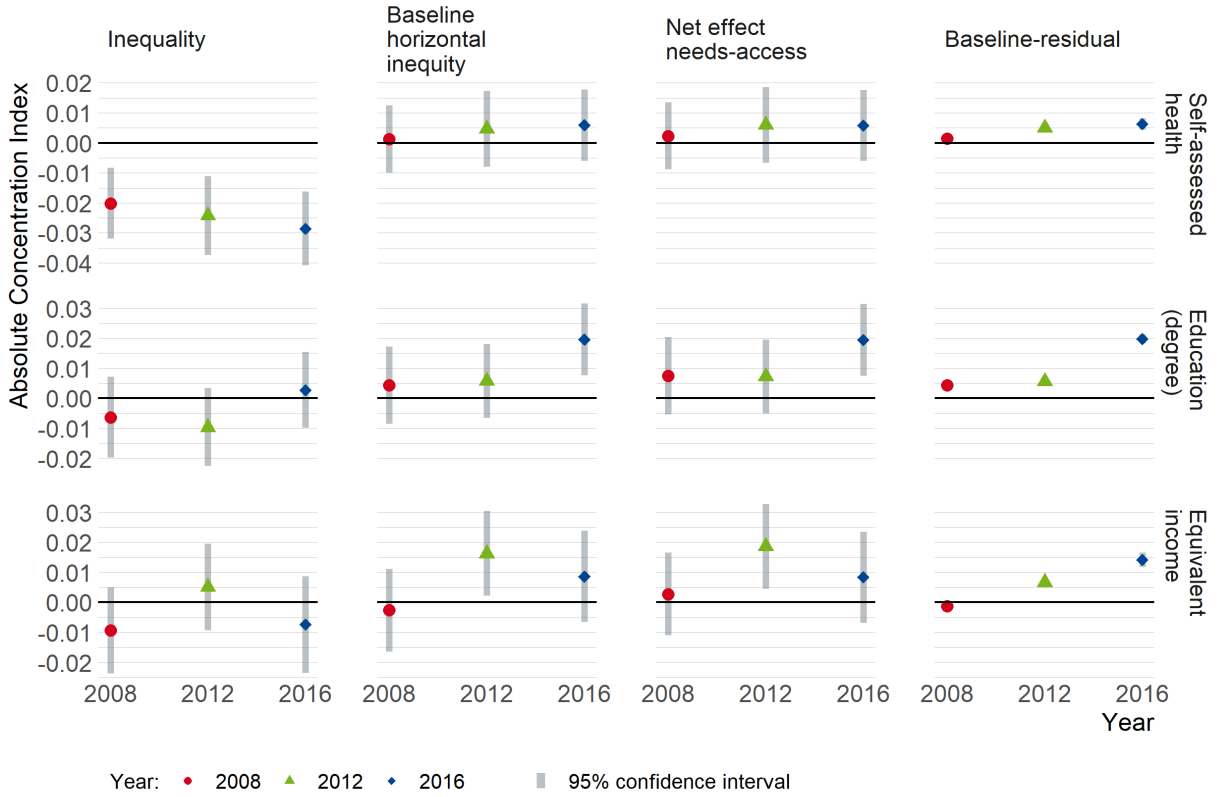


Figure 96 shows the absolute concentration index of the needs-corrected probability of being vaccinated against influenza to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher needs-corrected vaccination rates concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher needs-corrected vaccination rates among individuals with better self-assessed health, a higher education degree and higher income.

The results in Figure 96 show that there are systematic inequalities in the probability of being vaccinated against influenza with respect to self-assessed health, with a higher vaccination rate among individuals with a worse self-reported health status. After correcting for needs, no systematic socioeconomic inequities are found.

Figure 96 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



1.14. Breast cancer screening (women aged between 50 and 69)

1.14.1. Summary

We analyse inequity in breast cancer screening in the past two years in women aged between 50 and 69, both within and outside an organized programme.

Breast cancer screening within the organized screening programme is identified by the nomenclature codes 450192, 450203, 450214 or 450225, while opportunistic breast cancer screening is identified by the nomenclature codes 450096, 450100, 461090 or 461101. The overall rate of breast cancer screening combines opportunistic screening and screening within the organized programme. Women who are being treated for breast cancer are excluded from the analysis; they are identified by the nomenclature code of the medical examination/treatment equal to 227032, 227043, 227054, 227065, 227732, 227743, 227754, 227765, 227776, 227780, 227791, 227802, 227813, 227824, 227835, 227846, 227872, 227883, 226973, 226984, 226995, 227006, 227076, 227080, 227091, 227102, 227636, 227640, 227651, 227662, 227673, 227684, 227695, 227706, 227710, 227721, 227894 or 227905.

Breast cancer screening is a type of secondary preventive care recommended once every two year for women aged between 50 and 69. In case of preventive care, the role of healthcare needs and the interpretation of needs-corrected probabilities can be different in the assessment of inequities (see Scientific report section 2.4.1). With respect to breast cancer screening, one could argue that differences in healthcare needs are irrelevant, as prevention is important and valuable irrespective of one's health status. Therefore, we will present the results from the inequality scenario (without any correction for healthcare needs) and additionally provide results where regional effects are neutralized. The latter has been done, because the regions are responsible for the organized screening programme and hence regional difference might reflect differences in preferences and policies.

Key points inequity in the probability of breast cancer screening in the past two years

- EU-SILC/IMA-AIM survey value diverges from the population value. It is 3 to 8 percentage points higher for the overall rate, but follows a similar downward trend. For the organized programme, the survey value is 4 to 9 percentage points higher and has a downward trend, whereas the population rate has an upward trend.
- The overall rate of breast cancer screening in the past two years among women between 50 and 69 has decreased from 71% in 2008 to 65% in 2016 in the survey; the screening rate within the organized programme decreased from 40% in 2008 to 38% in 2016 in the survey and increased from 31% to 33% in the population over the same period.

Screening rates

- Limited association with healthcare needs and some variation by socioeconomic status. Opportunistic screening is associated with income and education, while organized screening is associated with the activity status of the individual. **Main associations (regression):**
  - Health status: changing age effect within the organized screening programme (women who were age eligible at the time of implementation of the programme (period 2001-2002) have a lower participation rate than women who became age-eligible when the programme was already in place; in 2008, the rate of screening among women aged 60-69 is lower than for women aged 50-54. This effect has disappeared in 2016). No systematic association between screening rate and self-reported health status, nor receipt of invalidity or disability allowance. For women with invalidity/disability allowance, there is an effect on the mode of screening with higher rates of opportunistic screening and lower rates within the organized programme. Lower screening rate among individuals taking medication for a neurological disorder.

  - Higher opportunistic and overall screening rate among individuals with tertiary education; individuals with higher income and without material deprivation.
  - Higher screening rate in the organized programme among individuals not at work, i.e. inactive, unemployed or retired; individuals who were not borne in Belgium (in 2008 and 2012).
  - Lower overall screening rate and screening rate in the organized programme among single individuals.
  - Important regional differences. Compared to women in Flanders, the screening rates within the organized screening programme are 32-41 and 41-46 percentage points lower for women in Brussels and Wallonia, respectively; whereas the screening rates outside the organized programme are 22-31 and 27-32 percentage points higher for women in Brussels and Wallonia, respectively.
- After controlling for regional effects, there are no systematic inequalities in the organized programme, while systematic inequalities are found for opportunistic screening with higher opportunistic screening among women with higher education, higher income and better health. Socioeconomic inequality with respect to income and education in opportunistic screening are similar to socioeconomic inequities in the probability to consult a specialist (see section 1.4.2.4).
- Subgroup analysis indicates (after controlling for regional effects):
  - Inequalities are more pronounced in opportunistic screening than organized screening. Important social gradients with lower opportunistic screening among women with low educational attainment, with low income, or in a difficult financial situation (material deprivation, increased reimbursement, unemployment) and higher opportunistic screening rates among women with tertiary education, higher incomes and the self-employed (for the self-employed the trend converges over time to the population mean).
  - Below average screening rates (opportunistic, overall and organized) among women in (very) bad self-assessed health.

1.14.2. Overview inequity and evolution in the different scenarios

Table 64 reports the evolution over time of the rate of breast cancer screening in women aged between 50 and 69 in the past two year. Three rates are reported, the rate within the organized screening programme, the rate outside the organized screening programme and the overall rate. For the rate within the organized programme and the overall rate, information on the population rate is provided in the KCE HSPA report.[18] There is a stable overall rate over time in the population at about 62% and an increasing rate in the organized screening programme from 30.7% in 2008, to 32.5% in 2012 and 33.2% in 2016.

Among the women aged between 50 and 69 included in the EU-SILC/IMA-AIM sample (i.e. the sample used in the regression and inequity analysis), the screening coverage is higher than the population rate in all years, and decreasing over time for all three rates: the overall rate decreases from 70.5% in 2008 to 68.3% in 2012 and 65.3% in 2016; the rate within the organized programme decreased form 39.7% in 2008 to 38.2% in 2012 and 37.6% in 2016; the rate outside the screening programme decreases from 30.9% in 2008 to 30.1% in 2012 and 27.7% in 2016. Hence, there is some difference between the population rate and the survey rate.

The reversed value is given as well, i.e. the probability of not having had breast cancer screening in the past two years. The reverse value is important, because the measurement and evaluation of relative disparity of probabilities might change depending on the definition of the indicator in terms of take-up or non-take-up of care (see section 1.1.5.1).

Table 64 - Evolution (2008-2016) in breast cancer screening rate in the past two years (women aged 50-69)

Type of screening	Sample	Definition	2008	2012	2016
Breast cancer screening - all	Population (women 50-69)	Indicator	62.2%	62.7%	61.8%
	Survey (women 50-69)	Indicator	70.5%	68.3%	65.3%
		Reverse	29.5%	31.7%	34.7%
Breast cancer screening – organized programme	Population (women 50-69)	Indicator	30.7%	32.5%	33.2%
	Survey (women 50-69)	Indicator	39.7%	38.2%	37.6%
		Reverse	60.3%	61.8%	62.4%
Breast cancer screening – outside programme	Survey (women 50-69)	Indicator	30.9%	30.1%	27.7%
		Reverse	69.1%	69.9%	72.3%

Figure 92 to Figure 99 show the evolution of the screening rate in the past two years (respectively the overall rate, the rate within the organized screening programme and the rate outside the organized programme), for a variety of subgroups of women aged 50-69 (see section 1.1.2). These are the crude trends, without a correction for healthcare needs. A multivariate regression analysis follows in section 1.14.3.

Remark that the sample sizes are relatively small, and thus there might be some random variation that interferes with the observed trends when zooming in on particular subgroups, e.g. the evolution of individuals in single parent households (panel G) or with very bad self-assessed health (panel E).

Most subgroups follow the general, downward evolution in the cancer screening rate. We find several gradients.

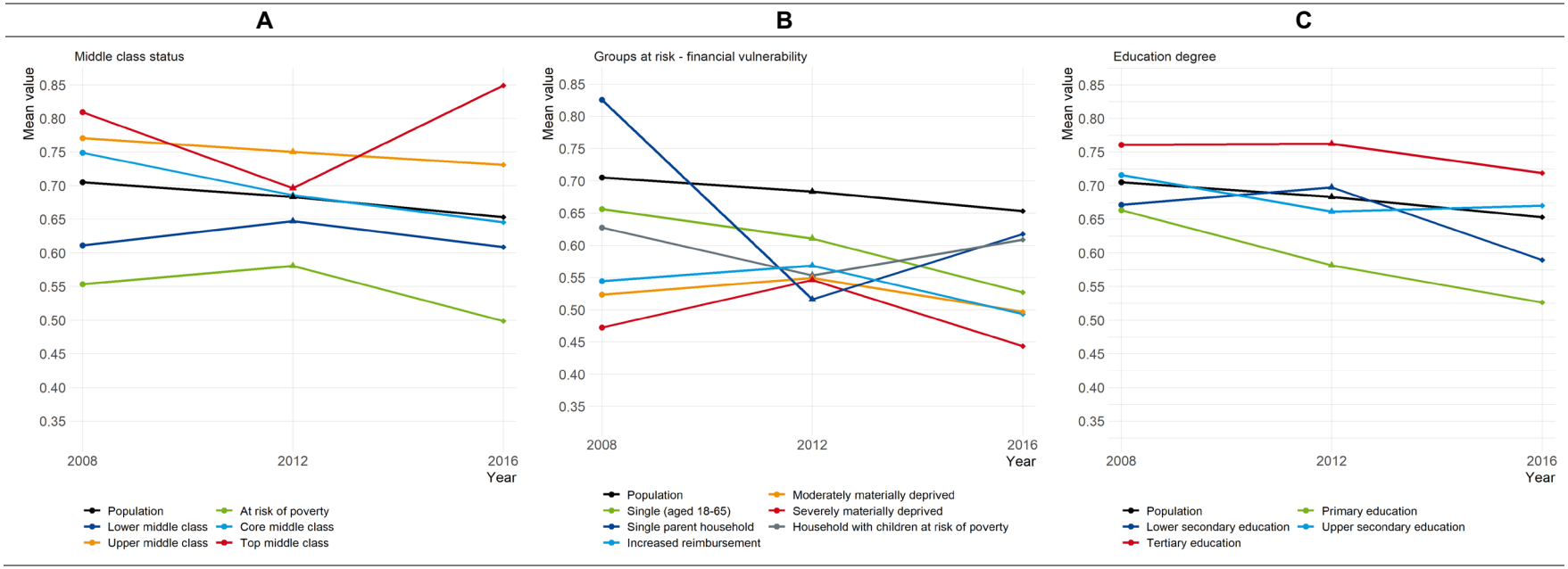
First, there is a clear gradient with respect to income, with higher screening rates (overall and outside the organized programme) among women in higher income groups (panel A). The screening rate is above the population average for women in the upper and top middle class, in line with the population average for women in the core middle class and below average for women in the lower middle class and at risk of poverty. Screening rates outside the organized programme for women in the lower middle class and at risk of poverty are, however, increasing and this against the general downward trend. Within the organized screening programme, the income gradient is less pronounced, but individuals at risk of poverty still have the lowest participation rate. Moreover women in a difficult financial situation, i.e. with material deprivation or increased reimbursement (panel B) generally have a screening rate below the population average and this both within and outside the organized screening programme. Singles and single parents have a screening rate below the population average within the organized programme and above the average outside the organized programme (panel B).

Second, there is a clear gradient with respect to educational attainment outside the organized programme, with higher screening rates among women with higher educational attainment (panel C). One merit of the organized screening programme is that it reaches women irrespective of educational attainment, no clear gradient can be discerned.

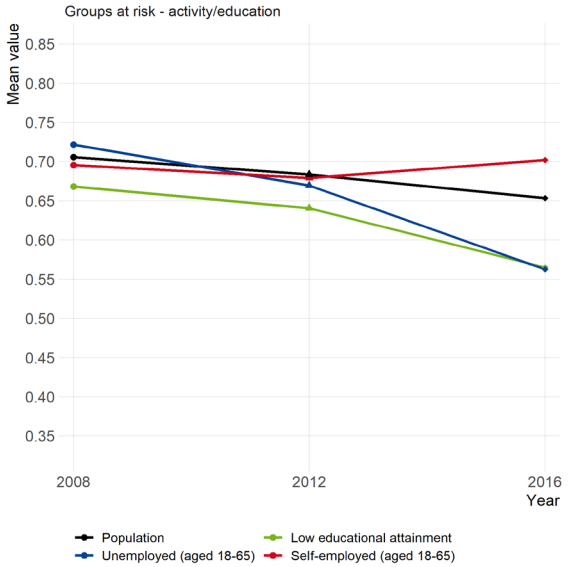
Third, individuals who are self-employed have a tendency to screen outside the organized programme (above average rate outside the organized programme, below average rate within the programme and in line with the average for the overall rate), whereas individuals who are unemployed tend to screen more with the organized programme (panel D). The screening rate for individuals who are unemployed, however, declines at a faster pace than the general downward trend.

Fourth, there is a clear gradient with respect to self-assessed health, with individuals reporting bad or very bad health having lower screening rates, clearly below the population average (except individuals with very bad self-assessed health in 2016 for screening outside the organized programme) (panel E). Individuals with fair, good and very good health have screening rates around the population average. Individuals with chronic disorders and limitation to daily activities have a screening rate below the population average both within and outside the organized programme, while for individuals with invalidity or disability, we find some kind of substitution with a screening rate in the organized programme that was at the population average in 2008, but with a strong downward and a screening rate outside the programme below the average in 2008 but with a clear increase between 2008 and 2012 leading to a rate above the population average (panel F).

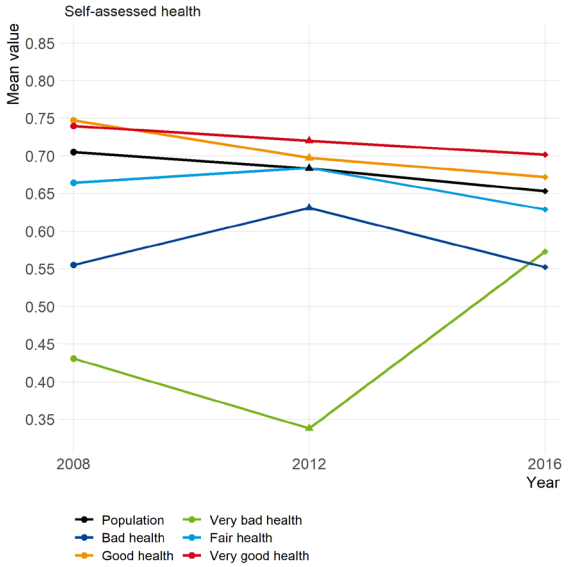
Figure 97 – Evolution (2008-2016) of the breast cancer screening overall rate in the past two years for different subgroups and populations groups at risk



D


Groups at risk - activity/education
Mean value
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
2008
2012
2016
Year
Population
Low educational attainment
Unemployed (aged 18-65)
Self-employed (aged 18-65)

E


Self-assessed health
Mean value
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
2008
2012
2016
Year
Population
Very bad health
Bad health
Fair health
Good health
Very good health

F

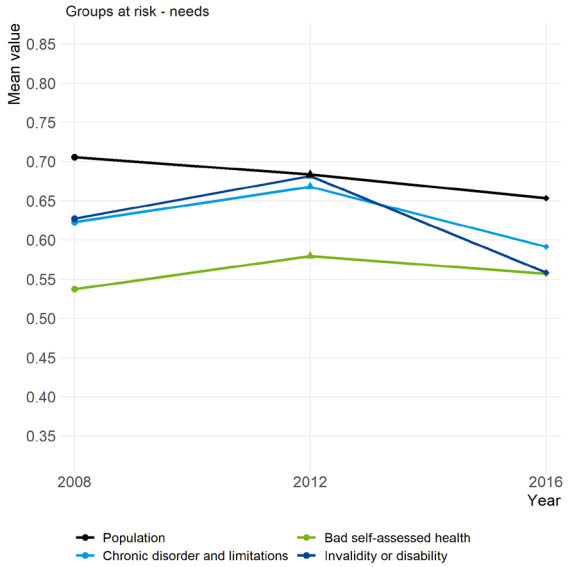
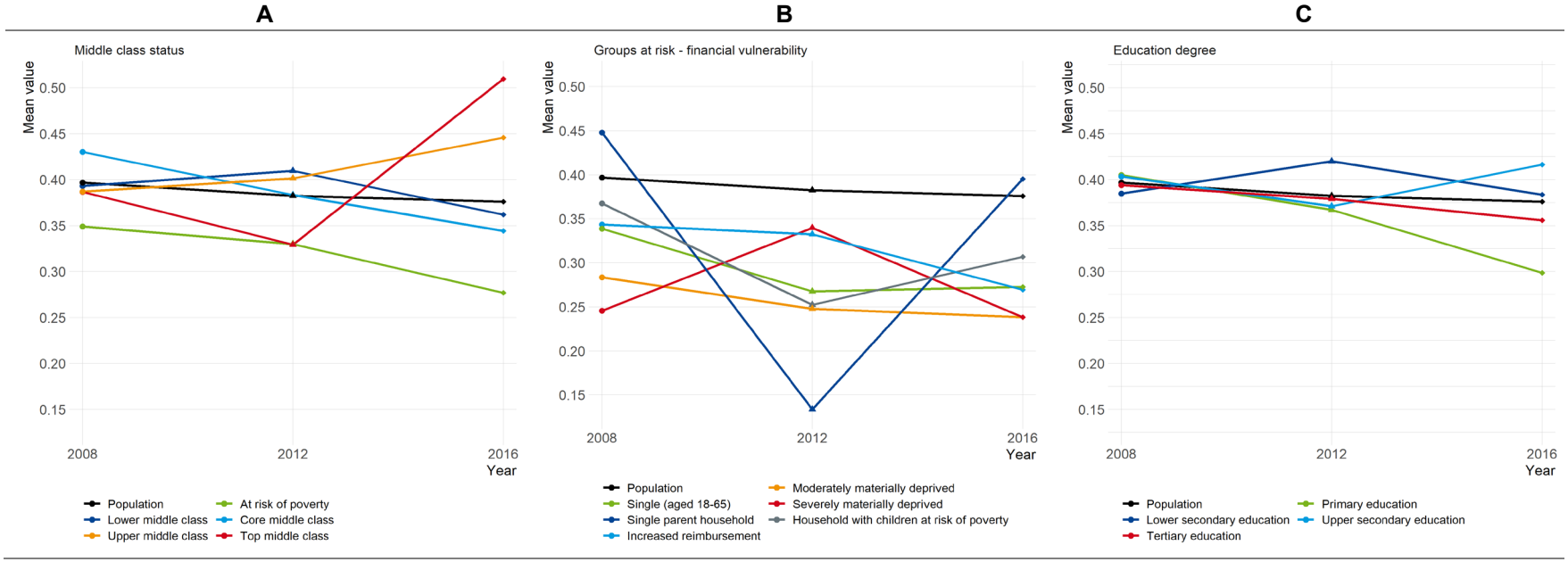

Groups at risk - needs
Mean value
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
2008
2012
2016
Year
Population
Bad self-assessed health
Chronic disorder and limitations
Invalidity or disability

Figure 98 – Evolution (2008-2016) of the breast cancer screening rate in the organized programme in the past two years for different subgroups and populations groups at risk



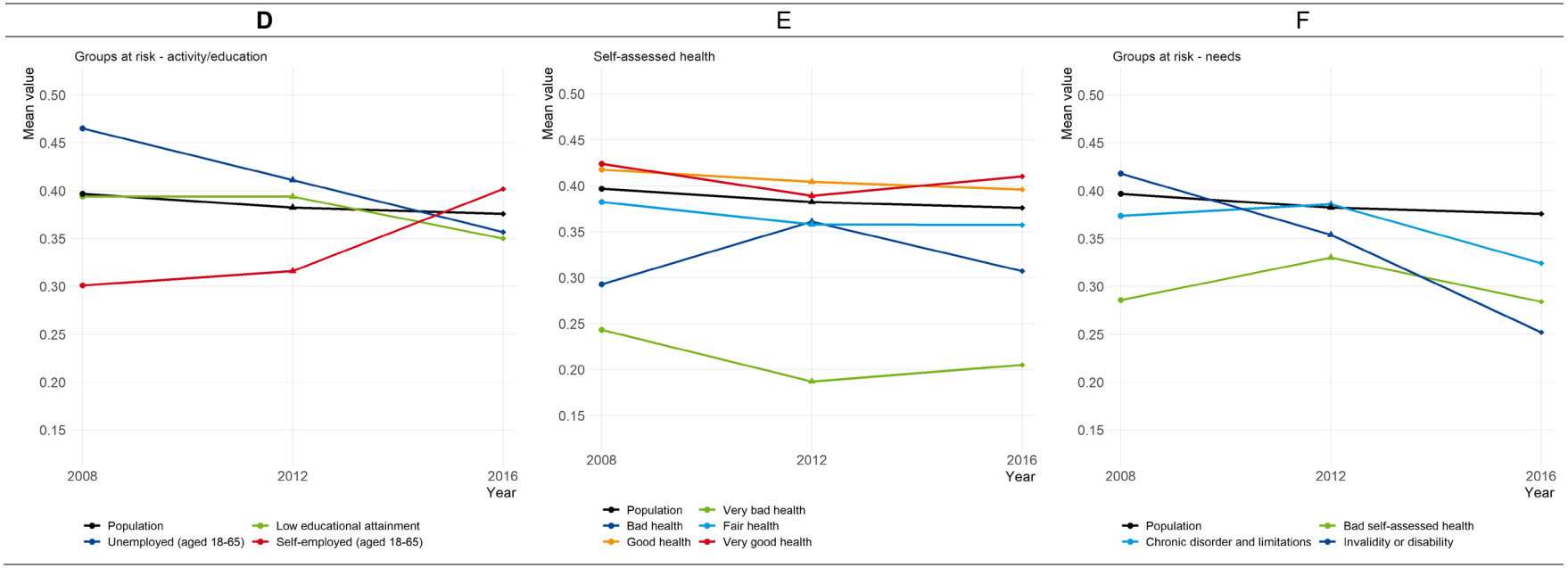
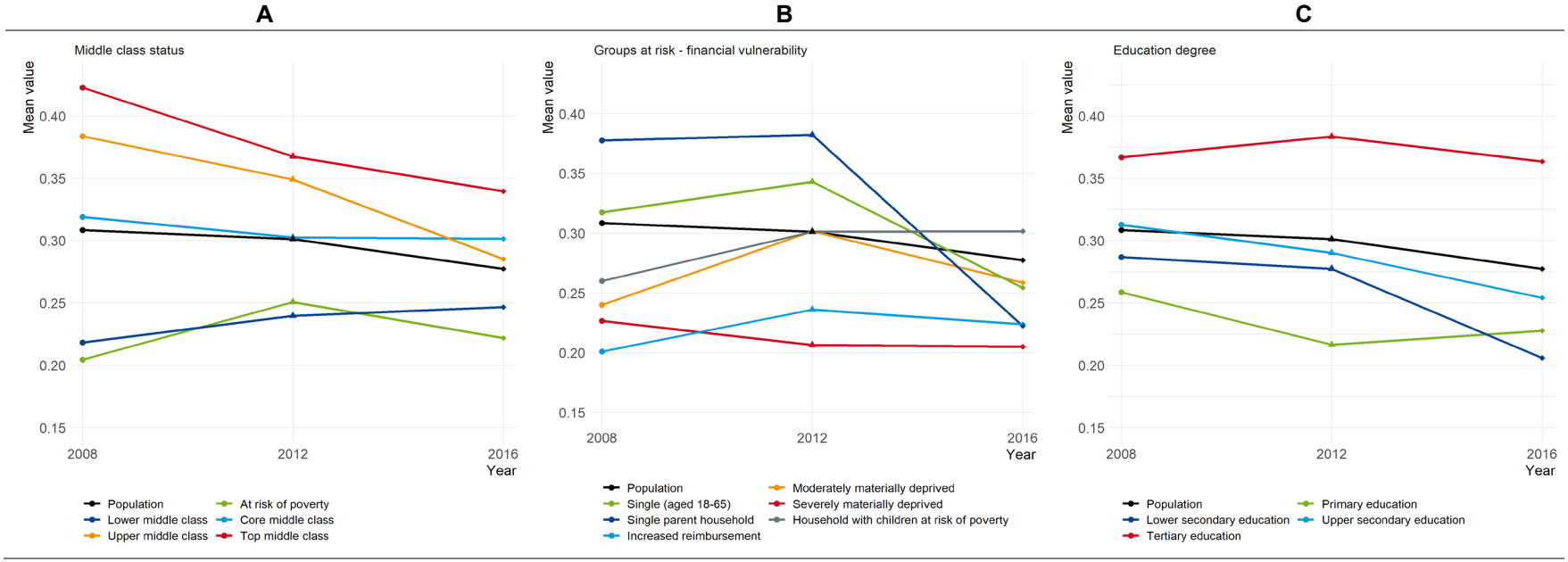
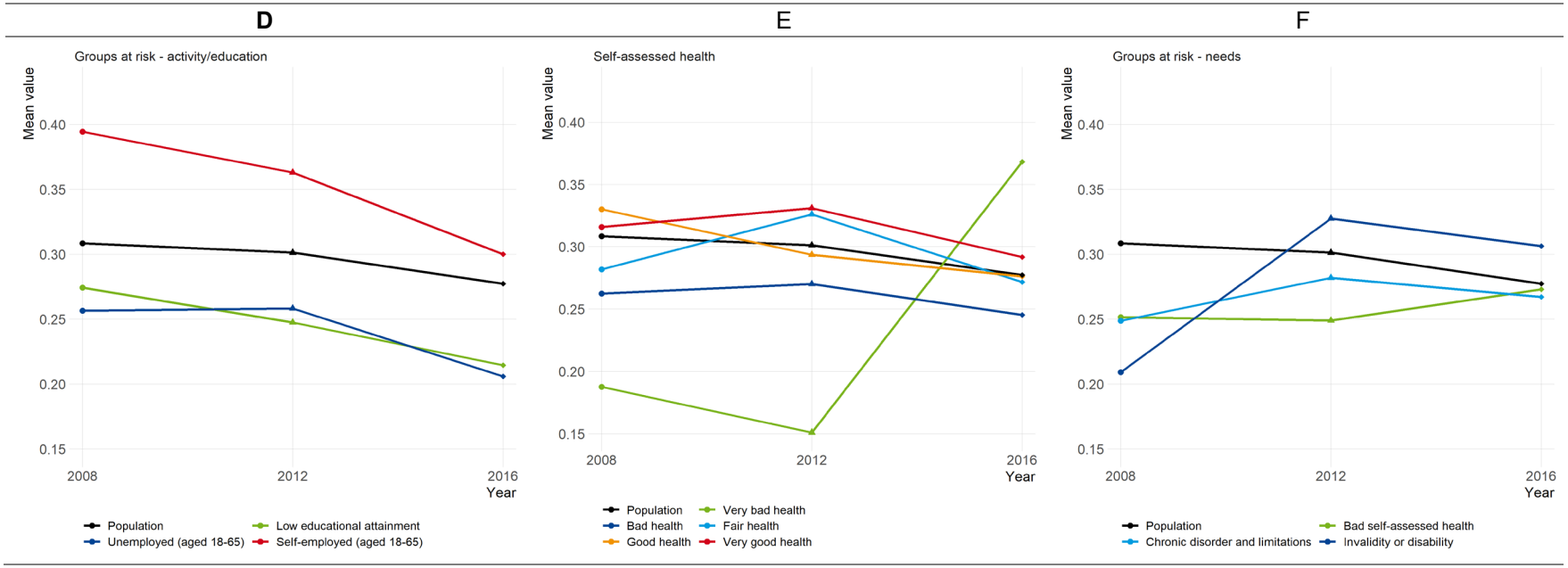

D
E
F
Groups at risk - activity/education
Self-assessed health
Groups at risk - needs
Mean value
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
2008
2012
2016
Year
Population
Low educational attainment
Unemployed (aged 18-65)
Self-employed (aged 18-65)
Very bad health
Bad health
Fair health
Good health
Very good health
Bad self-assessed health
Chronic disorder and limitations
Invalidity or disability

Figure 99 – Evolution (2008-2016) of the breast cancer screening rate outside the organized programme in the past two years for different subgroups and populations groups at risk




D
Groups at risk - activity/education
Mean value
0.40
0.35
0.30
0.25
0.20
0.15
2008
2012
2016
Year
Population
Low educational attainment
Unemployed (aged 18-65)
Self-employed (aged 18-65)
E
Self-assessed health
Mean value
0.40
0.35
0.30
0.25
0.20
0.15
2008
2012
2016
Year
Population
Very bad health
Bad health
Fair health
Good health
Very good health
F
Groups at risk - needs
Mean value
0.40
0.35
0.30
0.25
0.20
0.15
2008
2012
2016
Year
Population
Bad self-assessed health
Chronic disorder and limitations
Invalidity or disability

1.14.3. Regression output

Table 65 to Table 67 report the average marginal effects of a probit regression of the indicator of breast cancer screening in the past two years (value = 1) or not (value = 0) for the overall rate, the rate within the organized screening programme and the rate outside the organized screening programme, respectively (see section 1.1.3). The results should be interpreted as a change in probability expressed in percentage points.

We find the following associations (Table 65 to Table 67):

- There is a negative time trend for the overall screening rate (-4 and -7 percentage points relative to 2008 in 2012 and 2016, respectively) and the screening rate outside the organized programme (-3 and -6 percentage points in 2012 and 2016, respectively), indicating a general derease in the probability to have breast cancer screening.
- The probability to have breast cancer screening is only to a limited extent associated with **healthcare needs**:
    - Age: there is an age effect in the organized screening programme in 2008, i.e. in the early phase of the programme. Organized programmes were set up in Flanders in 2001 and in Brussels and Wallonia in 2002.[21] Participation rates were higher among women aged 50-54, i.e. women who first started screening when the programme was already implemented. The age effect has disappeared over time. No age effects were found for breast cancer screening outside the population programme nor for the overall screening rate.
    - Self-reported heath status: there is no systematic significant association between self-assessed health, the presence of a chronic disorder or limitations to daily activities and the probability to have breast cancer screening. However, individuals with very bad self-assessed health have a strong negative association in 2008 and 2012 with the overall screening rate (only 2012 is significant), an important negative but non-significant association with screening within the organized programme in all years and a negative association for screening outside the organized programme in 2012 (-20 percentage points) and positive in 2016 (+16 percentage points).
    - Administrative heath information: There no systematic association with the receipt of an invalidity or disability allowance nor eligibility of the lump sum chronic illness and the overall probability to have breast cancer screening. However, with respect to invalidity/disability, there is a difference in the mode of screening with effects going in opposite directions, i.e. there is a negative association with breast cancer screening within an organized programme (especially in 2016, -12 percentage points) and a positive association outside the organized programme (+11 and +8 percentage points in 2012 and 2016, respectively).
    - Medication use: we find an association with breast cancer screening for a limited number of disorders, in particular a lower screening rate for individuals with a neurological disorder (association with the screening rate outside the screening programme and the overall screening rate).
    - There is no significant difference for women registered in a community health centre.
- There is variation in the screening rate by **socioeconomic profile**. For screening outside the organized programme, the association is with income and education, while for screening within the programme, the association is with the activity status of the individual.
    - Education degree: there is a higher breast cancer screening rate (overall and outside the screening programme) for woman who obtained a tertiary degree. Women without a tertiary degree have screening rate that is 4, 5 and 7 percentage points lower for individuals with upper secondary, lower secondary and tertiary education, respectively (reduced pooled model, overall screening rate); and 3, 7 and 4 percentage points lower for individuals with upper secondary, lower secondary and tertiary education, respectively (reduced pooled model, screening rate outside organized programme). The screening rate within the organized programme is not associated with educational attainment.

- Activity status: individuals who are not at work, i.e. inactive, unemployed or retired have a significantly higher breast cancer screening rate within the organized screening programme (5 to 15 percentage points higher). No association is found between activity status and breast cancer screening outside the programme nor the overall screening rate.
- Income and material deprivation: a strong association is found between income, material deprivation and both the overall screening rate and the screening rate outside the organized programme. Higher income is associated with higher screening rates, while more severe material deprivation is associated with lower screening rates, all else equal. The screening rate within the organized programme is not associated with income nor with material deprivation.
- Household composition: singles have a 4 percentage points lower breast cancer screening rate than women living in couple without children (overall screening rate and screening rate within the organized programme).
- Country of birth: Individuals who were not born in Belgium have a higher participation rate in the organized screening programme, of 10, 7 and 2 percentage points in 2008, 2012 and 2016, respectively (non-significant in 2016). No association was found with the overall screening rate or the screening rate outside the organized programme.

- When controlling for health status, there is a negative effect of increased reimbursement status on the probability to have breast cancer screening in the past two years. The effect is borderline significant in 2008 for the overall rate and in 2016 for the screening rate within the organized programme and significant in 2008 for the screening rate outside the organized programme.
- The effects of the density of healthcare providers are small and only weakly significant. The results suggest that a higher density of GPs is associated with a higher breast cancer screening rate, both the overall screening rate and the screening rate within the organized programme; and that a higher density of specialists is associated with higher screening rates outside the organized programme and lower screenings rates within the organized programme.
- As expected, there are important regional differences: The probability that women have breast cancer screening is lower in Wallonia or Brussels. In Wallonia the overall screening rate is 7, 15 and 16 percentage points lower in 2008, 2012 and 2016 compared to women in Flanders; in Brussels the overall screening rate is 12, 9 and 11 percentage points lower in 2008, 2012 and 2016 compared to women in Flanders. The differences are even more pronounced when looking at the rates within and outside the organized programme. Compared to women in Flanders, the screening rates within the organized screening programme are 32-41 and 41-46 percentage points lower for women in Brussels and Wallonia, respectively; whereas the screening rates outside the organized programme are 22-31 and 27-32 percentage points higher for women in Brussels and Wallonia, respectively.

Table 65 – Regression output for the probability to have breast cancer screening in the past two years, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 4 823)	Reduced model (Obs. = 4 823)	Reduced model 2008 (Obs. = 1 584)	Reduced model 2012 (Obs. = 1 610)	Reduced model 2016 (Obs. = 1 629)
Age (reference = female aged 50-54 years)					
Female aged 55-59 years	-0.005 (0.023)				
Female aged 60-64 years	-0.035 (0.024)				
Female aged 65-69 years	-0.044 (0.029)				
Self-assessed health (reference = very good)					
Self-assessed health - good	-0.008 (0.020)	-0.007 (0.020)	0.013 (0.035)	-0.006 (0.034)	-0.025 (0.036)
Self-assessed health - fair	-0.008 (0.027)	-0.001 (0.024)	-0.022 (0.040)	0.013 (0.039)	-0.001 (0.040)
Self-assessed health - bad	-0.013 (0.040)	-0.007 (0.033)	-0.036 (0.056)	0.038 (0.049)	-0.016 (0.058)
Self-assessed health - very bad	-0.084 (0.061)	-0.089 (0.057)	-0.111 (0.099)	-0.215 (0.081)**	0.016 (0.082)
Self-reported chronic disorders and limitations daily activities (reference = none)					
No chronic disorder, limitations	0.003 (0.033)				
Chronic disorder, no limitations	0.033 (0.026)				
Chronic disorder, limitations	0.002 (0.024)				
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)					
Invalid or disabled	0.026 (0.034)				
Entitled to lump sum chronic illness	-0.037 (0.038)				
Clinical profile based on medication use (reference = no disorder)					
Medication use - neurological disorder	-0.106 (0.057)°	-0.119 (0.055)*	-0.142 (0.083)°	-0.190 (0.087)*	-0.034 (0.090)
Medication use - other disorder	0.086 (0.054)	0.096 (0.053)°	0.002 (0.115)	0.101 (0.103)	0.226 (0.103)*
Medication use - cardiovascular disorder	-0.015 (0.016)				
Medication use - thrombosis	0.030 (0.022)				
Medication use - chronic obstructive pulmonary disease (COPD)	0.015 (0.032)				
Medication use - asthma	0.017 (0.056)				
Medication use - diabetes	-0.036 (0.028)				

Independent variables	Full model (Obs. = 4 823)		Reduced model (Obs. = 4 823)		Reduced model 2008 (Obs. = 1 584)		Reduced model 2012 (Obs. = 1 610)		Reduced model 2016 (Obs. = 1 629)	
Medication use - epilepsy	-0.055	(0.050)								
Medication use - thyroid disorder	0.025	(0.021)								
Community health centre										
Registered in community health centre	0.037	(0.051)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.141	(0.019)***	-0.142	(0.018)***	-0.067	(0.029)*	-0.154	(0.025)***	-0.162	(0.030)***
Region of residence - Brussels	-0.148	(0.057)**	-0.119	(0.025)***	-0.116	(0.047)*	-0.094	(0.040)*	-0.113	(0.041)**
Urbanization - medium	-0.021	(0.019)								
Urbanization - thin	-0.022	(0.030)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.040	(0.027)								
Occupation - inactive	0.046	(0.027)°								
Occupation - self-employed in 2008	-0.019	(0.083)								
Occupation - self-employed in 2012	-0.025	(0.075)								
Occupation - self-employed in 2016	0.034	(0.062)								
Occupation - unemployed	0.073	(0.031)*								
Occupation - retired	0.064	(0.030)*								
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.065	(0.024)**	-0.067	(0.024)**	0.002	(0.041)	-0.131	(0.041)**	-0.061	(0.047)
Education degree - lower secondary	-0.042	(0.022)°	-0.045	(0.022)*	-0.026	(0.038)	-0.048	(0.035)	-0.051	(0.038)
Education degree - upper secondary	-0.039	(0.019)*	-0.039	(0.019)*	-0.014	(0.035)	-0.098	(0.029)***	-0.005	(0.035)
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.072	(0.020)***	0.065	(0.019)***	0.082	(0.027)**	0.024	(0.031)	0.084	(0.038)*
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.273	(0.065)***	-0.236	(0.060)***	-0.292	(0.116)*	-0.126	(0.103)	-0.292	(0.113)**
Household composition (reference = couple without children)										

Independent variables	Full model (Obs. = 4 823)		Reduced model (Obs. = 4 823)		Reduced model 2008 (Obs. = 1 584)		Reduced model 2012 (Obs. = 1 610)		Reduced model 2016 (Obs. = 1 629)	
Household composition - single without children	-0.040	(0.021)°	-0.044	(0.020)*	-0.038	(0.035)	-0.070	(0.032)*	-0.019	(0.033)
Household composition - single with children	-0.002	(0.046)	0.003	(0.045)	0.169	(0.113)	-0.125	(0.078)	0.035	(0.067)
Household composition - couple with children	-0.028	(0.031)	-0.026	(0.029)	-0.095	(0.051)°	0.017	(0.051)	0.001	(0.045)
Household composition - other	-0.052	(0.021)*	-0.049	(0.020)*	-0.063	(0.032)*	-0.070	(0.034)*	-0.017	(0.037)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	0.034	(0.025)								
Insurance status										
Insurance - increased reimbursement in 2008	-0.057	(0.036)	-0.060	(0.035)°	-0.047	(0.037)				
Insurance - increased reimbursement in 2012	-0.007	(0.034)	-0.009	(0.034)			-0.021	(0.037)		
Insurance - increased reimbursement in 2016	-0.037	(0.035)	-0.029	(0.033)					-0.029	(0.040)
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.001	(0.003)	0.003	(0.002)	0.004	(0.004)	-0.001	(0.003)	0.006	(0.004)
Density of GPs in neighbouring municipalities	0.008	(0.005)	0.009	(0.004)*	-0.001	(0.006)	0.015	(0.006)*	0.009	(0.009)
Density of specialists in municipality	0.001	(0.001)								
Density of specialists in neighbouring municipalities	-0.000	(0.002)								
Distance to nearest ED	0.001	(0.002)								
Number of EDs within 10km radius	0.000	(0.003)								
Time (reference = 2008)										
Time: year 2012	-0.041	(0.018)*	-0.038	(0.018)*						
Time: year 2016	-0.074	(0.023)**	-0.070	(0.021)***						

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 66 – Regression output for the probability to have breast cancer screening within the organized screening programme in the past two years, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 4 823)		Reduced model (Obs. = 4 824)		Reduced model 2008 (Obs. = 1 584)		Reduced model 2012 (Obs. = 1 611)		Reduced model 2016 (Obs. = 1 629)	
Age (reference = female aged 50-54 years)										
Female aged 55-59 years	-0.042	(0.021)*	-0.041	(0.021)*	-0.049	(0.032)	-0.024	(0.031)	-0.041	(0.036)
Female aged 60-64 years	-0.055	(0.022)*	-0.054	(0.023)*	-0.057	(0.037)	-0.049	(0.036)	-0.037	(0.043)
Female aged 65-69 years	-0.055	(0.027)*	-0.059	(0.028)*	-0.135	(0.044)**	-0.018	(0.045)	-0.013	(0.047)
Self-assessed health (reference = very good)										
Self-assessed health - good	-0.009	(0.018)	-0.010	(0.018)	0.002	(0.034)	0.013	(0.029)	-0.045	(0.031)
Self-assessed health - fair	0.005	(0.026)	-0.003	(0.023)	0.006	(0.040)	0.003	(0.039)	-0.020	(0.036)
Self-assessed health - bad	0.039	(0.036)	0.023	(0.031)	-0.014	(0.059)	0.064	(0.045)	0.015	(0.052)
Self-assessed health - very bad	-0.074	(0.063)	-0.099	(0.060)°	-0.136	(0.108)	-0.072	(0.105)	-0.123	(0.100)
Self-reported chronic disorders and limitations daily activities (reference = none)										
No chronic disorder, limitations	-0.012	(0.031)								
Chronic disorder, no limitations	-0.000	(0.027)								
Chronic disorder, limitations	-0.010	(0.022)								
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)										
Invalid or disabled	-0.044	(0.031)	-0.051	(0.031)°	0.048	(0.059)	-0.020	(0.047)	-0.124	(0.049)*
Entitled to lump sum chronic illness	-0.045	(0.033)								
Clinical profile based on medication use (reference = no disorder)										
Medication use - neurological disorder	-0.014	(0.056)								
Medication use - other disorder	0.028	(0.065)								
Medication use - cardiovascular disorder	-0.001	(0.014)								
Medication use - thrombosis	-0.002	(0.022)								
Medication use - chronic obstructive pulmonary disease (COPD)	0.018	(0.031)								
Medication use - asthma	-0.022	(0.052)								
Medication use - diabetes	0.036	(0.027)								

Independent variables	Full model (Obs. = 4 823)		Reduced model (Obs. = 4 824)		Reduced model 2008 (Obs. = 1 584)		Reduced model 2012 (Obs. = 1 611)		Reduced model 2016 (Obs. = 1 629)	
Medication use - epilepsy	-0.054	(0.043)	-0.060	(0.041)	0.022	(0.095)	-0.028	(0.100)	-0.131	(0.066)*
Medication use - thyroid disorder	-0.002	(0.018)								
Community health centre										
Registered in community health centre	0.070	(0.056)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	-0.468	(0.015)***	-0.469	(0.016)***	-0.411	(0.025)***	-0.464	(0.023)***	-0.463	(0.024)***
Region of residence - Brussels	-0.317	(0.046)***	-0.419	(0.023)***	-0.405	(0.055)***	-0.401	(0.044)***	-0.317	(0.041)***
Urbanization - medium	-0.024	(0.018)								
Urbanization - thin	-0.013	(0.029)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.033	(0.026)	0.036	(0.026)	0.055	(0.049)	0.053	(0.040)	0.022	(0.040)
Occupation - inactive	0.076	(0.027)**	0.075	(0.026)**	0.107	(0.048)*	0.065	(0.042)	0.080	(0.043)°
Occupation - self-employed in 2008	-0.051	(0.073)	-0.048	(0.076)	-0.016	(0.083)				
Occupation - self-employed in 2012	-0.005	(0.065)	0.007	(0.066)			0.006	(0.068)		
Occupation - self-employed in 2016	0.031	(0.064)	0.034	(0.064)					0.033	(0.065)
Occupation - unemployed	0.104	(0.034)**	0.100	(0.034)**	0.154	(0.059)**	0.109	(0.050)*	0.052	(0.056)
Occupation - retired	0.080	(0.028)**	0.083	(0.028)**	0.118	(0.049)*	0.060	(0.045)	0.075	(0.045)°
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.024	(0.023)	-0.028	(0.022)	-0.040	(0.036)	-0.033	(0.038)	-0.033	(0.042)
Education degree - lower secondary	0.025	(0.023)	0.022	(0.022)	-0.000	(0.036)	0.017	(0.032)	0.037	(0.037)
Education degree - upper secondary	-0.004	(0.018)	-0.006	(0.018)	-0.023	(0.032)	-0.045	(0.029)	0.035	(0.029)
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.017	(0.018)								
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.036	(0.062)								
Household composition (reference = couple without children)										
Household composition - single without children	-0.038	(0.019)°	-0.044	(0.019)*	0.007	(0.033)	-0.061	(0.034)°	-0.062	(0.029)*

Independent variables	Full model (Obs. = 4 823)		Reduced model (Obs. = 4 824)		Reduced model 2008 (Obs. = 1 584)		Reduced model 2012 (Obs. = 1 611)		Reduced model 2016 (Obs. = 1 629)	
Household composition - single with children	0.008	(0.045)	0.009	(0.046)	0.151	(0.078)°	-0.164	(0.092)°	0.075	(0.066)
Household composition - couple with children	-0.056	(0.032)°	-0.055	(0.031)°	-0.137	(0.055)*	-0.005	(0.047)	-0.033	(0.054)
Household composition - other	-0.012	(0.018)	-0.009	(0.018)	0.003	(0.034)	-0.012	(0.033)	-0.014	(0.032)
Country of birth (reference = Belgium)										
Country of birth other than Belgium	0.059	(0.023)*	0.057	(0.023)*	0.104	(0.044)*	0.074	(0.040)°	0.017	(0.037)
Insurance status										
Insurance - increased reimbursement in 2008	0.026	(0.035)	0.014	(0.033)	-0.018	(0.036)				
Insurance - increased reimbursement in 2012	0.000	(0.035)	-0.010	(0.034)			0.001	(0.037)		
Insurance - increased reimbursement in 2016	-0.050	(0.034)	-0.061	(0.034)°					-0.044	(0.038)
Healthcare supply (density per 10 000 population, distance in km)										
Density of GPs in municipality	0.001	(0.003)	0.003	(0.003)	0.002	(0.005)	0.004	(0.005)	0.004	(0.005)
Density of GPs in neighbouring municipalities	0.012	(0.006)*	0.013	(0.006)*	0.010	(0.012)	0.008	(0.009)	0.019	(0.009)*
Density of specialists in municipality	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.002)	-0.000	(0.002)	-0.002	(0.001)
Density of specialists in neighbouring municipalities	-0.003	(0.002)°	-0.004	(0.002)*	-0.005	(0.003)	-0.004	(0.003)	-0.004	(0.003)
Distance to nearest ED	-0.000	(0.002)								
Number of EDs within 10km radius	-0.009	(0.003)***								
Time (reference = 2008)										
Time: year 2012	-0.010	(0.019)	-0.005	(0.019)						
Time: year 2016	-0.011	(0.020)	-0.002	(0.019)						

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 67 – Regression output for the probability to have breast cancer screening outside the organized screening programme in the past two years, average marginal effects (standard error between brackets)

Independent variables	Full model (Obs. = 4 823)	Reduced model (Obs. = 4 823)	Reduced model 2008 (Obs. = 1 584)	Reduced model 2012 (Obs. = 1 610)	Reduced model 2016 (Obs. = 1 629)
Age (reference = female aged 50-54 years)					
Female aged 55-59 years	0.033 (0.021)				
Female aged 60-64 years	0.016 (0.024)				
Female aged 65-69 years	0.009 (0.029)				
Self-assessed health (reference = very good)					
Self-assessed health - good	0.001 (0.018)	0.002 (0.018)	0.021 (0.034)	-0.024 (0.029)	0.013 (0.029)
Self-assessed health - fair	-0.010 (0.025)	-0.001 (0.022)	-0.038 (0.038)	0.014 (0.034)	0.019 (0.036)
Self-assessed health - bad	-0.042 (0.034)	-0.029 (0.030)	-0.041 (0.056)	-0.027 (0.048)	-0.010 (0.055)
Self-assessed health - very bad	-0.006 (0.054)	0.008 (0.054)	-0.015 (0.136)	-0.195 (0.092)*	0.156 (0.070)*
Self-reported chronic disorders and limitations daily activities (reference = none)					
No chronic disorder, limitations	0.014 (0.033)				
Chronic disorder, no limitations	0.026 (0.022)				
Chronic disorder, limitations	0.011 (0.023)				
Administrative sources: Invalidity, disability, incapacity, lump sum chronic illness (reference = none)					
Invalid or disabled	0.074 (0.033)*	0.068 (0.030)*	-0.017 (0.065)	0.107 (0.047)*	0.077 (0.043)°
Entitled to lump sum chronic illness	0.002 (0.035)				
Clinical profile based on medication use (reference = no disorder)					
Medication use - neurological disorder	-0.091 (0.046)*	-0.094 (0.046)*	-0.084 (0.091)	-0.256 (0.102)*	-0.059 (0.090)
Medication use - other disorder	0.060 (0.059)				
Medication use - cardiovascular disorder	-0.014 (0.014)				
Medication use - thrombosis	0.033 (0.023)				
Medication use - chronic obstructive pulmonary disease (COPD)	-0.014 (0.029)				
Medication use - asthma	0.047 (0.061)				
Medication use - diabetes	-0.069 (0.023)**	-0.060 (0.022)**	-0.027 (0.043)	-0.090 (0.033)**	-0.073 (0.038)°

Independent variables	Full model (Obs. = 4 823)		Reduced model (Obs. = 4 823)		Reduced model 2008 (Obs. = 1 584)		Reduced model 2012 (Obs. = 1 610)		Reduced model 2016 (Obs. = 1 629)	
Medication use - epilepsy	-0.007	(0.045)								
Medication use - thyroid disorder	0.025	(0.022)								
Community health centre										
Registered in community health centre	-0.014	(0.048)								
Place of residence (reference = Flanders, dense)										
Region of residence - Wallonia	0.342	(0.020)***	0.321	(0.019)***	0.321	(0.020)***	0.296	(0.022)***	0.271	(0.024)***
Region of residence - Brussels	0.076	(0.049)	0.275	(0.028)***	0.259	(0.040)***	0.305	(0.044)***	0.217	(0.036)***
Urbanization - medium	0.004	(0.020)								
Urbanization - thin	-0.002	(0.030)								
Self-reported current occupation (reference = full-time employee)										
Occupation - part-time employee	0.006	(0.024)								
Occupation - inactive	-0.025	(0.024)								
Occupation - self-employed in 2008	0.023	(0.068)								
Occupation - self-employed in 2012	-0.006	(0.064)								
Occupation - self-employed in 2016	-0.006	(0.055)								
Occupation - unemployed	-0.023	(0.033)								
Occupation - retired	-0.011	(0.026)								
Highest obtained educational degree (reference = tertiary education)										
Education degree - primary	-0.037	(0.023)	-0.042	(0.023)°	0.036	(0.041)	-0.065	(0.036)°	-0.059	(0.043)
Education degree - lower secondary	-0.064	(0.021)**	-0.068	(0.021)**	-0.026	(0.038)	-0.043	(0.030)	-0.119	(0.036)**
Education degree - upper secondary	-0.031	(0.017)°	-0.032	(0.018)°	0.010	(0.032)	-0.039	(0.028)	-0.050	(0.030)°
Equivalized disposable household income										
Income (natural logarithm - linear & squared)	0.049	(0.016)**	0.063	(0.016)***	0.090	(0.027)***	0.071	(0.029)*	0.038	(0.031)
Socioeconomic status (reference = not materially deprived)										
Severe material deprivation index	-0.240	(0.061)***	-0.236	(0.058)***	-0.317	(0.117)**	-0.179	(0.101)°	-0.249	(0.100)*
Household composition (reference = couple without children)										

Independent variables	Full model (Obs. = 4 823)	Reduced model (Obs. = 4 823)	Reduced model 2008 (Obs. = 1 584)	Reduced model 2012 (Obs. = 1 610)	Reduced model 2016 (Obs. = 1 629)
Household composition - single without children	-0.006 (0.020)	0.003 (0.019)	-0.025 (0.035)	0.001 (0.030)	0.027 (0.030)
Household composition - single with children	-0.013 (0.040)	-0.010 (0.040)	0.030 (0.083)	-0.002 (0.069)	-0.039 (0.058)
Household composition - couple with children	0.029 (0.030)	0.024 (0.028)	0.015 (0.048)	0.011 (0.043)	0.050 (0.045)
Household composition - other	-0.039 (0.017)*	-0.040 (0.016)*	-0.070 (0.032)*	-0.084 (0.030)**	0.014 (0.031)
Country of birth (reference = Belgium)					
Country of birth other than Belgium	-0.017 (0.021)				
Insurance status					
Insurance - increased reimbursement in 2008	-0.080 (0.031)**	-0.085 (0.030)**	-0.066 (0.037)°		
Insurance - increased reimbursement in 2012	-0.019 (0.032)	-0.020 (0.032)		-0.016 (0.035)	
Insurance - increased reimbursement in 2016	-0.012 (0.032)	-0.008 (0.033)			-0.025 (0.039)
Healthcare supply (density per 10 000 population, distance in km)					
Density of GPs in municipality	0.001 (0.003)				
Density of GPs in neighbouring municipalities	-0.005 (0.005)				
Density of specialists in municipality	0.001 (0.001)	0.001 (0.001)*	0.002 (0.001)	0.001 (0.001)	0.002 (0.001)
Density of specialists in neighbouring municipalities	0.004 (0.002)*	0.003 (0.001)*	0.002 (0.002)	0.004 (0.002)°	0.003 (0.002)
Distance to nearest ED	0.001 (0.002)				
Number of EDs within 10km radius	0.013 (0.003)***				
Time (reference = 2008)					
Time: year 2012	-0.032 (0.017)°	-0.030 (0.016)°			
Time: year 2016	-0.056 (0.018)**	-0.063 (0.017)***			

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

1.14.4. Overview inequity and evolution in the different scenarios

Figure 100 visualizes the absolute Gini coefficient for inequality in the probability of being screened for breast cancer in the past two years (so without any correction) as well as inequality corrected for regional differences. The results are given for the overall screening rate, the screening rate within and outside the organized programme.

The results indicate an increase in inequality (with and without correction for regional differences) over time for the overall screening rate, a stable or slightly decreasing evolution in inequality (with and without correction for regional differences) over time for the screening rate within the organized programme and a downward evolution in inequality (with and without correction for regional differences) over time for the screening rate outside the organized programme

Table 68 provides the same information on the absolute Gini index and additionally provides information on the relative Gini index and the relative Gini of the reversed indicator (probability of no breast cancer screening in the past two years) (see section 1.1.5). For each disparity measurement, it is indicated whether the changes over time are significant, and whether the evolution in inequity is upward, downward or stable. Significance is measured using Tukey's Honest Significant Difference (HSD) test.

Based on the trends of the scenario where regional differences have been neutralized, we conclude that inequality in the overall probability of being screened for breast cancer has increased over time when measured by the absolute Gini coefficient or the relative Gini coefficient, and decreased over time when measured by the reversed relative Gini coefficient. For screening within and outside the organized programme, we find a decrease in inequality for the absolute and reversed relative Gini coefficients and, respectively, a stable and upward trend for the relative Gini coefficient. Hence, we can conclude the inequality within the organized screening programme has decreased over time.

Figure 100 – Evolution (2008-2016) of the absolute Gini index by type of screening and scenario

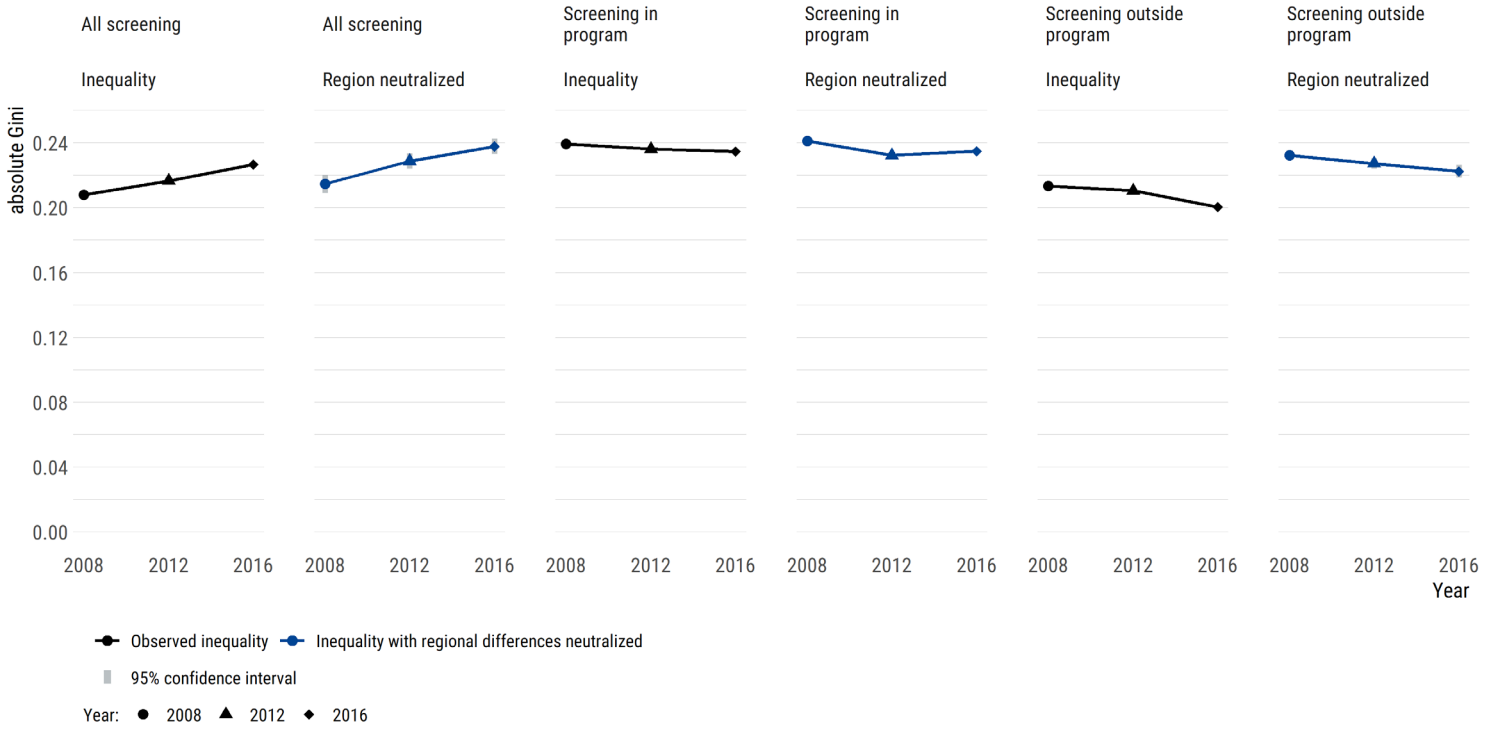


Table 68 – Evolution (2008-2016) of the inequality in the probability of being screened for breast cancer in the past two years

Type of screening	Inequality (Gini)	Inequality	2008	2012	2016	Trend§
Breast cancer screening - all	Regional differences neutralized	Absolute	0.215	0.229^	0.238^*	↑
		Relative	0.301	0.328^	0.355^*	↑
		Reversed relative	0.687	0.651^	0.624^*	↓
Breast cancer screening – organized programme	Regional differences neutralized	Absolute	0.241	0.232^	0.235^	↓
		Relative	0.497	0.485^	0.493	→
		Reversed relative	0.382	0.363^	0.363^	↓
Breast cancer screening – outside programme	Regional differences neutralized	Absolute	0.232	0.227	0.222^	↓
		Relative	0.576	0.575	0.609^*	↑
		Reversed relative	0.320	0.311^	0.297^*	↓

^: Value significantly different from 2008-value (Tukey's Honest Significant Difference test at p<0.05).
**: Value significantly different from 2012-value (Tukey's Honest Significant Difference test at p<0.05).*
§: An up arrow indicates a significant increase in inequity between 2008 and 2016, a down arrow indicates a significant decrease in inequity between 2008 and 2016 and a right arrow indicates a stable trend.

1.14.5. Overview inequity over time for different population subgroups

Figure 101 and Figure 102 show how the probability to have breast cancer screening in the past two years in various population subgroups differs from the population average when looking at inequality (with and without correction for regional differences). In Figure 101, population groups are defined based on categories of equivalized income, categories of educational attainment, and categories of self-assessed health. In Figure 102, specific vulnerable population subgroups are considered.

The figures can be read as follows. Values to the left of the vertical line indicate that the population subgroup has a lower breast cancer screening rate than the population average. Values to the right of the vertical line, on the other hand, indicate a higher screening rate than the population average. In addition to an evaluation in terms of the population average, it is possible to make a comparison over time for a specific population subgroup or a comparison of different subgroups.

The results in Figure 101 and Figure 102 indicate that the inequalities with respect to the probability to have breast cancer screening in the past two years are quite pronounced and range between -35 and +20 percentage points. The general trends are the same as reported in section 1.14.2, which makes sense as there is no correction for healthcare needs. After correcting for regional differences, we find that disparities within the organized screening programme are somewhat less pronounced, while deviations from the population average are somewhat more pronounced with respect to screening outside the organized programme.

A first conclusion is that we find important gradients with respect to education, income and self-assessed health for the overall screening rate and the screening outside the organized programme. Lower screening rates

are found for women with a degree of primary or lower secondary education, who are at risk of poverty or in the lower middle class and with bad or very bad self-assessed health. Higher screening rates are found for women with a degree of tertiary education, in the upper or top middle class and with very good self-assessed health. The gradients are smaller or do not exist for screening inside the organized programme, especially after neutralizing regional differences. For organized screening, a slightly lower screening rate is found for individuals at risk of poverty and with very bad self-assessed health.

Second, the screening behaviour of women in financially vulnerable situations, i.e. with material deprivation, with increased reimbursement or households with children at risk of poverty, are in line with the screening rates found for women at risk of poverty. This implies lower screening rates than the population average, except within the organized screening programme after neutralizing for regional differences.

Third, the screening rates for individuals with chronic disorder and limitations to daily activities are somewhat lower than the population average. Individuals who receive an invalidity or disability allowance have decreased their participation to the organized programme and increased screening outside the programme relative to the population average.

Fourth, the self-employed had screening rates that were lower than the population average within the organized screening programme and higher outside the programme. Over time, the gap relative to the population mean has, however, decreased and in 2016 screening rates are in line with the population average.

Fifth, singles have a lower screening rate than the population average, especially within the organized screening programme

Figure 101 – Deviation in the needs-corrected probability of being screened for breast cancer from population average for subgroups based on income, education and self-assessed health, by scenario and year

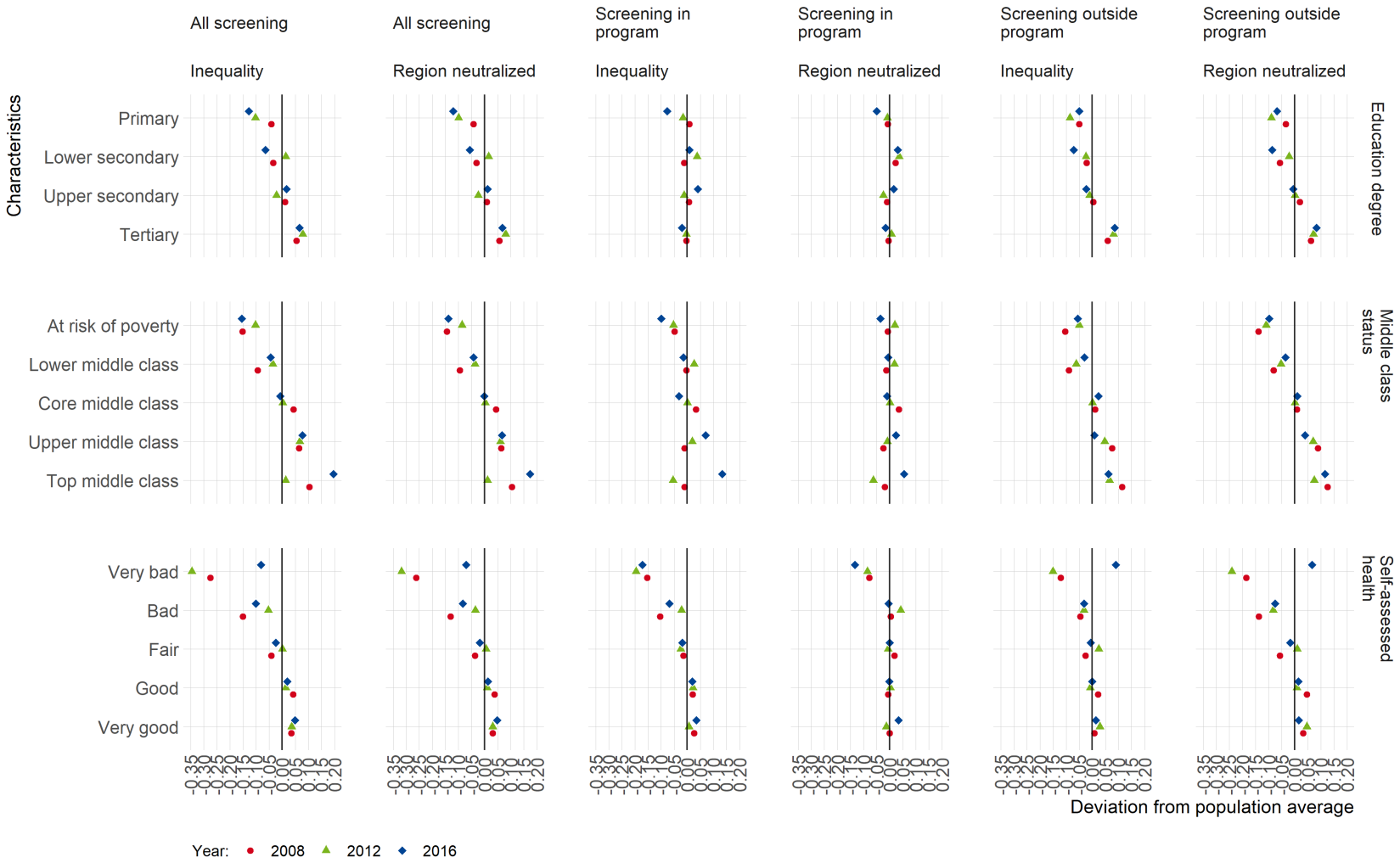


Figure 102 – Deviation in the needs-corrected probability of being screened for breast cancer from population average for specific vulnerable subgroups, by scenario and year

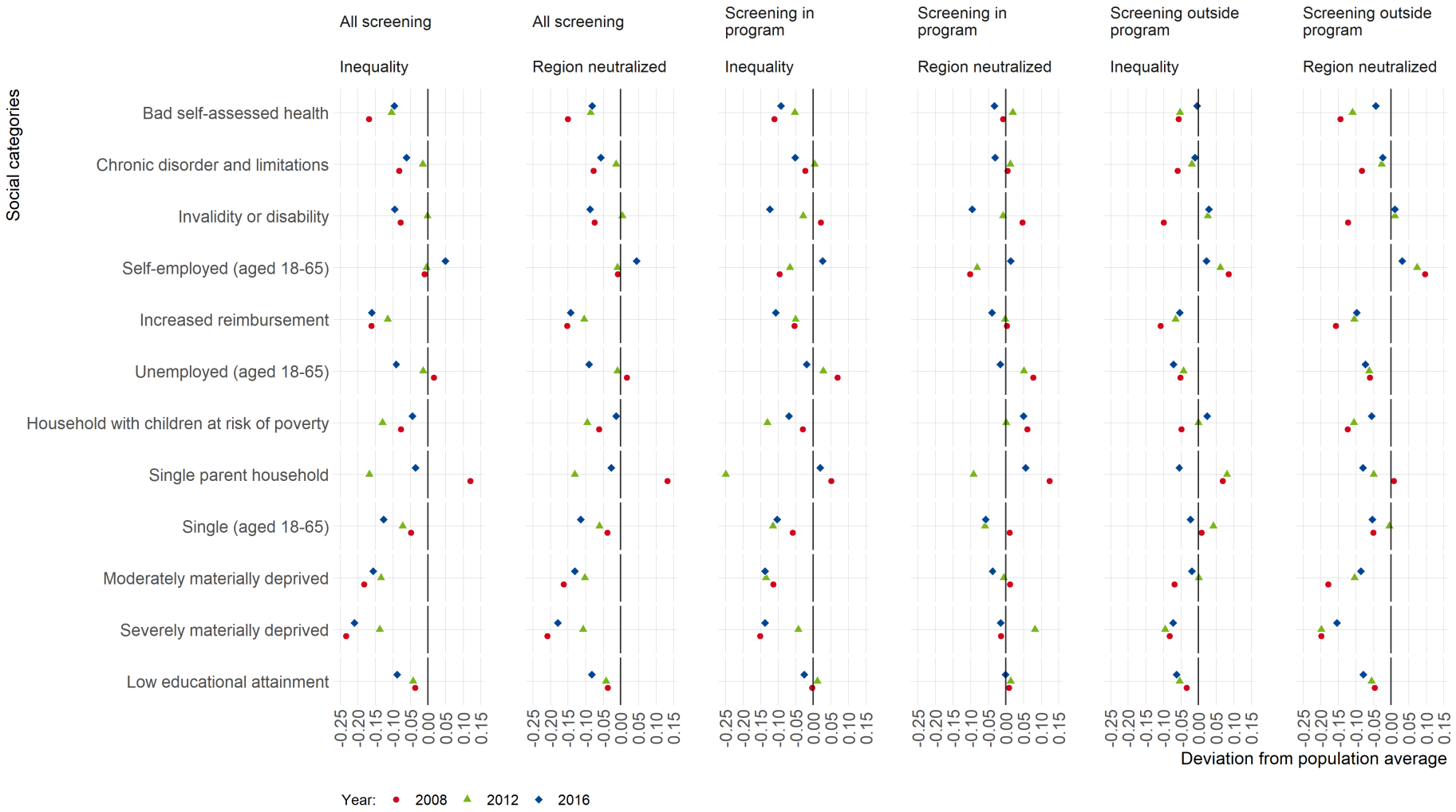
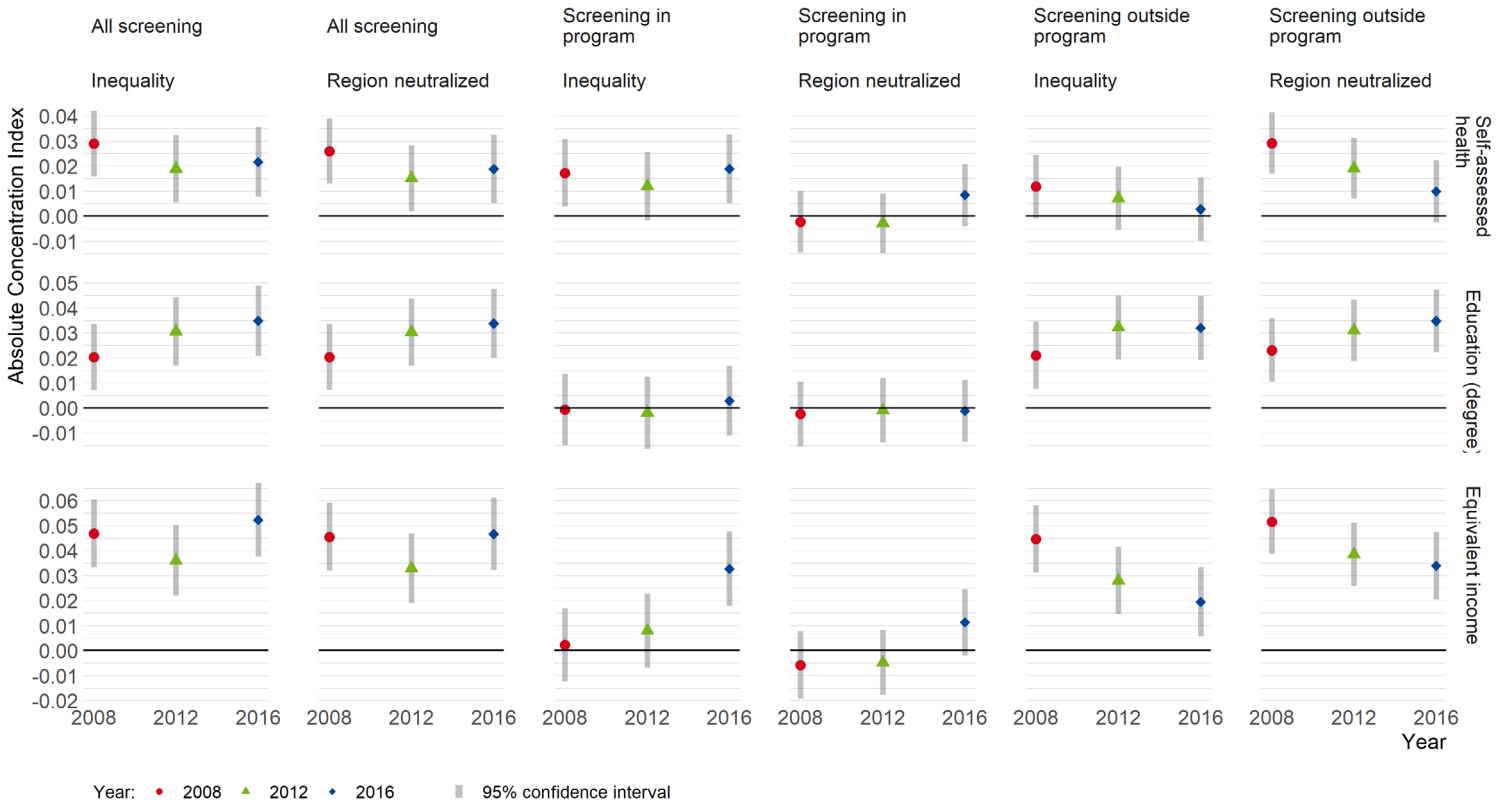


Figure 103 shows the absolute concentration index of the probability of being screened for breast cancer in the past two years (with and without neutralizing regional differences) to self-assessed health, education and income for the different inequity scenarios. The absolute concentration index takes into account the entire distribution of care use in a similar way as the Gini index (see section 1.1.5.2). Negative values of the concentration index should be interpreted as higher probabilities of being screened for breast cancer concentrated among individuals with worse self-assessed health, a lower educational degree or lower income. Positive values indicate higher screening rates among women with better self-assessed health, a higher education degree and higher income.

The results in Figure 103 show that there are inequalities in the probability of being screened for breast cancer, especially with respect to screening outside the organized screening programme and hence the overall screening rate. We find that for screening outside the organized programme, the probability of being screened is concentrated among women with a higher education degree and higher income. These systematic socioeconomic inequalities spill over to the overall screening rate. For screening within the organized screening programme, no systematic inequalities are found for educational attainment, and for income only in 2016. The latter is a point of attention, as we observe an upward trend over time in inequality with regard to income.

Systematic inequalities with respect to self-assessed health are of similar magnitude as for educational attainment, but not always significant. The effect is not significant in the organized programme after neutralizing regional differences, while for screening outside the programme it becomes significant after neutralizing regional differences. The results suggest systematic higher screening concentrated among women with better self-assessed health.

Figure 103 – Evolution (2008-2016) of the absolute concentration index by scenario for subgroups based on income, education and self-assessed health



2. APPENDIX ON UNMET NEEDS FOR MEDICAL CARE AND DENTAL CARE FOR FINANCIAL REASONS

2.1. Introduction

Financial access is a basic condition for a functional healthcare system. Foregoing necessary treatment because of its cost can be detrimental to a person's health. Unmet needs for medical or dental care for financial reasons (also denoted as postponement of care for financial reasons) is a frequently used indicator to assess financial accessibility. An analysis of unmet needs at the population level as well as a comparison of Belgium to other European countries can be found in the KCE HSPA report 313 of 2019, indicator A-4.[18] Healthcare is generally considered financially inaccessible when people limit or postpone the use of necessary care because of (excessively) high costs, or when they have to relinquish other basic necessities because they need care. Higher rates of unmet needs for financial reasons are therefore considered indicative for the financial accessibility of healthcare. One limitation is that unmet needs are self-assessed; hence it is impossible to evaluate whether or not the postponed care was related to an objective need for care (was it necessary or acute?), for how long care was postponed (forgone care or delayed until the receipt of income in the next month?), and whether the postponement is the result of spending money on basic necessities (food, utilities, rent) or on other (non-necessary) consumption.

The analysis in the KCE HSPA report 313 of 2019 indicates that the share of persons aged 16 and over in Belgium reporting unmet needs for **medical examination** due to financial reasons increased over the time from 0.5% in 2008 to 1.7% in 2012 and 2.2% in 2016. Unmet needs for **dental care** follow a comparable pattern but the rate is higher: 1.6% in 2008, 2.8% in 2012 and 3.7% in 2016. In particular the lowest income quintile has high rates of unmet needs. In comparison with other European countries, the Belgian rates for unmet needs are worse (higher) relative to both the European average and our neighbouring countries. In the lowest income quintile the rate of unmet needs in Belgium is among the highest in Europe.

Who has unmet needs?

Who are the individuals with unmet needs for medical care and dental care? In what follows, we go one step further and discuss the characteristics of the population reporting to have unmet needs for medical and dental care for financial reasons in the EU-SILC surveys of 2008, 2012 and 2016 using the coupled EU-SILC/IMA-AIM data (see Scientific report section 1.3.1). Using a descriptive analysis, we look at the distribution of characteristics in the subpopulations with and without unmet needs. Systematic differences between both groups may provide some answers on who has self-perceived unmet needs for financial reasons.

The characteristics under analysis are broad and do not only include individual and household characteristics related to health status, socioeconomic status and sociodemographic features (see section 1.1.1 for more information on these characteristics), but also information on healthcare supply, healthcare use and out-of-pocket payments. Information from different sources were coupled to the EU-SILC database (see Scientific report section 1.3.1).

In addition, we analyse whether individuals with and without unmet needs differ with respect to certain indicators on healthcare use analysed elsewhere in this report, both before and after a correction for healthcare needs is made (see Scientific report section 2.4). Throughout the analysis, we look at the population in its entirety (as surveyed in EU-SILC), but also zoom in on the subgroups with lower income as unmet needs for financial reasons are concentrated in these groups.[18] A comparison within income groups has the benefit that it provides a less biased account of the situation than a comparison of the entire population subdivided between the group with unmet needs (generally with lower incomes, lower educational attainment, and lower probability to have a job) and without unmet needs.

Scope

The analysis is restricted to the adult population (aged 18 or more).

Unmet needs for medical care and **dental care** are recorded at the individual level. Medical care refers to individual health services (medical examination or treatment) provided by or under direct supervision of medical doctors; it includes GP, specialist and hospital care, but also mental healthcare and excludes dental care and self-medication. Dental care refers to individual health services provided by or under direct supervision of dentists, stomatologists and orthodontists; it includes diagnostic and preventive dental care and excludes medical care and self-medication.

There was a revision of the phrasing of the question in 2011, which was accompanied by a significant increase in reported unmet needs.[18] Hence a direct comparison of the results of 2008 on the one hand and 2012/2016 on the other hand should be interpreted with caution. Below, we give the question on unmet needs for medical care. The phrasing of the question on dental care is the same, except for the type of care (underlined): medical (examination or) treatment should be replaced with dental (examination or) treatment. Compared to the 2012/2016 question, the question in 2008 is more restricted in scope and puts emphasis on the presence of a health condition as a preliminary to consult a doctor/dentist and the own responsibility of the interviewed person for not seeking care.

Question in 2008 (up to 2010) (authors' translation from Dutch phrasing):

"*During the past 12 months, did you have a health condition or did you need medical treatment (except dental issues) but did you not seek care for one or another reason"*

Answer options:

1. *Yes, I had a health condition and did not consult a doctor*
2. *No, I had a health condition and consulted a doctor*
3. *No, I did not have a health condition, but consulted a doctor for an annual check-up*
4. *No, I did not have a health condition and did not consult a doctor*

Question in 2012/2016 (from 2011 up to 2017) (authors' translation from Dutch phrasing):

"*Was there any time during the past 12 months when you really needed a medical examination or treatment, but that this did not occur?*"

Answer options:

1. *Yes, there was at least one occasion*
2. *No, there was no occasion*

In all waves and for both types of care, there is a follow-up question in which the individuals with unmet needs indicate the main reason for postponing care. In 2008, 2012/2016 the same reasons are available, but with a slightly different wording with respect to affordability:

- In 2008: *"I could not afford it due to financial reasons"*
- In 2012/2016: *"I could not afford it (too expensive or not covered by the sickness fund or an insurance)"*

In what follows, we restrict the analysis to individuals who indicate that affordability is the main reason for their unmet needs (as opposed to e.g. travel distance, presence of waiting lists, lack of time, fear of doctor or hospital).

Structure of the analysis

Section 2.2 summarizes a number of key points identified throughout the analysis. The analysis for unmet needs for medical care (section 2.3) and unmet needs for dental care (section 2.4) is structured in the same way. There is a separate subsection for each subcategory of individual or household characteristics, i.e. characteristics related to health status, healthcare system, socioeconomic status, sociodemographic situation, healthcare supply, and healthcare out-of-pocket payments. For each subcategory, there are three extensive Tables providing information on the distribution of characteristics in the subpopulation with and without unmet needs, including the evolution over time. One table presents the results for the entire adult population, one is restricted to individuals at risk of poverty (household equivalized income below 60% of the median income) and one is restricted to individuals in the lower middle class (household equivalized

income between 60% and 80% of the median income). Most individuals reporting unmet needs belong to these two income groups. Box 2 gives more details on how to interpret the results in the Tables. In addition, for each subcategory, the evolution of a subset of characteristics is visualized in a figure. Box 2 gives more details on how to interpret the results in the Figures.

Box 2 – Interpretation of the results in the Tables and Figures

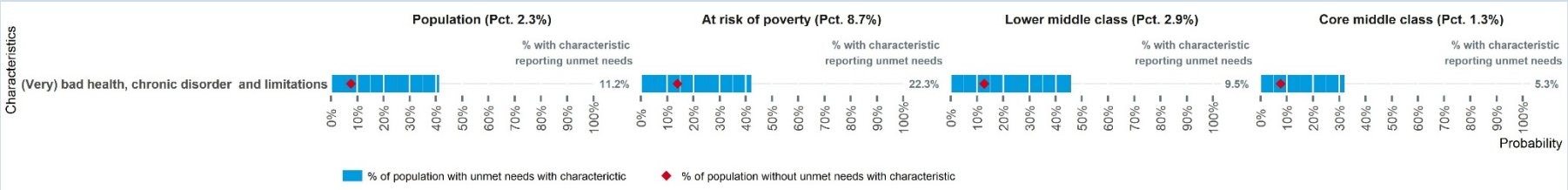
The Tables and Figures below provide information on the distribution of the characteristics related to a specific subcategory (health status, healthcare system, socioeconomic status, sociodemographic features, healthcare supply, out-of-pocket payments) in the populations *with* and *without* unmet needs for medical and dental care.

Three sets of results are reported in the Tables for each of the three survey years (2008, 2012, 2016) in a separate column. The same information for 2016 is presented in the summary Figures (Figure 104 and Figure 105). In the Figures for each subcategory (Figure 106 to Figure 117), two of the three results are presented. We illustrate the different sets of results by means of an example. We extracted information from Table 69, Figure 104 and Figure 106 on the association between unmet needs for medical care due to financial reasons and the characteristic "being in (very) bad health, in combination with the presence of one or more chronic disorders and functional limitations".

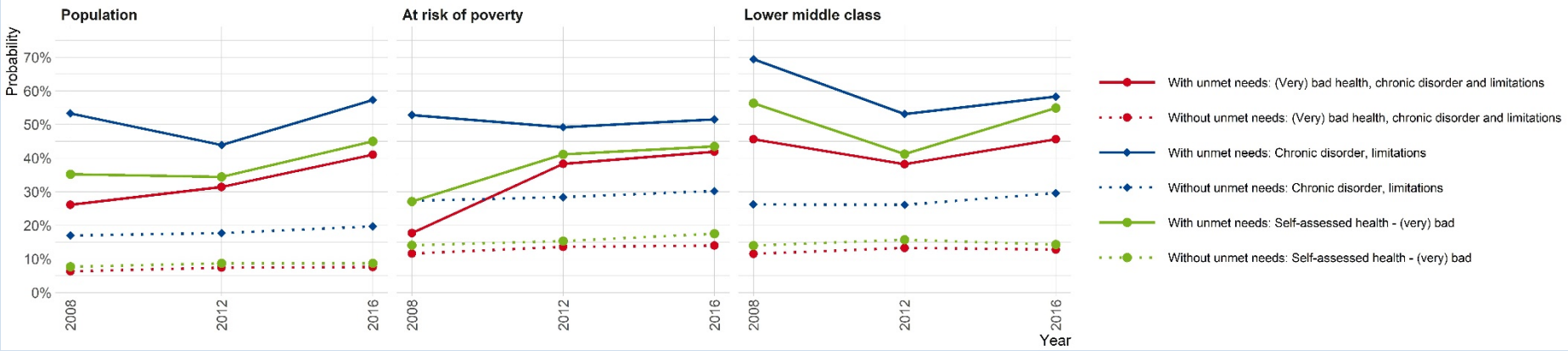
Extraction from Table 69

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Self-reported health status									
(Very) bad health, chronic disorder and limitations	11.2%	7.6%	41.0%***	6.7%	7.4%	31.4%***	1.6%	6.3%	26.1%**

Extraction from Figure 104



Extraction from Figure 106



First result: the fraction of individuals with a characteristic – in our example, being in (very) bad health, in combination with the presence of a chronic disorder and functional limitations – who report to have unmet needs (or the rate of unmet needs).

The first result is presented in the left column (for each year) in the Tables and depicted in Figure 104 and Figure 105 by the printed value right to the blue bar.
In our example, the extraction from Table 69 indicates that the rate of unmet needs for medical care among individuals in (very) bad health, with a chronic disorder and functional limitations is 11.2% in 2016, 6.7% in 2012 and 1.6% in 2008. This can be compared with the population rate of unmet needs for medical care in the respective years, which is added on top of the column, next to the year. The population rate of unmet needs amounts to 2.3%, 1.7% and 0.4% in 2016, 2012 and 2008, respectively. The extraction of Figure 104 shows similar information, but only for 2016 and subdivided by income group. We find that in 2016 the rate of unmet needs in the subpopulation with (very) bad health, chronic disorder and limitations is 11.2% (overall rate), 22.3% (further restricted to individuals at risk of poverty), 9.5% (further restricted to the lower middle class) and 5.3% (further restricted to the core middle class).

Second result: The fraction of the population *without* unmet needs with a characteristic, or in our example the fraction of the population *without* unmet needs that is in (very) bad health, has a chronic disorder and functional limitations. For certain variables, such as out-of-pocket payments, the second result is not a fraction, but an average value, e.g. the average amount of out-of-pocket payments in the population *without* unmet needs (see Table 84).

The second result is presented in the middle column (for each year) in the Tables, by the red diamonds in Figure 104 and Figure 105, and by the dotted trend line in the Figures for each subcategory.
In our example, the extraction from Table 69 indicates that 7.6%, 7.4% and 6.3% of the population *without* unmet needs for medical care reports to be in (very) bad health, with a chronic disorder and functional limitations in 2016, 2012 and 2008, respectively. The evolution over time of the fraction of individuals in (very) bad health, with a chronic disorder and functional limitations in the population *without* unmet needs is equally depicted by the red dotted line in the left panel (population) in the extraction from Figure 106. In addition, the fraction in the subpopulation at risk of poverty and the lower middle class is given by

the middle and right panel, respectively. The red diamond in the extraction from Figure 104 shows that in 2016 about 8%, of the population *without* unmet needs for medical care reports to be in (very) bad health, with a chronic disorder and functional limitations. This fraction is above 10% in the subpopulation at risk of poverty and in the lower middle class.

Third result: The fraction of the population *with* unmet needs with a characteristic; or in our example the fraction of the population *with* unmet needs that is in (very) bad health, has a chronic disorder and functional limitations. For certain variables, such as out-of-pocket payments, the results is not a fraction, but an average value, e.g. the average amount of out-of-pocket payments in the population *with* unmet needs (see Table 84).

The third result is presented in the right column (for each year) in the Tables, by the blue bars in Figure 104 and Figure 105, and by the solid trend line in the Figures for each subcategory.
In our example, the extraction from Table 69 indicates that 41.0%, 31.4% and 26.1% of the population *with* unmet needs for medical care reports to be in (very) bad health, with a chronic disorder and functional limitations in 2016, 2012 and 2008, respectively. This is much higher than the fraction in the population *without* unmet needs. The upward trend over time of the fraction of individuals in (very) bad health, with a chronic disorder and functional limitations in the population *with* unmet needs is equally depicted by the red solid line in the left panel (population) in the extraction from Figure 106. In addition, the fraction in the subpopulation at risk of poverty and the lower middle class is given by the middle and right panel, respectively. The blue bar in the extraction from Figure 104 shows that in 2016 about 40%, of the population *with* unmet needs for medical care reports to be in (very) bad health, with a chronic disorder and functional limitations. Slightly higher fractions are found in the subpopulation at risk of poverty and in the lower middle class.

The comparison of the second and third result, i.e. the fraction of individuals with a characteristic – in (very) bad health, with chronic disorder and functional limitations – in the populations *with* and *without* unmet needs informs us of the composition of both subpopulations and the way in which they are different. If both subgroups were similar, their composition would be the same and hence the fraction of individuals in bad health would be the same. Hence substantial differences in the composition of the populations *with* and *without* unmet needs gives information on which characteristics are associated with unmet needs for medical care and dental care. In the right column of the Tables, it is indicated whether or not the difference between both groups is significant. The significance is assessed using a weighted linear regression model with the characteristic as dependent variable and unmet need for medical/dental care for financial reasons as the independent variable.

The first result is related to the (comparison between the) second and third result, but provides a different perspective. If the rate of unmet needs for a subgroup with a characteristic (result 1) is above the rate of unmet needs in the population (as is the case in our example), we expect that the fraction of individuals with a characteristic in the population with unmet needs (result 3) is higher than the fraction of individuals with a characteristic in the population without unmet needs (result 2). The reverse is true if the rate of unmet needs for a subgroup with a characteristic (result 1) is below the rate of unmet needs in the population.

2.2. Summary

The analysis below (sections 2.3 and 2.4) provides evidence that individuals in the subpopulations with and without unmet needs for medical care or dental care for financial reasons do not always share the same characteristics. We illustrate a number of important differences in Figure 104 and Figure 105 with data from 2016. More information on the interpretation of these results can be found in Box 2.

The conclusions for unmet needs for medical care and unmet needs for dental care are highly similar. This is not surprising given that there is an important number of individuals reporting unmet needs for both types of care. In 2016, almost 80% of individuals with unmet needs for medical care also report unmet needs for dental care and vice versa almost 50% of individuals with unmet needs for dental care report unmet needs for medical care. Nonetheless, there are three important differences. First, unmet needs for financial reasons prevail among individuals in a financially vulnerable situation (see below). However, we find that the financial vulnerability of the subpopulation with unmet needs for medical care is higher relative to the subpopulation with unmet needs for dental care, suggesting that postponement of dental care also occurs in households with higher incomes and a better ability to cope with unexpected expenses. Second, unmet needs prevail among individuals with a bad (self-reported) health status, with chronic disorders and limitations to daily activities (see below). However, we find that this association is less pronounced for the subpopulation with unmet needs for dental care. Third, the patterns of care consumption are different for individuals reporting unmet needs for medical and dental care. Individuals with unmet needs for medical care have in particular a lower use of GP and specialist care (in particular in 2008) and higher use of emergency department (ED) services, while individuals with unmet needs for dental care have a lower probability to have regular dentist visits.

In line with previous research

Certain elements that result from the descriptive analysis have already been studied in detail and are well-known (see also Figure 104 and section 2.6.1 in the Scientific report). Individuals with unmet needs for financial reasons

- are concentrated in lower income groups, and increasingly so among the individuals at risk of poverty.
  In 2016, 57% of the individuals with unmet needs for medical care and 51% of the individuals with unmet needs for dental care are at risk of poverty (household equivalized income below 60% of the median income) compared to 43% in 2008 for unmet needs in both types of care. For both types of care, about 24% of the individuals with unmet needs belong in 2016 to the lower middle class (household equivalized income between 60% and 80% of the median income); and 19% and 24% of the individuals with unmet needs for, respectively medical care and dental care, belong in 2016 to the core middle class (household equivalized income between 80% and 120% of the median income).
- are concentrated in the age group 35-49 and among females aged 50-64. Retired individuals have a lower probability to report unmet needs. However, there are some differences by income group. In the core middle class, the probability to report unmet needs extends to the over-80 year olds. Among individuals at risk of poverty, a higher unmet needs are found among females aged between 18 and 34, a group that is characterised amongst others by higher care needs related to childbirth, and hence might be confronted with potentially high medical costs for childbirth, newborns or young children.
- are concentrated among single individuals below 65 year of age.
  They represent almost 30% of the subpopulation with unmet needs, compared to 10% of the subpopulation without unmet needs.
- are concentrated in Wallonia (among all income groups) and Brussels (in the population at risk of poverty and the lower middle class).
  In 2016, 2.3% and 3.7% of the population (18+) reports to have unmet needs for, respectively, medical and dental care for financial reasons. The regional rates are quite divergent, with, respectively, in the population residing in Flanders, Wallonia and Brussels a rate of unmet needs for medical care of 0.8%, 4.1% and 4.9% and for unmet needs for dental care 2.1%, 5.8% and 6.4%.
- are more likely to have a lower level of education.

However, the two most important conclusions are that individuals in the subpopulation with unmet needs are financially more vulnerable and have higher (self-reported) care needs. Even when comparing the subpopulations with and without unmet needs within the same income category, there are striking differences.

Financial vulnerability

Equivalized household income is one way to measure financial vulnerability. Nonetheless, we find individuals in the core middle class who report to have unmet needs for financial reasons. The EU-SILC survey and certain IMA-AIM indicators allow for a much richer description. We find that (2016 data):

- 95% of the individuals with unmet needs for medical care and 87% of the individuals with unmet needs for dental care perceive an **inability to cope with unexpected expenses**, compared to about 22% in the subgroup without unmet needs.
- 59% of the individuals with unmet needs for medical care and 44% of the individuals with unmet needs for dental care indicate to be **severely materially deprived**, compared to about 4% in the subgroup without unmet needs. About 1 in 4 and 1 in 3 individuals with severe material deprivation indicate to have unmet needs for, respectively, medical and dental care for financial reasons. Reducing material deprivation can be a lever for avoiding delayed or forgone care.
- Our results provide suggestive evidence of a **trade-off between expenditures for basic needs (food, utility, housing and hygiene) and healthcare**, possibly leading to postponement of care. We find that among individuals with unmet needs for, respectively, medical and dental care, about 54% and 36% cannot afford a hot meal every second day, 15% and 9% cannot afford a washing machine, 45% and 41% has arrears on utility, rent or mortgage. Housing costs (mortgage, rent, water, heating electricity) represent a higher share of disposable income in the subpopulation with unmet needs (about 40%, compared to about 20% in the subpopulation without unmet needs) and they are more likely to be tenants. House ownership is associated with a lower probability to have unmet needs.
- The (perceived) inability to cope with unexpected expenses is (at least partially) related to the activity status of the individuals. The majority of the individuals with unmet needs for medical care are **at working age, but without paid work**. The fraction that is unemployed (18% for medical care and 16% for dental care) or inactive (43% for medical care and 40% for dental care) is high and has increased over time. It concerns individuals in long-term unemployment or inactivity. Moreover, 67% and 59% of the individuals with unmet needs for, respectively, medical and dental care belong to households with very low working intensity, i.e. where the household members at working age spend less than 20% of their (combined) available time on paid work. Hence it is not surprising that in the subpopulation with unmet needs for, respectively medical and dental care, about 25% and 20% receives welfare support *("leefloon", "inkomensgarantie voor ouderen", "gewaarborgd inkomen", "hulp van OCMW" / "revenu d'intégration sociale", "revenu garanti pour les personnes âgées", "revenue garanti", "l'assistance d'un CPAS")*, while about 21% receives an invalidity or disability allowance for unmet needs in both types of care; in the subpopulation without unmet needs, these fractions are about 4%-5%.[g] The combined fraction of individuals receiving either **welfare support or a disability/invalidity allowance**, amounts to 45% of the individuals with unmet needs for medical care and 40% of the individuals with unmet needs for dental care; or from a different perspective 1 in 10 and 1 in 7 individuals receiving welfare support or a disability/invalidity allowance report unmet needs for, respectively medical and dental care. Individuals who receive welfare support or a disability/invalidity

[g] Individuals receive an allowance for *incapacity to work* in case of absence from work due to a medical condition for a period less than 1 year, an *allowance for invalidity* in case of absence from work due to a medical condition for a period exceeding 1 year, an *allowance for disability* in case the person is seriously physically or mentally impaired as evaluated according to an appropriate measure.

allowances can be administratively identified. Moreover, these individuals enter into contact with a medical doctor (invalidity/disability) or a social worker (welfare support), contacts that can help to better identify, understand and cope with unmet needs in this specific population.

Worse self-reported health status

- Less than 1% of the individuals with good or very good self-assessed health have unmet needs for medical care, for dental care this was 1.7%. The **probability to report unmet needs increases strongly with a deteriorated self-assessed health status and the presence of a chronic disorder and limitations to daily activities**. The association is stronger for unmet needs for medical care relative to unmet needs for dental care. Where very bad or bad self-assessed health is in particular a distinctive feature in the population at risk of poverty and in the lower middle class, the presence of a chronic disorder and limitations to daily activities is more important in the core middle class.
  Overall, about 41% of the subpopulation with unmet needs for medical care indicate to have bad or very bad self-assessed health in combination with a chronic disorder and limitations to daily activities (up from 26% in 2008), versus 8% in the subpopulation without unmet needs for medical care (up from 6% in 2008). With respect to unmet needs for dental care, the proportions are 31% and 8% in, respectively, the subpopulation with and without unmet needs (up from 27% and 6% in 2008).
- The association between unmet needs and prescribed medications use is more difficult to interpret. On the one hand, the presence of specific disorders identified through the use of prescribed medication, provides information on an individual's health status and needs and hence the potential for unmet needs. On the other hand, the absence of medication intake might indicate the absence of appropriate medical treatment for financial (or other) reasons. When comparing the subpopulations with and without unmet needs, there appears to be little difference in the use of prescribed medication for a set of disorders. However, a sub-analysis by income group indicates that among individuals at risk of poverty, there is a somewhat lower usage rate in the subpopulation with unmet needs compared to the subpopulation without unmet needs. In the lower middle class and core middle class, no such difference exists, or even the reverse.

Is there a different use of healthcare?

There is a clear distinction between the results in 2008 and the results in 2012/2016. This difference corresponds with the revision of the question on unmet needs in the EU-SILC survey in 2011 (see section 2.1). In 2008, we find a clear underuse of care by individuals reporting unmet needs. The association is (partly) different for unmet needs for medical and dental care; only partly because of the important overlap between both groups.

- With respect to the subgroup with unmet needs for medical care, we find a **lower probability to consult a GP or specialist**, which is particularly important in 2008. **Lower levels of inpatient care** are also found in the subpopulation with unmet needs, but the effects are smaller in size. On the other hand, there is a **higher probability to go to an emergency department (ED).** This pattern is consistent with postponement of care until an acute health situation occurs.
  After correcting for healthcare needs, the subpopulation with unmet needs for medical care has a 29 percentage points lower probability to consult a GP and a 14 percentage points lower probability to consult a specialist in 2008 in comparison with the population average; this reduces to a 3 and 5 percentage points lower probability to consult a GP in 2012 and 2016, respectively; and a 11 percentage points lower probability to consult a specialist in both 2012 and 2016. Moreover, after correcting for healthcare needs, the number of specialist consultations (conditional on having at least one consultation) is 2.7 consultations below the population average in 2008 in the subgroup with unmet needs; there are no other significant differences in the number of consultations.
  Among individuals with unmet needs for dental care, the same pattern is visible, but less pronounced, in particular for GP consultations. After correcting for healthcare needs, the subpopulation with unmet needs

for dental care has a 12, 3 and 1 percentage points lower probability to consult a GP in 2008, 2012 and 2016, respectively; and a 13, 11 and 10 percentage points lower probability to consult a specialist in 2008, 2012 and 2016, respectively.

- With respect to the subgroup with unmet needs for dental care, we find a **lower probability to have regular dentist visits.** Only about 21% of the subpopulation with unmet needs for dental care had regular dentist visits in 2008 (compared to 52% in the subpopulation without unmet needs). This fraction increased to 33% in 2012 and 2016 (compared to 52% and 58% in the subpopulation without unmet needs). In addition, we find a significantly lower use of preventive dental care, with regular visits for only 9% to 10% of the subpopulation with unmet needs for dental care. There is no clear break in probability between 2008 and 2012.
  Among individuals with unmet needs for medical care, the pattern is not entirely the same, with a probability to have regular dentist visits that is relatively stable over time, between 30% and 33%, without break in results between 2008 and 2012. This probability is still lower than for the subpopulation without unmet needs for medical care. In addition, in the population at risk of poverty with unmet needs for medical care, a higher use of dental care was observed in 2008 relative to the subgroup without unmet needs.
- The rate of unmet needs for financial reasons is higher and increasing among individuals registered in community health centres. The rate of unmet needs for medical care in 2016 was 7.9% (compared to 2.3% in the adult population); for dental care, the rate of unmet needs was 8.4% (compared to 3.7% in the adult population). It is unclear what is driving this trend and whether the vulnerable population experiencing unmet needs is turning increasingly towards community health centres (to either lower their out-of-pocket payments or to improve their accessibility to primary care), whether this is a regional effect with higher usage of community health centres in Wallonia and Brussels or that there is increasingly a problem of unmet needs among patients in community health centres.

Affordability of care

- **Out-of-pocket expenses (after MAB) are increasing over time, with higher growth rates in the population with unmet needs**. The increase differs by income group; with a strong upward trend in the lower and core middle class and a more modest increase among individuals at risk of poverty. The increase is driven by supplements, which can be particularly problematic for the subpopulation with unmet needs. Given their activity status and difficult financial situation, it is likely that these individuals do not have a hospital or supplementary dental insurance. Out-of-pocket payments are in general lower in the subpopulation with unmet needs compared to the subpopulation without unmet needs, this can be the results of postponement of care or thanks to the protective measures in place that reduce co-payments, e.g. increased reimbursement and maximum billing. The increase in co-payments is lower. As a case in point, in the subpopulation at risk of poverty, co-payments (after MAB) in 2016 were similar (group without unmet needs) or lower (group with unmet needs) than in 2012, while out-of-pocket payments increased over the same period. As a share of disposable income or total household expenses, out-of-pocket payments have increased more sharply over time for the subpopulation with unmet needs.
- The rate of unmet needs is higher among individuals with **catastrophic out-of-pocket payments**.
  The rate of unmet needs for medical care in 2016 was 10.5% among individuals in households with catastrophic payments (compared to 2.3% in the adult population); for dental care, the rate of unmet needs was 12.4% (compared to 3.7% in the adult population). Hence, between 1 in 10 and 1 in 8 individuals with catastrophic payments also reports unmet needs for medical or dental care. This shows that, although both indicators are to some extent related, the subpopulation with catastrophic payments and with unmet needs are not entirely the same.
- Average out-of-pocket payments and co-payments hide the fact that some individuals and households are confronted with **(persistent) high own payments**. The fraction of households with high co-payments in the current and previous year, i.e. above € 450 in both years (an

eligibility criterion for the receipt of the chronic MAB), has increased over time, it nearly doubled in the subpopulation with unmet needs for medical care from 11.0% in 2008 to 20.1% in 2016, it was stable at 18%-19% in the subpopulation with unmet needs for dental care and increased from about 26% in 2008 to about 32% in 2016 in the subpopulation without unmet needs. There is important variation by income group, with a much lower and stable fraction in the population at risk of poverty (about 7% and 9% in the group with unmet needs for dental care and medical care, respectively). The increase over time in the subpopulation with unmet needs for medical care is driven by the lower middle class.

- Are these individuals not covered by one of the protective measures set up in the healthcare insurance? **Individuals in the subpopulation with unmet needs have a higher coverage by protective measures** than their counterparts without unmet needs.
In 2016, we find that among the individuals with unmet needs for, respectively, medical and dental care, about 65% and 56% have the **status of increased reimbursement** (versus 17% in the subpopulation without unmet needs), about 25% and 17% receive reimbursements through the **system of maximum billing** (versus 12%), about 22% and 19% has the **status of chronic illness** (versus 12%), and 14% and 13% is eligible to the **lump sum chronic illness** (versus 7%).
In general, this calls for a reflection on how we can improve these protective measures to better respond to unmet needs for medical and dental care in the population and in particular the population that suffers from ill-health and is financially vulnerable.

Figure 104 – Overview key characteristics for population with and without unmet needs for medical care in 2016

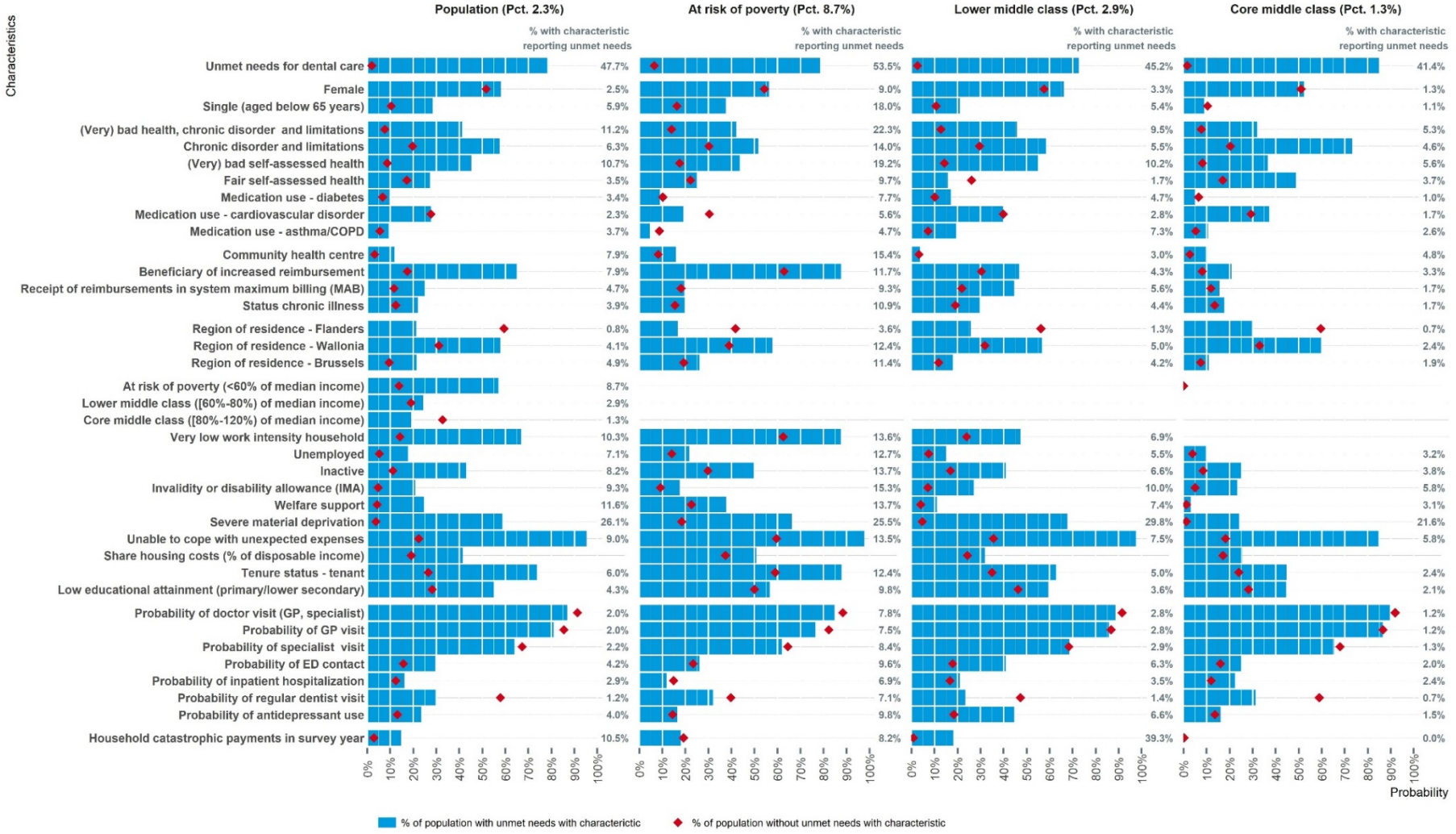
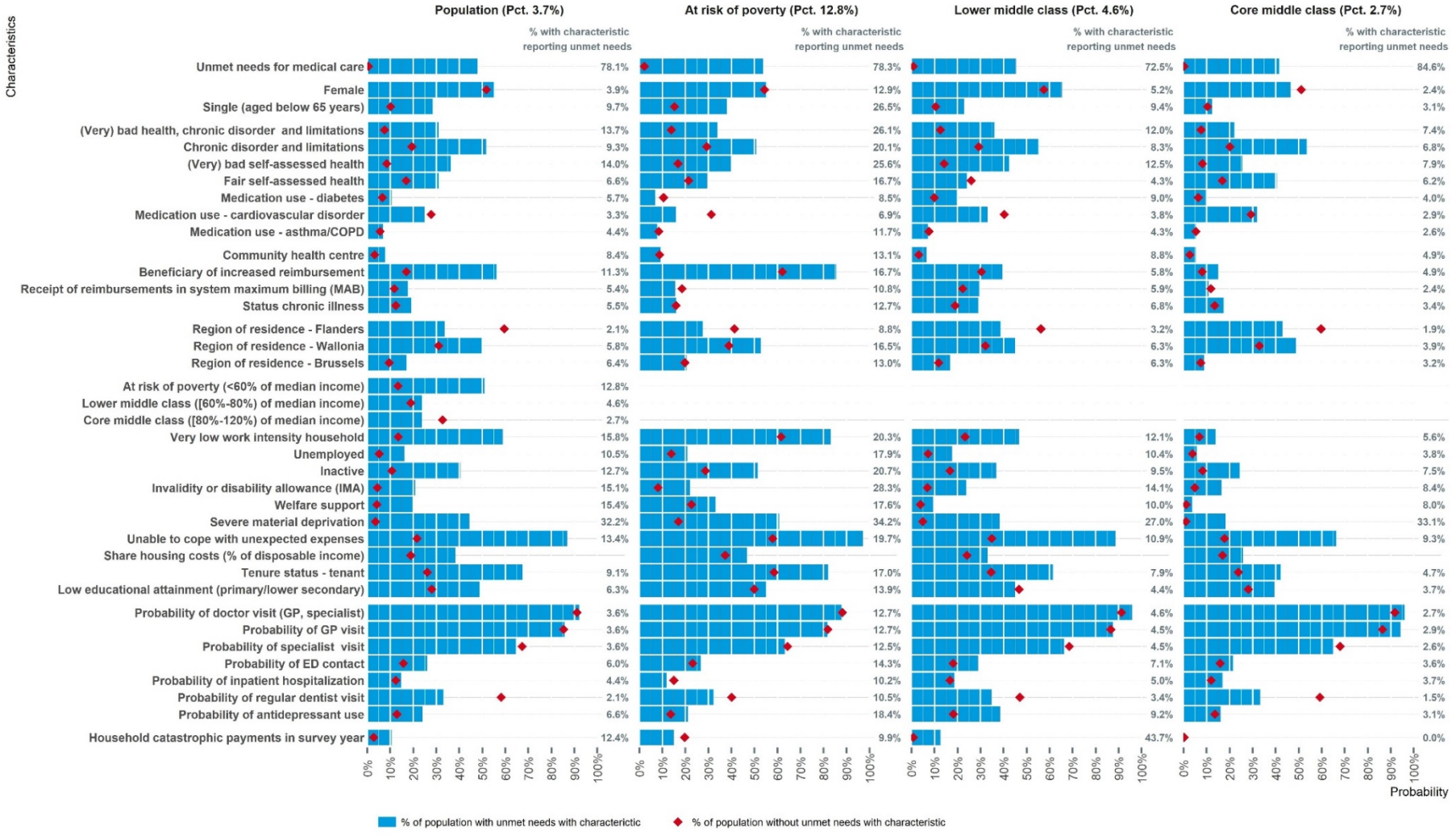


Figure 105 – Overview key characteristics for population with and without unmet needs for dental care in 2016



2.3. Unmet needs for medical care for financial reasons

2.3.1. Characteristics related to health status and care needs

Table 69 provides information on the distribution of the characteristics related to health status and care needs in the subpopulations with and without unmet needs for medical care (see Box 2 on how to interpret the results in the Tables and Figures). Table 70 and Table 71 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 106 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) individuals with (very) bad self-assessed health, chronic disorder and limitations; (panel B) individuals with (very) good and fair self-assessed health; (panel C) individuals with an allowance for invalidity or disability; (panel D) individuals taking prescribed medication for cardiovascular diseases or asthma/COPD; (panel E, F, G, H) individuals in age groups 35-49, 50-64, 65-79, 80+.

Main conclusions

1. There is an important overlap between unmet needs for medical care for financial reasons and unmet needs for dental care for financial reasons (see also section 2.4.1). No less than 70.6%, 73.1% and 78.1% of the individuals with unmet needs for medical care also have unmet needs for dental care in 2008, 2012 and 2016, respectively; whereas only 1.3%, 1.5% and 2.0% of the individuals without unmet needs for medical care report unmet needs for dental care in 2008, 2012 and 2016, respectively. The overlap is increasing over time and is stronger among individuals at risk of poverty than for individuals in the lower middle class.
2. Unmet needs are concentrated among individuals aged 35 to 49 and females in the age category 50 to 64. Individuals aged 65+ are underrepresented among the subpopulation with unmet needs. While the age groups 35-49 and females between 50 and 64 have a higher risk for unmet needs, irrespective of their income group, there are, however, non-negligible differences by income group. Among individuals at risk of poverty, we find that females aged between 18 and 34, a group characterised among other by higher care needs related to childbirth, have a higher risk to have unmet needs (see Table 70). Hence unmet needs start at an earlier age for individuals at risk of poverty. Among individuals in the lower middle class, we find that females in the age category 65-79 are overrepresented in 2016 in the subpopulation with unmet needs (see panel G in Figure 106 and Table 71). Among individuals in the core middle class (household equivalized income between 80% and 120% of the median income), we find a particularly high share of over-80 year olds (result not shown).
   The pattern is clear, individuals are confronted with unmet needs at younger age if they are at risk of poverty, and at higher ages as income increases, especially in the core middle class. Multiple explanations why we find this pattern are possible, amongst others (1) a survival effect among the poor over-80 year olds, where individuals in better health both report fewer (unmet) needs and have a higher likelihood to survive and be included in the survey sample than individuals with worse health and higher unmet needs (this effect might play less in higher income groups); (2) a welfare effect among elderly in the core middle class that leads to different expectations of life and therefore different perceived care needs to satisfy these expectations; (3) potential high medical costs for childbirth, newborns or young children that lead to postponement of care for females aged 18-34 who are at risk of poverty.
3. The self-reported health status of individuals in the subgroup with unmet needs is worse than in the subgroups without unmet needs.
   - 45.0% of the individuals in the group with unmet needs for medical care reports to have bad or very bad self-assessed health in 2016 (up from 35.2% in 2008) compared to 8.7% in the group without unmet needs;
   - 57.3% of the individuals in the group with unmet needs for medical care reports to have both a chronic disorder and limitations to daily living in 2016 (up from 53.3% in 2008) compared to 19.7% in the group without unmet needs;

- 41.0% of the individuals in the group with unmet needs for medical care reports to have both conditions listed above (bad or very bad self-assessed health, a chronic disorder and limitations to daily living) in 2016 (up from 26.1% in 2008) compared to 7.6% in the group without unmet needs.

Less than 1% of the individuals with good or very good self-assessed health have unmet needs for medical care (0.2%, 0.9% and 0.9% in 2008, 2012 and 2016, respectively); whereas 1.8%, 6.3% and 10.7% of the individuals with bad or very bad self-assessed health reported to have unmet needs for medical care in 2008, 2012 and 2016, respectively. The latter is multiple times higher than the population rate of unmet needs for dental care, which was 0.4%, 1.7% and 2.3% in 2008, 2012 and 2016, respectively.

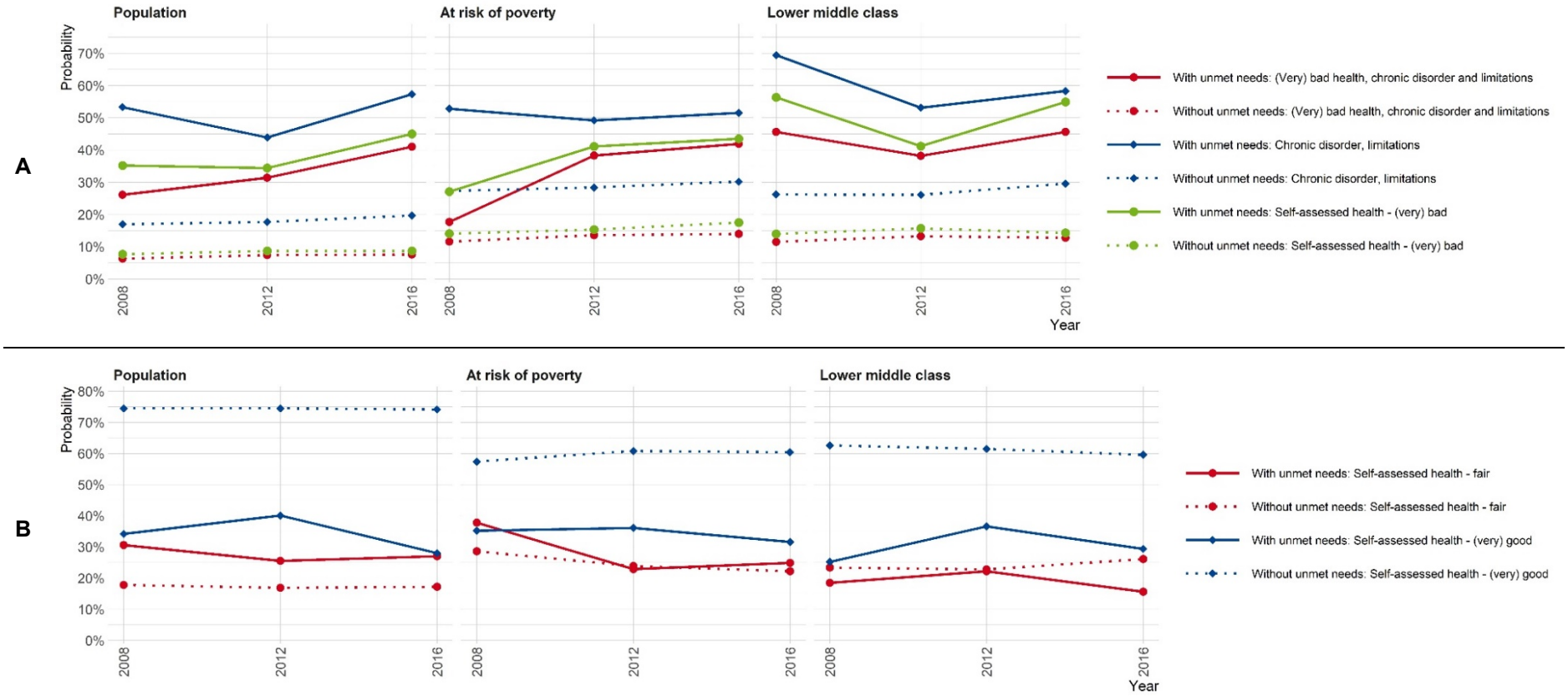
Moreover, there are interactions between income group and unmet needs for medical care. For example, we find that 19.2% of individuals with bad or very bad self-assessed health indicated to have unmet needs for medical care in 2016 in the subgroup at risk of poverty, while the fraction was 10.2% in the lower middle class. In addition, while bad or very bad self-assessed health is the dominant health status for individuals with unmet needs at risk of poverty and in the lower middle class, this is not the case in the core middle class, where 48.5% of the individuals with unmet needs for medical care report to have fair self-assessed health (results not shown). The reverse is true for individuals reporting to have chronic disorders and limitations to daily living, who represent in 2016 a fraction of 51.5%, 58.3% and 73.0% of the individuals with unmet needs in, respectively, the population at risk of poverty, the lower middle class and the core middle class.

4. The intake of prescribed medication for specific disorders can be seen as a proxy for higher care needs (and hence potentially higher unmet needs), but also as the receipt of (appropriate) care (and hence lower unmet needs); the lack of intake may signal a problem of affordability (and hence postponement of care for financial reasons). Therefore, it is a priori difficult to assess whether individuals taking specific types of medication will be concentrated in the subpopulation with or without unmet needs. The findings in Table 69 indicate that the differences between both groups are fairly small and generally not significant. For specific disorders, there are however differences by income group. We find a lower fraction of individuals with unmet needs who take medication for e.g. diabetes, asthma, COPD or cardiovascular disease in the subgroup at risk of poverty, indicating that they possibly do not receive or cannot afford the (appropriate) care that they require. In the lower middle class, we find lower levels of medication use in the subgroup with unmet needs in 2008, but similar or higher levels in 2016 compared to individuals without unmet needs. In the core middle class, we find generally higher levels of medication use among the individuals with unmet needs, compared to those without unmet needs (results not shown).

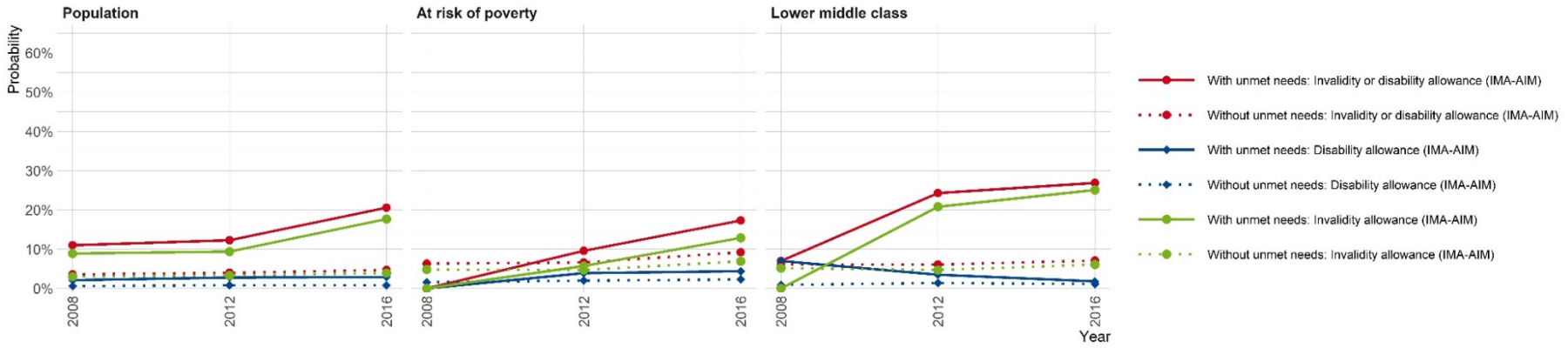
5. Individuals confronted with long-term health shocks, i.e. individuals receiving disability or invalidity allowances have an increased risk of unmet needs. This effect has increased sharply over time with 1.2%, 4.9% and 9.3% of the individuals with invalidity or disability allowance reporting to have unmet needs for medical care in 2008, 2012 and 2016, respectively. This is 3 to 4 times above the population rates of 0.4%, 1.7% and 2.3% in 2008, 2012 and 2016, respectively. Overall, individuals who receive an invalidity or disability allowance constitute about 20.6% of the subpopulation with unmet needs for medical care in 2016 (up from 11.0% in 2008).
   The probability to report unmet needs for medical care is above the population fraction for individuals being incapacitated to work, with 4.4% of individuals incapacitated from work reporting to have unmet needs in 2016. On the other hand, the risk for unmet needs is clearly smaller than for individuals with invalidity or disability. Hence, we conclude that unmet needs for medical care are lower when related to a (possibly) temporary health shock compared to a long-term health shock and the financial implications thereof. However, for individuals at risk of poverty, the presence of a temporary or long-term health shock leads to the same risk of reporting unmet needs. It is likely that they have no financial means to cope with temporary health shocks without postponing expenses.
   For individuals in the lower middle class and core middle class, the risk

to have unmet needs is lower among individuals incapacitated to work or with disability compared to individuals with invalidity.

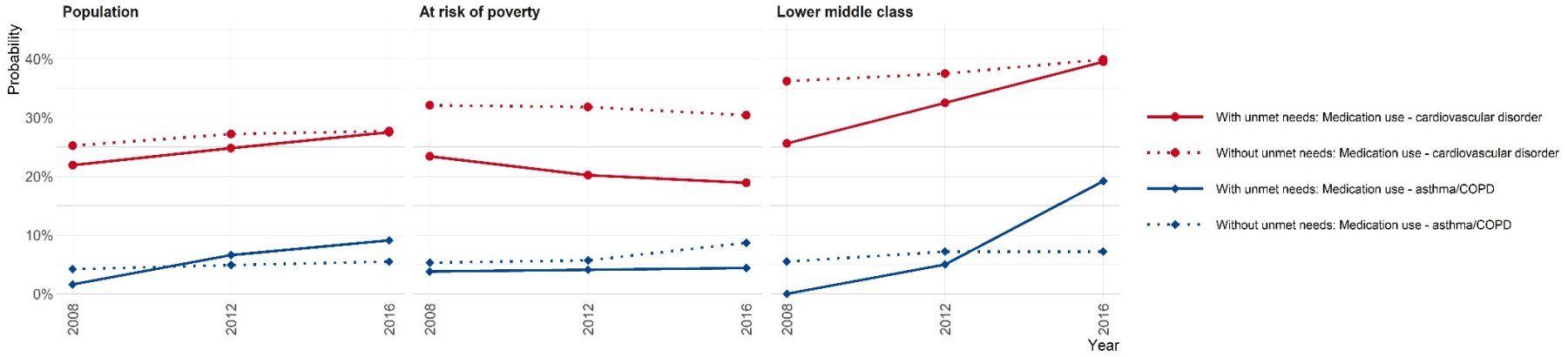
Figure 106 – Evolution (2008, 2012, 2016) for subset of characteristics related to health status for the population with and without unmet needs for medical care



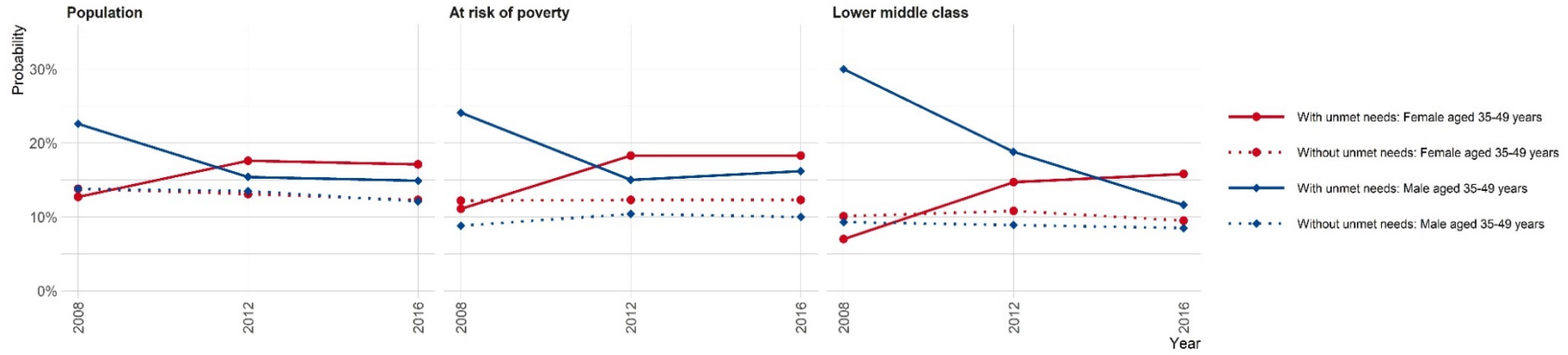
C


Population
At risk of poverty
Lower middle class
Probability
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Invalidity or disability allowance (IMA-AIM)
Without unmet needs: Invalidity or disability allowance (IMA-AIM)
With unmet needs: Disability allowance (IMA-AIM)
Without unmet needs: Disability allowance (IMA-AIM)
With unmet needs: Invalidity allowance (IMA-AIM)
Without unmet needs: Invalidity allowance (IMA-AIM)

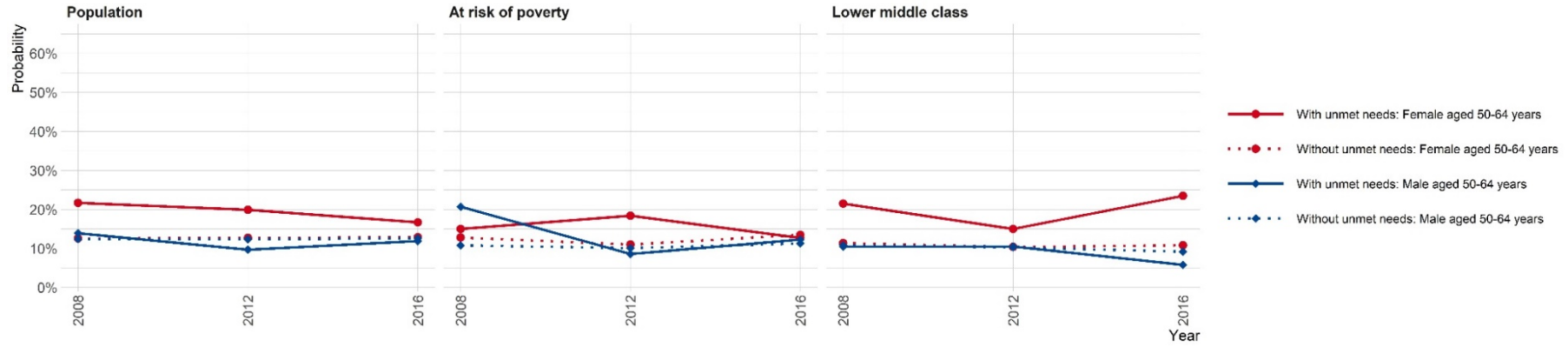
D


Population
At risk of poverty
Lower middle class
Probability
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Medication use - cardiovascular disorder
Without unmet needs: Medication use - cardiovascular disorder
With unmet needs: Medication use - asthma/COPD
Without unmet needs: Medication use - asthma/COPD

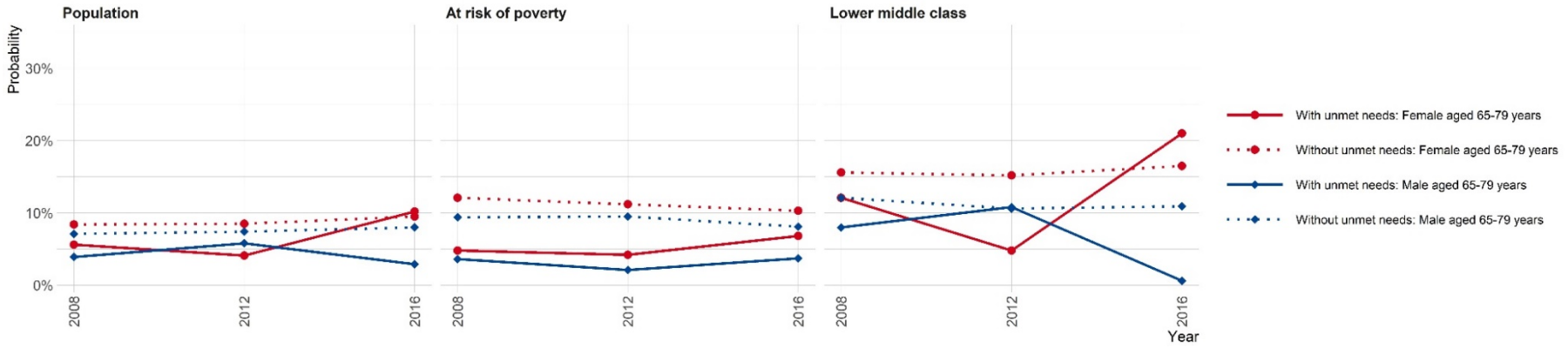
E


Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 35-49 years
Without unmet needs: Female aged 35-49 years
With unmet needs: Male aged 35-49 years
Without unmet needs: Male aged 35-49 years

F


Population
At risk of poverty
Lower middle class
Probability
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 50-64 years
Without unmet needs: Female aged 50-64 years
With unmet needs: Male aged 50-64 years
Without unmet needs: Male aged 50-64 years

G


Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 65-79 years
Without unmet needs: Female aged 65-79 years
With unmet needs: Male aged 65-79 years
Without unmet needs: Male aged 65-79 years

H

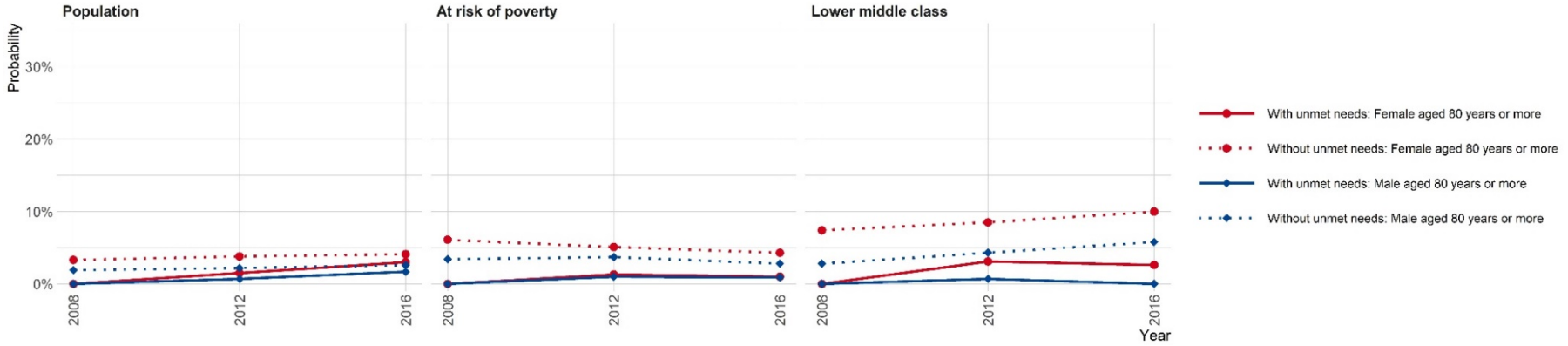

Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 80 years or more
Without unmet needs: Female aged 80 years or more
With unmet needs: Male aged 80 years or more
Without unmet needs: Male aged 80 years or more

Table 69 – Overview of the distribution of health status in the subpopulations with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by health status

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unmet needs									
Unmet needs for dental care	47.7%	2.0%	78.1%***	44.5%	1.5%	73.1%***	17.7%	1.3%	70.6%***
Age and gender									
Female aged 18-34 years	1.9%	13.0%	10.8%	1.5%	13.1%	11.5%	0.4%	13.2%	14.4%
Male aged 18-34 years	1.9%	13.0%	10.7%	1.7%	13.2%	13.7%	0.2%	13.6%	5.3%**
Female aged 35-49 years	3.1%	12.3%	17.1%	2.2%	13.1%	17.6%	0.4%	13.8%	12.7%
Male aged 35-49 years	2.8%	12.1%	14.9%	1.9%	13.5%	15.4%	0.7%	13.8%	22.6%
Female aged 50-64 years	2.9%	12.9%	16.7%	2.6%	12.7%	19.9%°	0.7%	12.6%	21.7%
Male aged 50-64 years	2.1%	12.6%	11.9%	1.3%	12.4%	9.7%	0.4%	12.4%	13.9%
Female aged 65-79 years	2.4%	9.5%	10.2%	0.8%	8.5%	4.1%**	0.3%	8.4%	5.6%
Male aged 65-79 years	0.8%	8.0%	2.9%***	1.3%	7.4%	5.8%	0.2%	7.1%	3.9%
Female aged 80 years or more	1.7%	4.1%	3.0%	0.7%	3.8%	1.5%*	0.0%	3.3%	0.0%***
Male aged 80 years or more	1.5%	2.6%	1.7%	0.5%	2.2%	0.7%**	0.0%	1.9%	0.0%***
Self-reported health status									
(Very) bad health, chronic disorder and limitations	11.2%	7.6%	41.0%***	6.7%	7.4%	31.4%***	1.6%	6.3%	26.1%**
No chronic disorder, no limitations	1.0%	69.9%	31.5%***	1.1%	71.2%	44.8%***	0.2%	70.2%	35.4%***
No chronic disorder, limitations	3.6%	4.8%	7.7%	1.9%	4.2%	4.8%	0.2%	5.3%	2.5%
Chronic disorder, no limitations	1.4%	5.6%	3.5%	1.5%	7.0%	6.5%	0.5%	7.4%	8.9%
Chronic disorder, limitations	6.3%	19.7%	57.3%***	4.0%	17.7%	43.9%***	1.2%	17.0%	53.3%***
Self-assessed health - (very) bad	10.7%	8.7%	45.0%***	6.3%	8.7%	34.4%***	1.8%	7.7%	35.2%***
Self-assessed health - fair	3.5%	17.2%	27.0%**	2.5%	16.9%	25.5%*	0.7%	17.8%	30.6%°
Self-assessed health - (very) good	0.9%	74.1%	28.0%***	0.9%	74.5%	40.1%***	0.2%	74.5%	34.2%***

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Clinical profile based on medication use									
Medication use - diabetes	3.4%	6.7%	10.0%	2.1%	6.1%	7.7%	0.9%	5.0%	10.7%
Medication use - cardiovascular disorder	2.3%	27.7%	27.5%	1.5%	27.2%	24.8%	0.3%	25.2%	21.9%
Medication use - thrombosis	3.0%	14.3%	19.1%	1.2%	13.5%	10.0%	0.3%	6.5%	5.0%
Medication use - asthma/COPD	3.7%	5.5%	9.1%	2.2%	4.9%	6.6%	0.2%	4.2%	1.6%
Medication use - epilepsy	2.9%	1.8%	2.3%	2.8%	1.4%	2.5%	0.0%	1.3%	0.0%***
Medication use - neurological disorder	2.6%	2.0%	2.3%	3.4%	1.7%	3.5%	0.0%	1.6%	0.0%***
Medication use - thyroid disorder	4.0%	5.6%	9.9%°	2.8%	5.1%	8.9%	0.8%	4.1%	8.4%
Administrative sources (IMA-AIM): Invalidity, disability, incapacity									
Incapacity to work	4.4%	4.7%	9.2%*	2.4%	4.8%	7.1%	0.3%	5.0%	3.3%
Invalidity or disability	9.3%	4.7%	20.6%***	4.9%	4.0%	12.3%**	1.2%	3.6%	11.0%
Disability	8.0%	0.8%	2.9%	5.8%	0.8%	2.8%	1.3%	0.6%	2.1%
Invalidity	9.4%	3.9%	17.7%***	4.6%	3.3%	9.4%**	1.2%	3.0%	8.9%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 70 – Overview of the distribution of health status in the subpopulations at risk of poverty with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by health status

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unmet needs									
Unmet needs for dental care	53.5%	6.5%	78.3%***	56.7%	3.4%	78.8%***	23.3%	4.1%	94.4%***
Age and gender									
Female aged 18-34 years	10.7%	13.9%	17.4%	6.3%	14.4%	16.9%	1.9%	12.4%	18.5%
Male aged 18-34 years	7.2%	13.4%	10.9%	6.2%	12.2%	14.2%	0.2%	12.0%	2.2%***
Female aged 35-49 years	12.5%	12.3%	18.3%	7.8%	12.3%	18.3%	1.2%	12.2%	11.1%
Male aged 35-49 years	13.4%	10.0%	16.2%	7.6%	10.4%	15.0%	3.5%	8.8%	24.1%
Female aged 50-64 years	8.2%	13.5%	12.7%	8.7%	11.0%	18.4%	1.5%	12.8%	15.0%
Male aged 50-64 years	9.4%	11.3%	12.3%	4.6%	10.1%	8.6%	2.5%	10.8%	20.7%
Female aged 65-79 years	5.9%	10.3%	6.8%	2.1%	11.2%	4.2%**	0.5%	12.1%	4.8%
Male aged 65-79 years	4.2%	8.1%	3.7%*	1.2%	9.5%	2.1%***	0.5%	9.4%	3.6%
Female aged 80 years or more	2.1%	4.3%	1.0%**	1.4%	5.1%	1.3%**	0.0%	6.1%	0.0%***
Male aged 80 years or more	2.9%	2.8%	0.9%*	1.6%	3.7%	1.0%*	0.0%	3.4%	0.0%***
Self-reported health status									
(Very) bad health, chronic disorder and limitations	22.3%	14.0%	41.9%***	13.9%	13.6%	38.3%***	2.0%	11.6%	17.7%
No chronic disorder, no limitations	6.0%	58.2%	38.6%***	4.1%	60.5%	45.0%*	1.0%	56.4%	45.1%
No chronic disorder, limitations	8.8%	6.0%	6.0%	3.8%	5.7%	4.0%	0.4%	7.5%	2.0%*
Chronic disorder, no limitations	6.1%	5.7%	3.9%	2.0%	5.4%	1.9%**	0.0%	8.7%	0.0%***
Chronic disorder, limitations	14.0%	30.2%	51.5%***	9.0%	28.4%	49.2%**	2.5%	27.3%	52.8%°
Self-assessed health - (very) bad	19.2%	17.5%	43.5%***	13.3%	15.3%	41.1%***	2.5%	14.1%	27.1%
Self-assessed health - fair	9.7%	22.2%	24.9%	5.2%	23.9%	22.9%	1.7%	28.6%	37.8%
Self-assessed health - (very) good	4.8%	60.4%	31.6%***	3.3%	60.8%	36.1%***	0.8%	57.4%	35.2%°

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Clinical profile based on medication use									
Medication use - diabetes	7.7%	10.2%	8.8%	0.7%	8.7%	1.1%***	2.1%	7.5%	12.2%
Medication use - cardiovascular disorder	5.6%	30.4%	18.9%**	3.5%	31.8%	20.2%°	0.9%	32.1%	23.4%
Medication use - thrombosis	7.6%	17.4%	15.0%	3.0%	17.9%	9.8%	0.0%	7.7%	0.0%***
Medication use - asthma/COPD	4.7%	8.7%	4.4%°	3.9%	5.7%	4.1%	0.9%	5.3%	3.8%
Medication use - epilepsy	7.7%	2.2%	1.9%	0.0%	2.2%	0.0%***	0.0%	1.6%	0.0%***
Medication use - neurological disorder	9.1%	2.9%	3.1%	16.2%	1.7%	5.6%	0.0%	2.3%	0.0%***
Medication use - thyroid disorder	15.2%	4.7%	8.8%	9.2%	5.1%	9.0%	0.0%	3.6%	0.0%***
Administrative sources (IMA-AIM): Invalidity, disability, incapacity									
Incapacity to work	13.8%	4.8%	8.0%	9.8%	3.4%	6.5%	0.0%	5.3%	0.0%***
Invalidity or disability	15.3%	9.2%	17.3%*	7.6%	6.6%	9.6%	0.0%	6.3%	0.0%***
Disability	15.6%	2.3%	4.4%	10.2%	2.0%	3.9%	0.0%	1.6%	0.0%***
Invalidity	15.1%	6.9%	12.9%°	6.5%	4.7%	5.7%	0.0%	4.8%	0.0%***

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 71 – Overview of the distribution of health status in the subpopulations of the lower middle class with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by health status

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unmet needs									
Unmet needs for dental care	45.2%	2.6%	72.5%***	36.6%	3.1%	68.4%***	9.5%	2.4%	36.1%*
Age and gender									
Female aged 18-34 years	0.8%	10.9%	3.0%***	2.1%	11.0%	9.0%	0.2%	11.8%	3.7%*
Male aged 18-34 years	5.6%	8.1%	16.1%	3.1%	10.1%	12.6%	0.6%	8.8%	7.2%
Female aged 35-49 years	4.7%	9.5%	15.8%	3.4%	10.8%	14.7%	0.5%	10.1%	7.0%
Male aged 35-49 years	3.9%	8.5%	11.6%	5.2%	8.9%	18.8%	2.2%	9.3%	30.0%
Female aged 50-64 years	6.0%	10.8%	23.5%*	3.6%	10.4%	15.0%	1.3%	11.4%	21.5%
Male aged 50-64 years	1.8%	9.2%	5.8%	2.6%	10.3%	10.5%	0.7%	10.8%	10.5%
Female aged 65-79 years	3.6%	16.5%	21.0%	0.8%	15.2%	4.8%***	0.5%	15.6%	12.1%
Male aged 65-79 years	0.2%	10.9%	0.6%***	2.6%	10.6%	10.8%	0.5%	12.1%	8.0%
Female aged 80 years or more	0.8%	10.0%	2.6%**	0.9%	8.5%	3.1%°	0.0%	7.4%	0.0%***
Male aged 80 years or more	0.0%	5.8%	0.0%***	0.4%	4.3%	0.7%***	0.0%	2.8%	0.0%***
Self-reported health status									
(Very) bad health, chronic disorder and limitations	9.5%	12.8%	45.6%***	7.0%	13.3%	38.2%***	2.6%	11.5%	45.6%*
No chronic disorder, no limitations	1.3%	57.7%	25.2%***	1.4%	61.0%	33.9%**	0.1%	58.7%	7.2%***
No chronic disorder, limitations	5.4%	6.3%	12.2%	2.9%	5.9%	6.9%	0.4%	8.4%	5.5%
Chronic disorder, no limitations	1.9%	6.5%	4.4%	2.3%	7.0%	6.2%	1.8%	6.6%	17.9%
Chronic disorder, limitations	5.5%	29.6%	58.3%***	5.1%	26.1%	53.1%**	1.8%	26.2%	69.4%**
Self-assessed health - (very) bad	10.2%	14.3%	54.9%***	6.4%	15.7%	41.2%***	2.7%	14.0%	56.3%**
Self-assessed health - fair	1.7%	26.1%	15.6%°	2.5%	22.8%	22.2%	0.5%	23.4%	18.5%
Self-assessed health - (very) good	1.4%	59.6%	29.4%***	1.5%	61.5%	36.6%**	0.3%	62.6%	25.2%**

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Clinical profile based on medication use									
Medication use - diabetes	4.7%	10.1%	16.9%	5.9%	8.2%	19.4%°	1.1%	7.8%	12.1%
Medication use - cardiovascular disorder	2.8%	39.9%	39.5%	2.2%	37.5%	32.5%	0.5%	36.2%	25.6%
Medication use - thrombosis	2.7%	23.4%	21.8%	1.9%	20.3%	15.3%	0.5%	10.7%	8.0%
Medication use - asthma/COPD	7.3%	7.2%	19.2%°	1.8%	7.2%	5.0%	0.0%	5.5%	0.0%***
Medication use - epilepsy	4.4%	2.7%	4.2%	11.4%	1.3%	6.6%	0.0%	1.8%	0.0%***
Medication use - neurological disorder	1.2%	3.8%	1.6%°	1.5%	2.0%	1.1%	0.0%	2.8%	0.0%***
Medication use - thyroid disorder	3.5%	7.3%	9.0%	3.7%	6.2%	9.2%	3.2%	5.9%	28.2%
Administrative sources (IMA-AIM): Invalidity, disability, incapacity									
Incapacity to work	4.7%	3.6%	6.0%	1.8%	6.0%	4.2%	1.4%	5.1%	11.0%
Invalidity or disability	10.0%	7.1%	26.9%**	9.5%	6.1%	24.3%**	0.8%	6.1%	7.0%
Disability	4.4%	1.1%	1.8%	6.0%	1.4%	3.5%	5.2%	0.9%	7.0%
Invalidity	10.7%	6.1%	25.1%**	10.4%	4.7%	20.8%**	0.0%	5.2%	0.0%***

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.3.2. Characteristics related to the healthcare system

Table 72 provides information on the distribution of the characteristics related to health system variables in the subpopulations with and without unmet needs for medical care (see Box 2 on how to interpret the results in the Tables and Figures). Table 73 and Table 74 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 107 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) individuals registered in a community health centre; (panel B) individuals with increased reimbursement status.

Main conclusions

1. We find that the fraction of individuals that is registered in a community health centre is much higher in 2016 among the subpopulation with unmet needs, i.e. 11.7% in 2016 up from 5.7% in 2008 compared to the subpopulation without unmet needs, i.e. 3.2% in 2016 up from 1.7% in 2008. The strong increase is predominantly driven by an increase among individuals at risk of poverty where 3.4% of the individuals with unmet needs were registered in a community health centre in 2008 increasing up to 15.7% in 2016. Most of these individuals were also enrolled in a community health centre in the year before the survey interview. However, the increase also took place within individuals of the core middle class reporting to have unmet needs (results not shown).
   It is unclear what is behind this difference. One possibility is that individuals in a vulnerable financial situation, who are in need of care, but have difficulties to afford care turn increasingly to community health centres, since basic care is free at the point of consumption. This provides them with primary care free of charge, but does not imply that they can afford other types of care, such as specialist or hospital care explaining the unmet needs for medical care. However, from the analysis of the indicators on care use, we did not find important differences in use of specialist, inpatient or dental care between individuals registered or not in a community health centre (see sections 1.4, 1.6 and 1.8). Moreover, we find an increase in registration rates also among individuals with unmet needs in the core middle class. A second possibility is that patients enrolled in healthcare community centres have different perceptions about the care they require, possibly because of the multidisciplinary approach in the community care centres, and hence perceive unmet needs. A third possibility is that individuals enrolled in a community health centre do not feel that they receive adequate care. This, however, appears to be unlikely as one would expect to see a decrease in enrolment rates between the year prior to the survey year and the survey year. A fourth possibility is that there is a regional effect with higher unmet needs and enrolment in community health centres in Wallonia and Brussels.
2. Individuals who benefit from measures designed to decrease the burden of healthcare costs are overrepresented in the subpopulation with unmet needs. This might indicate that these measures are not sufficient to avoid postponement of medical care, possibly because financial protection measures are aimed at limiting co-payments, but do not protect against high supplements that are increasingly driving out-of-pocket payments upwards (see section 2.3.6). We find a higher share of individuals with increased reimbursement, with receipt of reimbursement through the system of maximum billing (in 2016), with the status chronic illness (in 2016) and with eligibility to the lump sum chronic illness (in 2016) in the subgroup with unmet needs compared to the subgroup without unmet needs. However, while differences between the subpopulation with and without unmet needs exist in 2016 for protection measures related to high healthcare use or co-payments (reimbursement through the system of maximum billing that sets an income-dependent annual cap on household co-payments, eligibility for the status or lump sum chronic illness), these differences are primarily situated in the lower middle class (and to a lesser extent in the core middle class); they are small(er) and not significant among the population at risk of poverty. It is likely that due to postponement of medical care, individuals in households at risk of poverty do not reach the required thresholds for eligibility or reimbursement; hence more inclusive entitlements for this subgroup might be part of a policy to reduce unmet needs.

With respect to increased reimbursement, we find an increase in coverage rates over time in both the subpopulation with and without unmet needs: 64.7% of the individuals with unmet needs benefitted from increased reimbursement in 2016, up from 40.5% in 2008, compared to 17.4% of the individuals without unmet needs in 2016 and 13.5% in 2008. Put differently, 7.9% of the individuals with increased reimbursement reports to have unmet needs for medical care in 2016. These fractions are even higher among the subgroup at risk of poverty and lower in the lower middle class (where fewer individuals benefit from the means-tested measures).

The high fractions of individuals with increased reimbursement in the subpopulation with unmet needs, can be partly explained by the fact that individuals with higher care costs and hence higher care needs (and possibly also higher unmet needs) are more likely to take up the increased reimbursement status, because they interact more with the system and are better informed about the different statuses.

Given that accessibility to a GP was strengthened over time in the system of increased reimbursement (e.g. social third payer system, see Scientific report section 3.1.1), it appears that unmet needs for medical care for financial reasons are not in the first place related to GP care.

Figure 107 – Evolution (2008, 2012, 2016) for subset of characteristics related to the healthcare system for the population with and without unmet needs for medical care

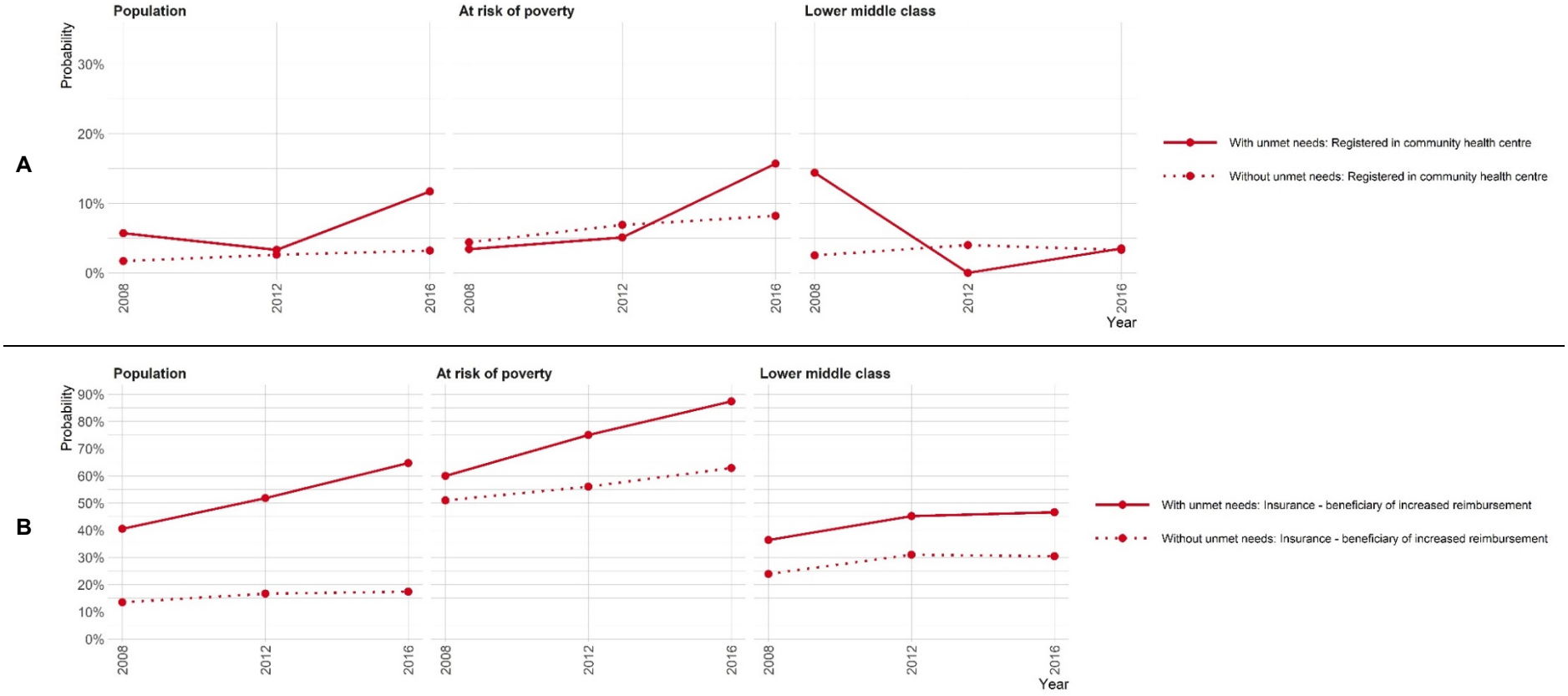


Table 72 – Overview of the distribution of health system variables in the subpopulations with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by health system variables

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Community health centre									
Registered in community health centre	7.9%	3.2%	11.7%***	2.1%	2.6%	3.3%	1.3%	1.7%	5.7%
Registered in community health centre previous year	7.9%	3.0%	11.0%***	2.1%	2.6%	3.3%	1.4%	1.6%	5.7%
Insurance status									
Insurance - beneficiary of increased reimbursement	7.9%	17.4%	64.7%***	5.0%	16.7%	51.8%***	1.2%	13.5%	40.5%**
Receipt of reimbursements in system maximum billing (MAB)	4.7%	11.7%	24.8%***	2.4%	10.4%	15.0%	0.4%	10.0%	10.5%
Status chronic illness	3.9%	12.4%	21.8%**						
Entitled to lump sum chronic illness	4.8%	6.5%	14.2%**	2.3%	6.1%	8.6%	0.9%	5.0%	10.8%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 73 – Overview of the distribution of health system variables in the subpopulations at risk of poverty with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by health system variables

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Community health centre									
Registered in community health centre	15.4%	8.2%	15.7%*	4.0%	6.9%	5.1%	1.0%	4.4%	3.4%
Registered in community health centre previous year	13.7%	8.7%	14.4%°	4.3%	6.5%	5.1%	1.2%	3.6%	3.4%
Insurance status									
Insurance - beneficiary of increased reimbursement	11.7%	62.9%	87.4%***	7.1%	56.0%	75.0%***	1.5%	51.0%	60.0%

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Receipt of reimbursements in system maximum billing (MAB)	9.3%	18.1%	19.3%	5.8%	14.6%	15.6%	1.2%	13.4%	12.2%
Status chronic illness	10.9%	15.5%	19.8%						
Entitled to lump sum chronic illness	10.0%	11.1%	12.8%	2.6%	9.7%	4.5%°	0.5%	9.6%	3.8%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 74 – Overview of the distribution of health system variables in the subpopulations of the lower middle class with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by health system variables

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Community health centre									
Registered in community health centre	3.0%	3.3%	3.5%	0.0%	4.0%	0.0%***	3.8%	2.5%	14.4%
Registered in community health centre previous year	3.6%	2.8%	3.5%	0.0%	4.2%	0.0%***	3.8%	2.5%	14.4%
Insurance status									
Insurance - beneficiary of increased reimbursement	4.3%	30.4%	46.6%*	3.7%	31.0%	45.2%°	1.0%	23.9%	36.4%
Receipt of reimbursements in system maximum billing (MAB)	5.6%	21.9%	44.4%**	1.7%	19.8%	13.1%	0.5%	22.2%	17.9%
Status chronic illness	4.4%	19.1%	29.9%						
Entitled to lump sum chronic illness	5.9%	10.6%	22.6%°	4.4%	11.4%	19.8%	2.5%	8.2%	30.9%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.3.3. Characteristics related to socioeconomic status

Table 75 provides information on the distribution of the characteristics related to socioeconomic status in the subpopulations with and without unmet needs for medical care (see Box 2 on how to interpret the results in the Tables and Figures). Table 76 and Table 77 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 108 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) inactivity; (panel B) welfare support; (panel C) material deprivation; (panel D) tenure status; (panel E) educational attainment.

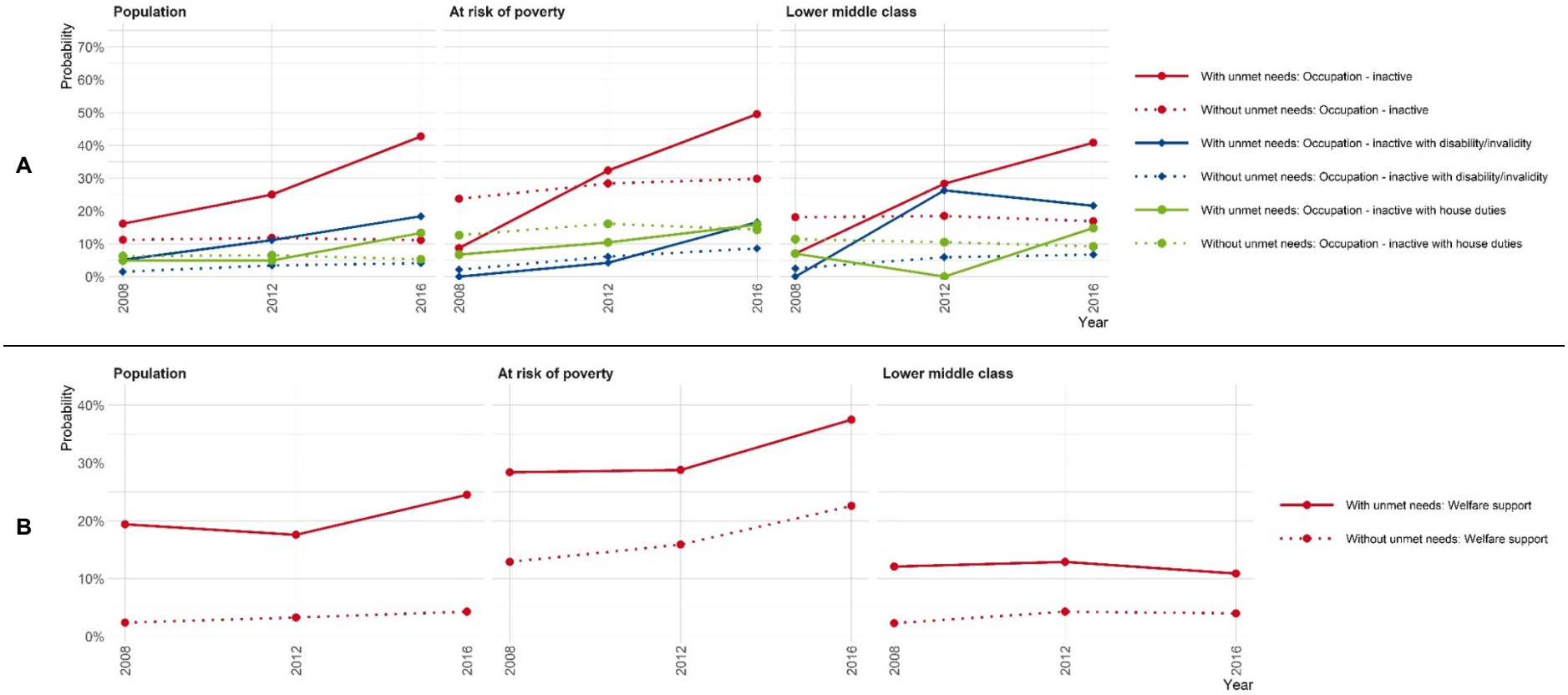
Main conclusions

1. Individuals with unmet needs for medical care for financial reasons have on average a lower income than individuals without unmet needs. The discrepancy has increased over time. The average equivalized household income has remained constant over time in the subpopulation with unmet needs (while it has increased in the subpopulation without unmet needs); hence given the inflation, it has decreased in absolute terms. This implies that this group consists increasingly of poor individuals.
   This is confirmed by the changing composition of the income groups over time. While in 2008 42.6% of the subpopulation with unmet needs was at risk of poverty and 13.1% belonged to the upper middle class, this has changed in 2016 to 56.8% at risk of poverty and 0.2% in the upper middle class. The combined share of the lower and core middle class have remained more or less stable over time.
   When comparing the average income within income groups, we find little difference in income level between the subpopulations with and without unmet needs.
2. The subpopulation with unmet needs has a significantly larger fraction of individuals with low educational attainment and a smaller fraction of individuals with tertiary education (see also Figure 108, panel E).
3. The results clearly demonstrate that there is an increased risk of unmet needs among the population at working age, but not at work, i.e. either in unemployment or inactivity. Individuals in retirement on the other hand have a lower risk for unmet needs, a trend that was already found when looking at age patterns (see section 2.3.1).
   The fraction of individuals in inactivity among the subpopulation with unmet needs has increased drastically over time, and this both among individuals at risk of poverty and in the lower middle class (see also Figure 108, panel A). In 2008, 16.1% of the individuals with unmet needs were in inactivity, while in 2016 this increased up to 42.7%; for individuals in unemployment the fractions were 35.3% in 2008 and 17.6% in 2016. Neither the inactivity nor unemployment rate have drastically changed in the subpopulation without unmet needs for medical care, indicating that this is not a general increase in the rates across the population.
   Moreover there are two aggravating circumstances. First, it concerns individuals in long-term unemployment or long-term inactivity, as unemployment/inactivity rates of individuals who are currently *and* in the previous year unemployed/inactive are nearly as high as the unemployment/inactivity rates of individuals who are currently unemployed/inactive. Second, in the subpopulation with unmet needs, about two thirds of the population (in 2016: 87.3% in the subgroup at risk of poverty; 47.2% in the lower middle class) belong to a household with very low working intensity. In such households, individuals at working age spend less than 20% of their combined available time in paid employment, self-employment or traineeship. Put differently, 10.3% of the individuals who live in a household with very low working intensity, reported to have unmet needs in 2016 (up from 2.4% in 2008); this fraction was about 13.6% among individuals at risk of poverty (or 1 in 8 individuals) and 6.9 in the lower middle class.
4. There is an overrepresentation of individuals on welfare support among the individuals with unmet needs for medical care. As for individuals in inactivity, this fraction has increased over time (see also Figure 108, panel B). In 2016, 11.6% of individuals (or 1 in 9 individuals) receiving welfare support indicate to have unmet needs for medical care for financial reasons, this fraction was 13.7% (or 1 in 8 individuals) among

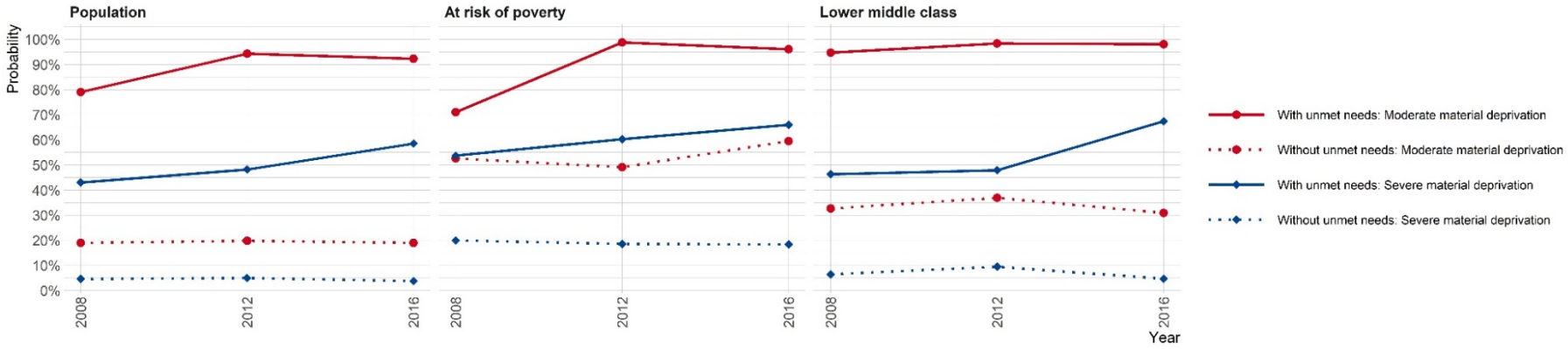
individuals at risk of poverty and 7.4% in the lower middle class.
When looking at individuals who receive either welfare support or an allowance for invalidity or disability, we find that in 2016 about 44.4% of the individuals with unmet needs received such support and 10.4% of the individuals receiving such support indicates to have unmet needs. These are high rates and indicate that despite the social safety net, an important number of individuals have unmet needs for medical care. On the other hand, individuals receiving welfare support or an invalidity/disability allowance are registered in administrative databases and can be identified. These individuals enter into contact with a medical doctor (invalidity/disability) or a social worker (welfare support), contacts that provide an opportunity to better understand and cope with unmet needs in this specific population.

5. Most striking, however, is the difference in financial situation between the subpopulation with and without unmet needs and in particular the difference and trend in material deprivation (see Figure 108, panel C). In 2016, at least 92.3% of the individuals with unmet needs indicate to be moderately materially deprived and 58.5% of the individuals were severely materially deprived. Over 90% of the individuals in the subpopulation with unmet needs indicates to be unable to cope with unexpected expenses compared to about 20% in the subpopulation without unmet needs and this in all years.
Reducing material deprivation can be a lever for avoiding delayed or forgone medical care. It becomes clear that individuals who are not able to afford basic necessities (food, utilities, housing, basic hygiene) find it increasingly more difficult to afford care and hence experience unmet needs for medical care for financial reasons. Some examples are: 21.2% of individuals who cannot afford a hot meal every second day in 2016 (up from 2.5% in 2008, 13.8% in 2012); 23.6% of individuals who cannot afford a washing machine in 2016 (up from 6.2% in 2008, 18.1% in 2012); 17.5% of individuals with arrears on utility, rent or mortgage in 2016 (up from 2.5% in 2008, 9.3% in 2012). Overall, 26.1% of the individuals with severe material deprivation report to have unmet needs for medical care for financial reasons (up from 3.6% in 2008, 14.1% in 2012). These fractions are even more outspoken in this subpopulation at risk of poverty, but remain a distinctive criterion in the lower middle class and even in the core middle class (results not shown). Expenses for basic necessities compete with the required expenses for healthcare.
Moreover, we find that housing costs are a higher burden for individuals with unmet needs, amounting to over 40% of their disposable income in 2016, leaving little room for other expenses, let alone the ability to cope with unexpected expenses. The results indicate that individuals who own a house are less at risk to experience unmet needs for medical care for financial reasons compared to tenants. In the subpopulation at risk of poverty, the majority of individuals are tenants, whereas in the lower middle class, the majority owns their own house.

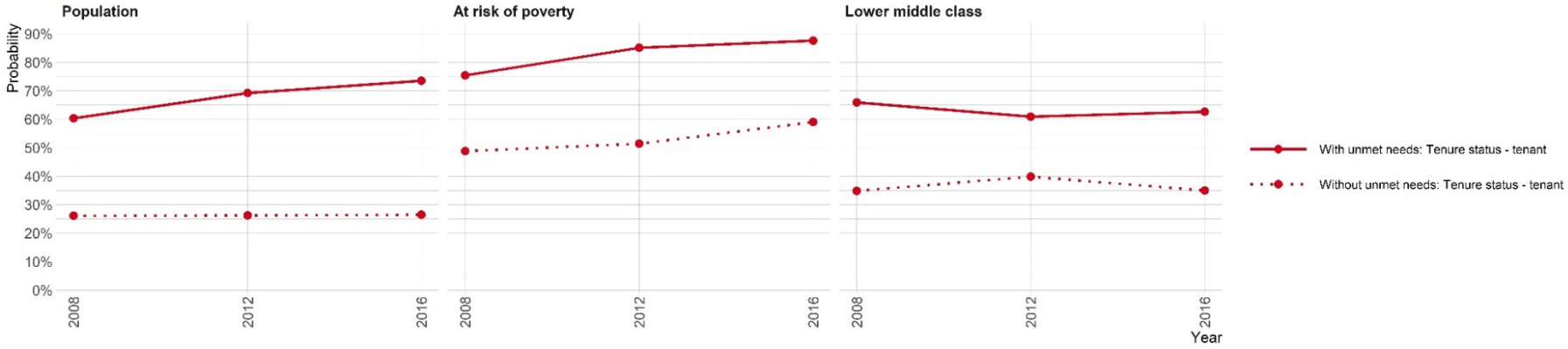
Figure 108 – Evolution (2008, 2012, 2016) for subset of characteristics related to socioeconomic status of the population with and without unmet needs for medical care



C


Population
At risk of poverty
Lower middle class
Probability
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Moderate material deprivation
Without unmet needs: Moderate material deprivation
With unmet needs: Severe material deprivation
Without unmet needs: Severe material deprivation

D


Population
At risk of poverty
Lower middle class
Probability
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Tenure status - tenant
Without unmet needs: Tenure status - tenant

E

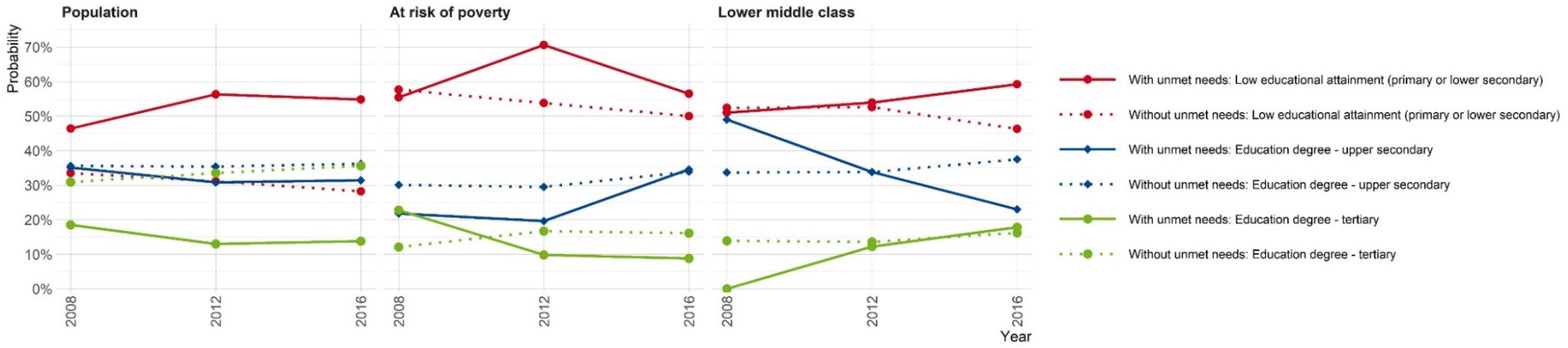


Table 75 – Overview of the distribution of socioeconomic status in the subpopulations with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by socioeconomic status

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household income									
Equivalized disposable household income		24 407.5	13 310.0***		22 104.7	13 510.8***		20 293.4	13 381.5***
Household at risk of poverty (<60% of median income)	8.7%	13.8%	56.8%***	5.4%	13.8%	46.6%***	1.3%	13.0%	42.6%***
Lower middle class ([60%-80%) of median income)	2.9%	19.0%	24.1%	2.5%	18.7%	28.9%*	0.7%	17.5%	29.7%
Core middle class ([80%-120%) of median income)	1.3%	32.7%	18.8%***	1.1%	33.0%	20.7%***	0.2%	33.7%	14.5%***
Upper middle class ([120%-200%) of median income)	0.0%	29.5%	0.2%***	0.2%	29.9%	3.8%***	0.2%	30.6%	13.1%**
Top middle class (>=200% of median income)	0.0%	5.0%	0.0%***	0.0%	4.7%	0.0%***	0.0%	5.1%	0.0%***
Self-reported occupation									
Low working intensity household (intensity < 0.20)	10.3%	14.2%	66.7%***	7.3%	13.3%	53.7%***	2.4%	11.9%	66.5%***

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Occupation - full-time employee	0.7%	31.2%	9.3%***	0.6%	33.2%	12.4%***	0.2%	34.1%	16.2%**
Occupation - part-time employee	0.9%	12.1%	4.5%***	1.5%	12.7%	11.8%	0.2%	11.8%	5.7%
Occupation - self-employed	1.3%	5.5%	3.0%°	0.2%	5.2%	0.6%***	0.1%	6.4%	1.8%*
Occupation - retired	1.5%	27.1%	17.3%***	0.9%	24.5%	13.2%***	0.4%	24.4%	23.8%
Occupation - unemployed	7.1%	5.3%	17.6%***	8.2%	5.7%	30.5%***	2.4%	5.7%	35.3%***
Occupation - unemployed (currently and in previous year)	8.5%	3.6%	14.4%***	9.4%	4.2%	26.1%***	2.7%	4.4%	30.4%***
Occupation - inactive	8.2%	11.1%	42.7%***	3.4%	11.8%	25.0%***	0.6%	11.2%	16.1%
Occupation - inactive with disability/invalidity	9.4%	4.1%	18.4%***	5.2%	3.4%	11.1%**	1.4%	1.5%	5.1%
Occupation - inactive with house duties	5.4%	5.3%	13.3%**	1.3%	6.5%	4.9%	0.3%	6.3%	4.9%
Occupation - inactive for other reason	13.8%	1.6%	11.1%***	7.1%	2.0%	9.1%*	0.7%	3.4%	6.1%
Occupation - inactive (currently and in previous year)	8.6%	9.9%	40.2%***	3.6%	10.1%	22.5%***	0.7%	9.6%	16.1%
Welfare support (OCMW/CPAS)	11.6%	4.3%	24.5%***	8.4%	3.3%	17.6%***	3.1%	2.4%	19.4%*
Welfare support (OCMW/CPAS) or invalidity/disability allowance	10.4%	8.9%	44.4%***	6.4%	7.2%	29.1%***	2.0%	5.9%	30.4%**
Material deprivation									
Moderately materially deprived	10.1%	19.0%	92.3%***	7.5%	19.8%	94.3%***	1.6%	19.0%	79.0%***
Severely materially deprived	26.1%	3.8%	58.5%***	14.1%	5.0%	48.2%***	3.6%	4.6%	43.0%***
Unable to cope with unexpected expenses	9.0%	22.4%	95.0%***	6.5%	22.2%	90.6%***	1.7%	20.9%	91.3%***
Unable to afford 1 week holiday	8.0%	24.2%	90.7%***	5.6%	25.1%	88.9%***	1.2%	24.1%	70.6%***
Arrears on utility, rent, mortgage	17.5%	4.9%	44.7%***	9.3%	6.3%	38.7%***	2.5%	5.3%	34.2%***
Unable to afford meal every second day	21.2%	4.7%	54.2%***	13.8%	4.5%	42.1%***	2.5%	4.5%	28.6%***
Unable to afford washing machine	23.6%	1.2%	15.4%***	18.1%	1.4%	18.3%***	6.2%	1.6%	25.9%**
Unable to afford car	16.0%	5.6%	45.7%***	11.0%	6.0%	44.4%***	1.9%	5.6%	27.6%**
Unable to keep home adequately warm	17.1%	3.9%	35.1%***	12.1%	5.5%	44.5%***	2.3%	5.9%	33.7%***

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Heavy burden loan or mortgage	6.6%	29.2%	89.2%***	4.5%	31.8%	89.0%***	1.1%	30.5%	84.9%***
Share housing costs (% of disposable income)		19.1%	41.2%***		22.0%	38.4%***		25.5%	33.1%*
Tenure status									
Tenure status - owner	0.8%	73.5%	26.5%***	0.7%	73.8%	30.8%***	0.2%	73.9%	39.7%***
Tenure status - tenant	6.0%	26.5%	73.5%***	4.3%	26.2%	69.2%***	0.9%	26.1%	60.3%***
Highest obtained educational degree									
Low educational attainment (primary or lower secondary)	4.3%	28.2%	54.8%***	3.0%	31.1%	56.3%***	0.6%	33.5%	46.4%
Education degree - upper secondary	2.0%	36.2%	31.4%	1.4%	35.4%	30.8%	0.4%	35.6%	35.1%
Education degree - tertiary	0.9%	35.6%	13.8%***	0.6%	33.5%	13.0%***	0.2%	30.9%	18.5%*

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 76 – Overview of the distribution of socioeconomic status in the subpopulations at risk of poverty with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by socioeconomic status

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household income									
Equivalized disposable household income		10 698.9	10 095.8***		9 450.6	9 721.4		8 521.2	9 190.6**
Self-reported occupation									
Low working intensity household (intensity < 0.20)	13.6%	62.5%	87.3%***	9.6%	57.8%	78.6%***	2.7%	50.7%	86.0%***
Occupation - full-time employee	6.5%	6.5%	4.7%	1.6%	7.2%	2.1%**	1.1%	7.5%	6.2%
Occupation - part-time employee	3.4%	6.8%	2.5%**	5.4%	7.7%	7.7%	1.3%	8.5%	8.8%
Occupation - self-employed	4.0%	5.8%	2.5%°	0.4%	4.8%	0.4%***	1.0%	5.8%	4.3%
Occupation - retired	3.4%	25.7%	9.6%***	1.6%	28.2%	8.2%***	1.3%	30.6%	29.8%
Occupation - unemployed	12.7%	14.1%	21.5%°	14.4%	14.7%	43.6%***	3.2%	15.9%	40.0%°
Occupation - unemployed (currently and in previous year)	13.3%	11.8%	19.0%°	14.5%	12.6%	37.4%***	3.5%	14.4%	40.0%°
Occupation - inactive	13.7%	29.8%	49.5%***	6.1%	28.4%	32.3%	0.5%	23.7%	8.7%**
Occupation - inactive with disability/invalidity	15.6%	8.6%	16.6%°	3.7%	6.1%	4.2%	0.0%	2.1%	0.0%***
Occupation - inactive with house duties	9.5%	14.3%	15.8%	3.6%	16.1%	10.4%	0.7%	12.6%	6.7%
Occupation - inactive for other reason	19.1%	7.0%	17.1%*	14.1%	6.2%	17.7%°	0.3%	9.0%	2.0%**
Occupation - inactive (currently and in previous year)	14.8%	26.7%	48.3%***	6.4%	25.2%	30.1%	0.6%	20.2%	8.7%*
Welfare support (OCMW/CPAS)	13.7%	22.6%	37.5%**	9.4%	15.9%	28.8%*	2.8%	12.9%	28.4%
Welfare support (OCMW/CPAS) or invalidity/disability allowance	14.1%	31.1%	53.6%***	8.6%	22.1%	36.6%*	2.0%	18.8%	28.4%
Material deprivation									
Moderately materially deprived	13.4%	59.5%	96.1%***	10.3%	49.1%	98.8%***	1.7%	52.6%	71.0%
Severely materially deprived	25.5%	18.4%	66.0%***	15.6%	18.6%	60.3%***	3.4%	20.0%	53.7%*
Unable to cope with unexpected expenses	13.5%	59.6%	97.5%***	9.6%	50.9%	94.5%***	2.3%	52.8%	93.4%***

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unable to afford 1 week holiday	12.4%	63.7%	94.1%***	8.4%	57.6%	93.0%***	1.5%	58.6%	67.6%
Arrears on utility, rent, mortgage	23.4%	16.1%	51.4%***	13.1%	15.2%	40.2%***	1.2%	14.7%	13.7%
Unable to afford meal every second day	28.5%	16.0%	66.6%***	18.0%	13.9%	53.4%***	2.6%	16.6%	33.3%
Unable to afford washing machine	34.0%	4.3%	23.2%***	21.9%	5.3%	26.0%***	6.3%	6.6%	33.6%*
Unable to afford car	17.6%	24.1%	53.9%***	14.7%	19.4%	58.3%***	2.3%	21.1%	37.3%
Unable to keep home adequately warm	23.6%	13.2%	42.4%***	18.8%	15.2%	61.8%***	2.0%	15.6%	24.0%
Heavy burden loan or mortgage	13.4%	54.9%	89.0%***	9.5%	49.1%	90.1%***	2.1%	51.9%	82.5%**
Share housing costs (% of disposable income)		37.4%	50.6%***		43.7%	44.1%		59.9%	43.7%°
Tenure status									
Tenure status - owner	2.8%	41.0%	12.4%***	1.7%	48.6%	14.9%***	0.6%	51.2%	24.6%**
Tenure status - tenant	12.4%	59.0%	87.6%***	8.6%	51.4%	85.1%***	2.0%	48.8%	75.4%**
Highest obtained educational degree									
Low educational attainment (primary or lower secondary)	9.8%	50.0%	56.5%	7.0%	53.8%	70.6%**	1.2%	57.7%	55.4%
Education degree - upper secondary	8.9%	33.9%	34.6%	3.6%	29.5%	19.6%*	0.9%	30.1%	21.8%
Education degree - tertiary	5.0%	16.1%	8.8%**	3.2%	16.7%	9.8%*	2.4%	12.1%	22.8%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 77 – Overview of the distribution of socioeconomic status in the subpopulations of the lower middle class with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by socioeconomic status

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household income									
Equivalized disposable household income		15 625.5	15 078.4**		14 163.7	13 886.3°		12 589.4	11 822.6***
Self-reported occupation									
Low working intensity household (intensity < 0.20)	6.9%	24.0%	47.2%*	7.0%	24.8%	51.3%**	2.6%	25.5%	68.5%**
Occupation - full-time employee	2.2%	12.9%	9.8%	1.7%	15.5%	10.2%	0.3%	15.8%	7.2%
Occupation - part-time employee	3.0%	8.4%	8.9%	2.5%	8.5%	8.3%	0.0%	6.9%	0.0%***
Occupation - self-employed	0.7%	4.2%	1.0%**	0.0%	3.6%	0.0%***	0.0%	4.8%	0.0%***
Occupation - retired	1.6%	42.9%	24.2%**	1.4%	38.4%	20.1%**	0.6%	39.3%	37.4%
Occupation - unemployed	5.5%	7.5%	14.8%	6.4%	8.8%	23.1%°	3.8%	8.4%	48.4%**
Occupation - unemployed (currently and in previous year)	5.7%	5.1%	10.5%	7.4%	6.7%	20.5%°	3.6%	6.9%	37.4%*
Occupation - inactive	6.6%	16.9%	40.8%**	3.8%	18.5%	28.3%	0.3%	18.1%	7.0%
Occupation - inactive with disability/invalidity	8.7%	6.7%	21.6%**	10.5%	5.9%	26.3%**	0.0%	2.5%	0.0%***
Occupation - inactive with house duties	4.6%	9.2%	14.8%	0.0%	10.5%	0.0%***	0.4%	11.4%	7.0%
Occupation - inactive for other reason	10.5%	1.1%	4.3%	2.4%	2.1%	2.0%	0.0%	4.2%	0.0%***
Occupation - inactive (currently and in previous year)	6.4%	15.1%	35.3%**	4.1%	15.9%	26.0%	0.3%	16.9%	7.0%
Welfare support (OCMW/CPAS)	7.4%	4.0%	10.9%	7.4%	4.3%	12.9%°	3.5%	2.3%	12.1%
Welfare support (OCMW/CPAS) or invalidity/disability allowance	9.2%	11.0%	37.8%***	8.8%	10.1%	37.2%***	1.6%	8.3%	19.1%
Material deprivation									
Moderately materially deprived	8.6%	30.9%	98.1%***	6.5%	36.9%	98.4%***	1.9%	32.7%	94.7%***
Severely materially deprived	29.8%	4.7%	67.4%***	11.6%	9.5%	47.9%***	4.6%	6.5%	46.3%**
Unable to cope with unexpected expenses	7.5%	35.6%	97.3%***	6.0%	39.1%	95.0%***	2.1%	32.1%	100.0%***

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unable to afford 1 week holiday	6.6%	40.2%	96.8%***	5.2%	45.0%	94.4%***	1.4%	40.5%	82.8%***
Arrears on utility, rent, mortgage	21.4%	5.6%	51.3%***	9.8%	10.0%	41.4%***	6.2%	7.1%	75.1%***
Unable to afford meal every second day	19.0%	6.7%	53.7%***	11.9%	8.0%	41.0%***	2.3%	6.3%	21.4%
Unable to afford washing machine	12.6%	1.7%	8.5%*	16.1%	2.7%	19.8%*	8.4%	1.9%	24.9%°
Unable to afford car	14.2%	7.4%	41.4%***	8.9%	11.1%	41.7%***	1.6%	9.3%	22.8%
Unable to keep home adequately warm	9.0%	6.0%	20.3%**	8.3%	9.5%	32.9%**	3.7%	9.7%	54.4%**
Heavy burden loan or mortgage	6.6%	37.1%	89.3%***	5.7%	40.1%	91.8%***	1.6%	39.9%	94.7%***
Share housing costs (% of disposable income)		24.3%	31.7%**		27.6%	38.3%***		29.4%	32.0%
Tenure status									
Tenure status - owner	1.7%	65.0%	37.4%***	1.7%	60.2%	39.1%**	0.4%	65.2%	34.1%*
Tenure status - tenant	5.0%	35.0%	62.6%***	3.8%	39.8%	60.9%**	1.3%	34.8%	65.9%*
Highest obtained educational degree									
Low educational attainment (primary or lower secondary)	3.6%	46.3%	59.2%°	2.6%	52.6%	53.9%	0.7%	52.4%	51.0%
Education degree - upper secondary	1.8%	37.5%	23.0%*	2.5%	33.8%	33.8%	1.0%	33.7%	49.0%
Education degree - tertiary	3.1%	16.2%	17.8%	2.3%	13.6%	12.2%	0.0%	13.9%	0.0%***

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.3.4. Characteristics related to sociodemographic situation

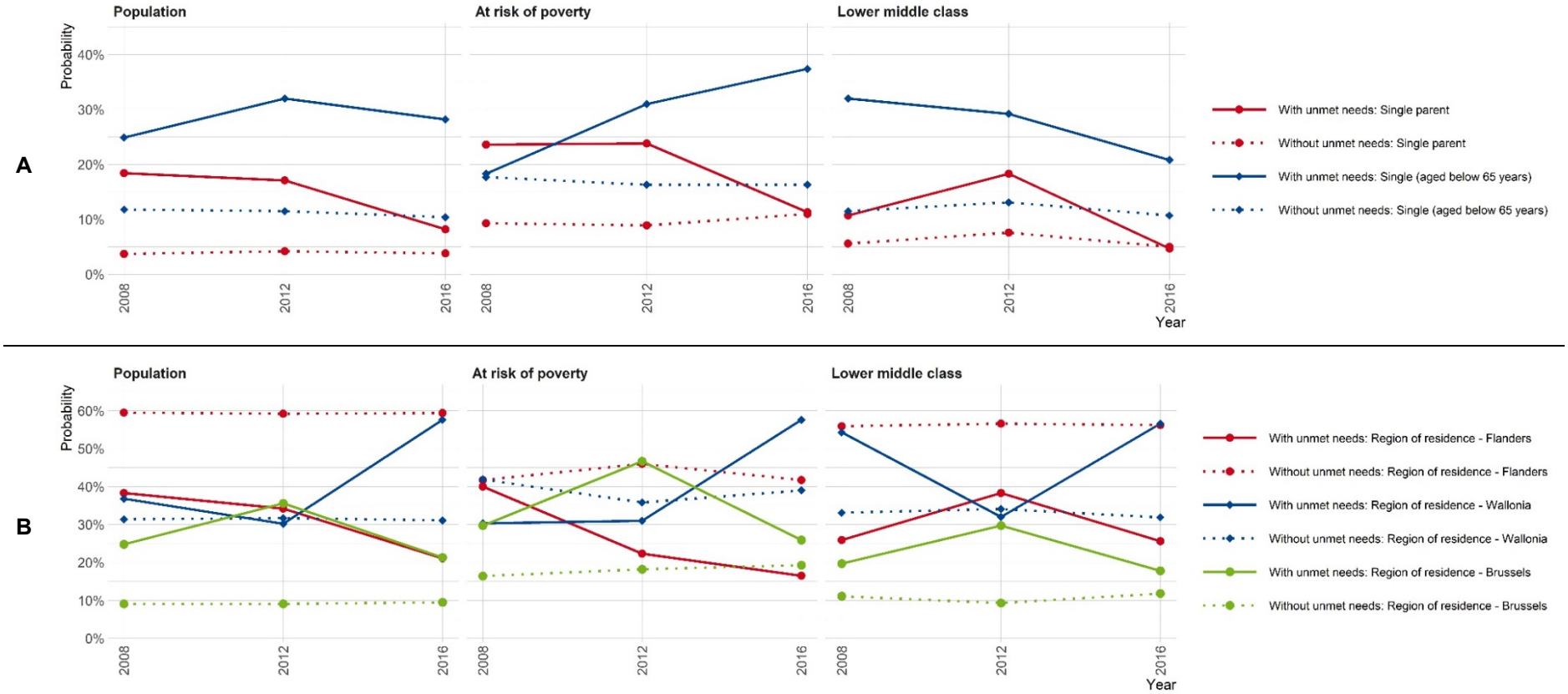
Table 78 provides information on the distribution of the characteristics related to sociodemographic features in the subpopulations with and without unmet needs for medical care (see Box 2 on how to interpret the results in the Tables and Figures). Table 79 and Table 80 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 109 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) singles and single parents; (panel B) region of residence; (panel C) urbanization; (panel D) country of birth.

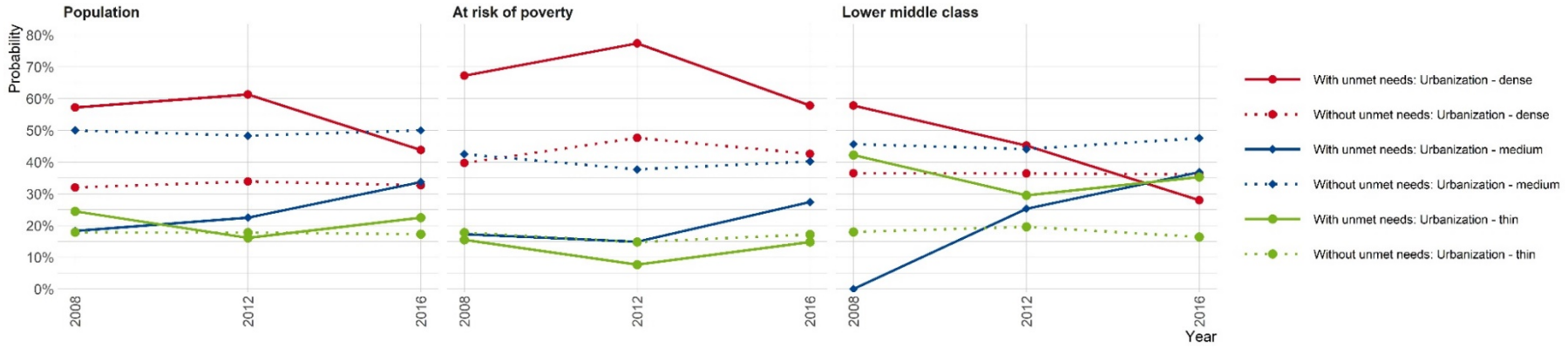
Main conclusions

1. Single persons (with and without children), but in particular single adults without children aged below 65 years have an increased risk to report unmet needs for medical care for financial reasons (see also Figure 109, panel A). For singles below 65, the risk has increased over time, in particular among those at risk of poverty where 18.0% (or almost 1 in 5 individuals) report to have postponed medical care for financial reasons in 2016. For single parent households, the overrepresentation in the subpopulation with unmet needs, has decreased over time.
2. There is a striking regional difference and differential trend in unmet needs for medical care for financial reasons between the regions (see Figure 109, panel B and KCE HSPA report 313[18]), with lower rates of postponement of care for financial reasons in Flanders and higher rates in Wallonia and Brussels. While individuals in Brussels were already at increased risk for unmet needs in 2008, the situation in Wallonia has deteriorated over time and in particular between 2012 and 2016.
   The regional differences should be considered in combination with other distinctive characteristics that are associated with unmet needs and differ between the regions, such as the age structure (Brussels has a younger population), the (in)activity rates (activity rate is higher in Flanders), the unemployment rate (the unemployment rate is lower in Flanders), the poverty risk (lower in Flanders), etc. For example, while about 10% of the Belgian population lives in Brussels, about 20% of the households at risk of poverty live in Brussels. Given that postponement of medical care for financial reasons is more important in the population at risk of poverty, it is also not surprising that the risk for unmet needs is higher in Brussels. However, we also find a higher rate of unmet needs in Brussels and Wallonia when an analysis within income groups is made.
3. Individuals with unmet needs for medical care for financial reasons predominantly live in densely populated areas (see also Figure 109, panel C). Also when zooming in on the subpopulation at risk of poverty, we find an overrepresentation of individuals in densely populated areas among the subgroup with unmet needs. This is of course linked to the results for Brussels. In the lower middle class, we also find an increased risk to have unmet needs for medical care for individuals living in rural areas.
4. Individuals who reside in Belgium, but are borne in a country outside the European Union are at increased risk of unmet needs for medical care for financial reasons (see also Figure 109, panel D). This is in the first place the result of an increasing share over time of individuals borne outside the EU in the population at risk of poverty.

Figure 109 – Evolution (2008, 2012, 2016) for subset of characteristics related to sociodemographic features for the population with and without unmet needs for medical care



C


Population
At risk of poverty
Lower middle class
Probability
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Urbanization - dense
Without unmet needs: Urbanization - dense
With unmet needs: Urbanization - medium
Without unmet needs: Urbanization - medium
With unmet needs: Urbanization - thin
Without unmet needs: Urbanization - thin

D

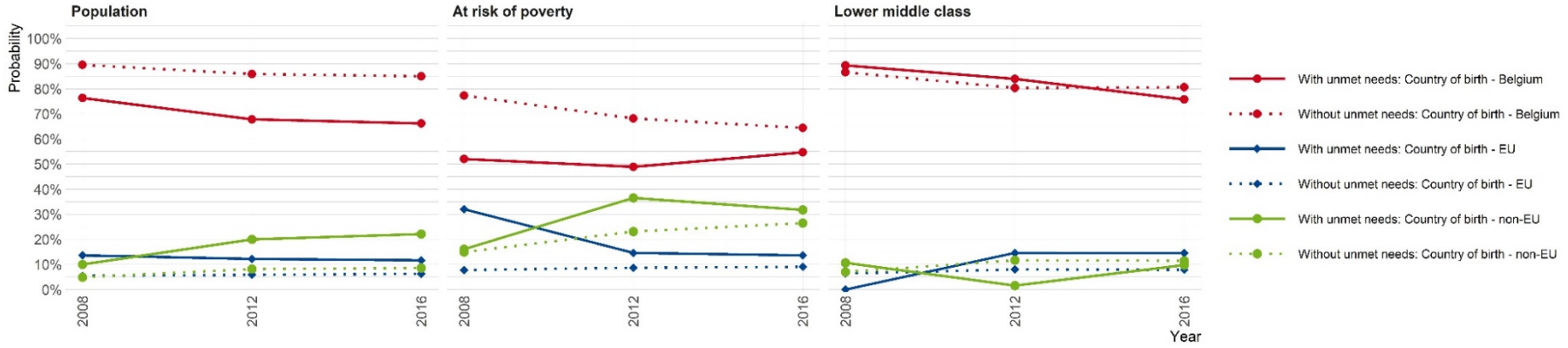

Population
At risk of poverty
Lower middle class
Probability
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Country of birth - Belgium
Without unmet needs: Country of birth - Belgium
With unmet needs: Country of birth - EU
Without unmet needs: Country of birth - EU
With unmet needs: Country of birth - non-EU
Without unmet needs: Country of birth - non-EU

Table 78 – Overview of the distribution of sociodemographic features in the subpopulations with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by sociodemographic feature

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household composition									
Household size		2.8	2.6		2.7	2.2***		2.8	2.3*
Couple without children	1.5%	31.1%	21.0%***	0.8%	31.4%	15.2%***	0.4%	31.8%	31.4%
Couple with children	1.3%	28.9%	16.1%***	1.1%	28.9%	19.0%**	0.2%	27.7%	15.3%*
Single without children	4.6%	18.2%	37.9%***	3.3%	19.1%	39.0%***	0.6%	19.3%	28.5%
Single parent	4.7%	3.8%	8.2%*	6.4%	4.2%	17.1%***	1.9%	3.7%	18.4%*
Household composition - other	2.1%	17.8%	16.8%	1.0%	16.4%	9.7%*	0.1%	17.5%	6.4%***
Single (aged below 65 years)	5.9%	10.4%	28.2%***	4.5%	11.5%	32.0%***	0.8%	11.8%	24.9%°
Place of residence									
Region of residence - Flanders	0.8%	59.4%	21.1%***	1.0%	59.2%	34.2%***	0.3%	59.5%	38.3%**
Region of residence - Wallonia	4.1%	31.1%	57.6%***	1.6%	31.7%	30.2%	0.5%	31.4%	36.8%
Region of residence - Brussels	4.9%	9.5%	21.3%***	6.2%	9.1%	35.6%***	1.1%	9.1%	24.8%*
Urbanization - dense	3.0%	32.7%	43.8%**	3.0%	33.9%	61.3%***	0.7%	32.0%	57.2%**
Urbanization - medium	1.5%	50.0%	33.7%***	0.8%	48.3%	22.5%***	0.1%	50.0%	18.3%***
Urbanization - thin	2.9%	17.3%	22.5%	1.5%	17.8%	16.1%	0.5%	17.9%	24.5%
Country of birth									
Country of birth - Belgium	1.8%	85.0%	66.2%***	1.3%	85.9%	67.8%***	0.3%	89.5%	76.3%°
Country of birth - EU	4.1%	6.3%	11.7%*	3.4%	5.9%	12.2%*	1.0%	5.5%	13.6%
Country of birth - non-EU	5.6%	8.6%	22.1%***	3.9%	8.2%	20.0%**	0.8%	4.9%	10.0%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 79 – Overview of the distribution of sociodemographic features in the subpopulations at risk of poverty with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by sociodemographic feature

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household composition									
Household size		2.7	2.6		2.6	2.2*		2.6	2.6
Couple without children	4.5%	24.5%	12.0%***	3.5%	30.7%	19.3%*	1.6%	27.9%	35.3%
Couple with children	7.5%	23.7%	20.0%	4.3%	22.7%	17.7%	0.8%	19.4%	12.4%
Single without children	14.9%	25.6%	46.7%***	7.0%	25.9%	34.3%	0.8%	31.6%	18.3%
Single parent	9.0%	11.0%	11.3%	13.2%	8.9%	23.8%*	3.2%	9.3%	23.6%
Household composition - other	5.9%	15.2%	9.9%°	2.3%	11.8%	4.9%**	1.2%	11.8%	10.4%
Single (aged below 65 years)	18.0%	16.3%	37.4%***	9.8%	16.3%	31.0%*	1.3%	17.7%	18.3%
Place of residence									
Region of residence - Flanders	3.6%	41.7%	16.5%***	2.7%	46.0%	22.3%***	1.2%	41.7%	40.0%
Region of residence - Wallonia	12.4%	39.0%	57.6%***	4.7%	35.8%	31.0%	0.9%	41.9%	30.3%
Region of residence - Brussels	11.4%	19.3%	25.9%°	12.8%	18.2%	46.7%***	2.3%	16.4%	29.7%
Urbanization - dense	11.5%	42.6%	57.8%**	8.5%	47.6%	77.4%***	2.2%	39.7%	67.2%*
Urbanization - medium	6.1%	40.2%	27.4%*	2.2%	37.7%	14.9%***	0.5%	42.5%	17.3%**
Urbanization - thin	7.6%	17.2%	14.8%	2.9%	14.8%	7.7%*	1.1%	17.8%	15.5%
Country of birth									
Country of birth - Belgium	7.5%	64.4%	54.7%°	3.9%	68.2%	48.9%**	0.9%	77.3%	52.0%°
Country of birth - EU	12.5%	9.1%	13.6%	8.8%	8.7%	14.6%	5.1%	7.8%	32.0%°
Country of birth - non-EU	10.3%	26.5%	31.7%	8.3%	23.1%	36.5%*	1.4%	14.9%	16.1%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 80 – Overview of the distribution of sociodemographic features in the subpopulations of the lower middle class with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by sociodemographic feature

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household composition									
Household size		2.5	2.4		2.4	2.3		2.6	1.9°
Couple without children	2.2%	30.2%	23.4%	0.8%	29.8%	9.4%***	0.7%	32.6%	34.2%
Couple with children	1.0%	20.8%	6.9%***	1.4%	20.6%	11.3%*	0.3%	21.8%	11.0%
Single without children	2.8%	31.4%	31.0%	3.3%	32.3%	42.5%	1.1%	28.2%	44.1%
Single parent	2.7%	5.0%	4.7%	5.9%	7.6%	18.3%*	1.3%	5.6%	10.7%
Household composition - other	7.4%	12.6%	34.1%**	4.7%	9.7%	18.5%	0.0%	11.8%	0.0%***
Single (aged below 65 years)	5.4%	10.7%	20.8%°	5.5%	13.1%	29.2%°	1.9%	11.5%	32.0%
Place of residence									
Region of residence - Flanders	1.3%	56.2%	25.6%***	1.7%	56.6%	38.3%*	0.3%	55.9%	25.9%*
Region of residence - Wallonia	5.0%	31.9%	56.6%***	2.4%	34.1%	32.0%	1.1%	33.1%	54.3%
Region of residence - Brussels	4.2%	11.8%	17.8%	7.7%	9.3%	29.7%**	1.2%	11.1%	19.7%
Urbanization - dense	2.2%	36.1%	28.0%	3.1%	36.4%	45.2%	1.1%	36.5%	57.8%
Urbanization - medium	2.2%	47.5%	36.8%	1.5%	44.1%	25.3%**	0.0%	45.6%	0.0%***
Urbanization - thin	6.0%	16.4%	35.3%*	3.8%	19.6%	29.5%	1.6%	18.0%	42.2%
Country of birth									
Country of birth - Belgium	2.7%	80.6%	75.7%	2.7%	80.3%	83.9%	0.7%	86.6%	89.3%
Country of birth - EU	5.1%	7.9%	14.5%	4.6%	8.0%	14.6%	0.0%	6.4%	0.0%***
Country of birth - non-EU	2.4%	11.5%	9.8%	0.3%	11.7%	1.6%***	1.0%	7.0%	10.7%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.3.5. Characteristics related to healthcare supply and use

Table 81 provides information on the distribution of the characteristics related to healthcare supply and use in the subpopulations with and without unmet needs for medical care (see Box 2 on how to interpret the results in the Tables and Figures). Remark that in Table 81, negative values can occur in the rows labelled “Deviation population”. These deviations depict the difference between healthcare use (probability of healthcare contact or number of contacts) in the population and the subpopulation with/without unmet needs after a correction for healthcare needs is made (according to the methodology of the fairness gap, see Scientific report section 2.4.2). Negative values indicate that – after accounting for healthcare needs – the subgroup has a lower healthcare use than the population in general. Positive values, on the other hand, indicate that – after accounting for healthcare needs – the subgroup has a higher healthcare use than the population in general. Table 82 and Table 83 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 110 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) the probability to consult a GP; (panel B) the probability to consult a specialist; (panel C) the probability of an ED contact; (panel D) the probability to use antidepressants over the period of 1 year.

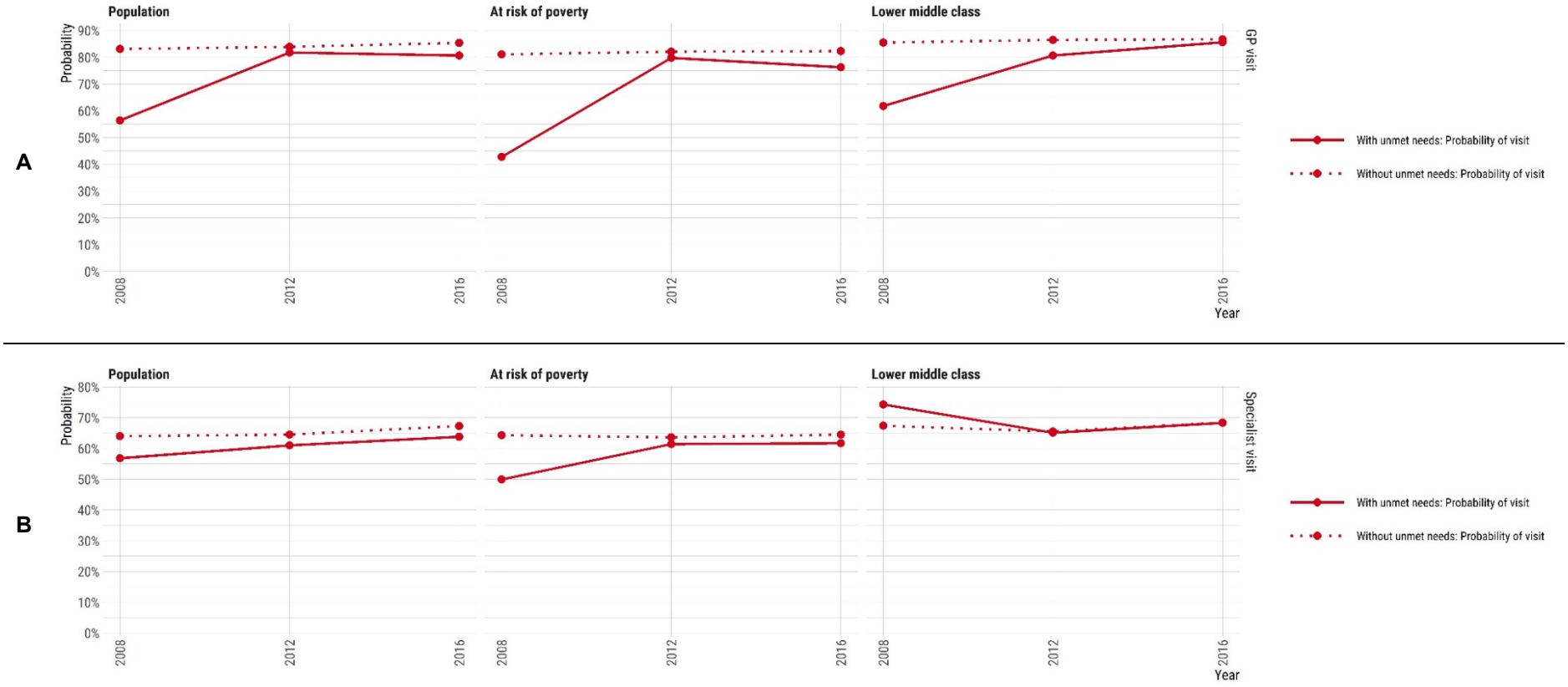
Main conclusions

1. The probability to report unmet needs does not appear to be associated with the availability of healthcare providers. If anything, individuals who report to have unmet needs for medical care for financial reasons live in areas with a higher density of healthcare providers (GP, specialist, dentist) and closer to a nearby hospital site with an emergency department.
2. With respect to the use of GP and specialist care, there appears to be a clear distinction between the results in 2008 and the results in 2012/2016. In 2008, we observe a significantly lower use of care, i.e. the probability to see a GP or specialist is markedly lower in the subpopulations with unmet needs for medical care for financial reasons compared to the subpopulation without unmet needs (see also Figure 110, panel A & B).
   After correcting for healthcare needs (baseline inequity scenario, see Scientific report section 2.4), we find that the subpopulation with unmet needs has a 28.5 percentage points lower probability to consult a GP in 2008 in comparison with the population average; this reduces to a 3.0 percentage points and 5.3 percentage points lower probability in 2012 and 2016, respectively. After correcting for healthcare needs, the number of GP consultations (conditional on having at least one consultation) is not significantly different in the subpopulations with and without unmet needs. Moreover, individuals with unmet needs have a lower coverage rate of the global medical record, although the gap with the population mean has decreased over time.
   After correcting for healthcare needs (baseline inequity scenario, see Scientific report section 2.4), we find that the subpopulation with unmet needs has a 14.0 percentage points lower probability to consult a specialist in 2008 in comparison with the population average; this reduces to a 10.5 percentage points and 10.8 percentage points lower probability in 2012 and 2016, respectively. After correcting for healthcare needs, the number of specialist consultations (conditional on having at least one consultation) is 2.7 consultations below the population average in 2008 in the subgroup with unmet needs and not significantly different in 2012 and 2016.
3. For hospital inpatient care, the results are divergent by income group. At the population level, we observe again a break between 2008 and 2012/2016, but smaller in magnitude. This is not surprising given that the probability to use inpatient care in a given year is lower than the probability to use GP or specialist care. In 2008, the probability to use inpatient care (without correcting for healthcare needs) was lower in the subpopulation with unmet needs compared to the subgroup without unmet needs; in 2012 and 2016, the reverse was true. After correcting for healthcare needs (baseline inequity scenario, see Scientific report section 2.4), we find that the subpopulation with unmet needs has a 4.5 percentage points lower probability to use inpatient care in 2008 in

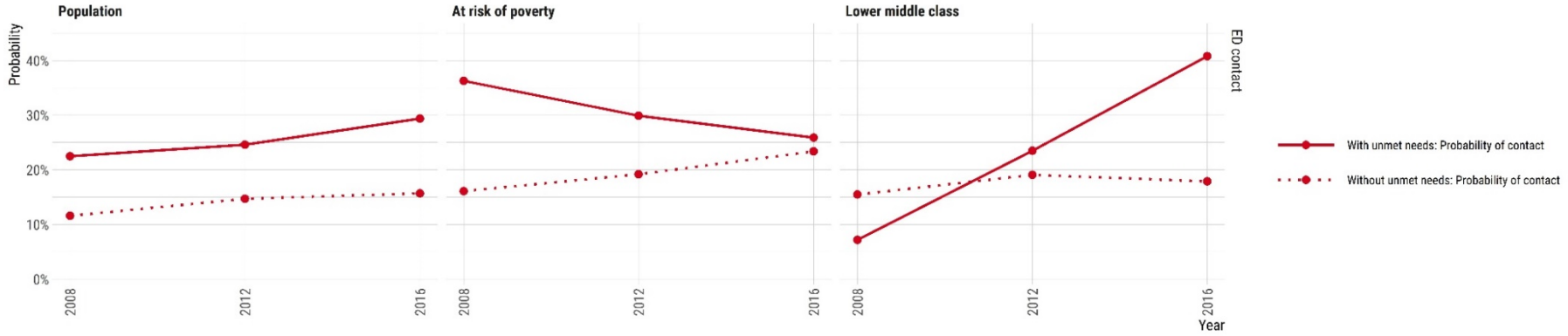
comparison with the population average; this reduces to a 3.2 percentage points and 2.5 percentage points lower probability in 2012 and 2016, respectively.
These results are driven by the trend in the lower middle class. In the population at risk of poverty, we find the opposite, with higher probability to use inpatient care in 2008 and lower in 2012/2016.

4. Among the subpopulation with unmet needs, there is a higher probability to go to an emergency department (ED). After correcting for needs, the probability to go to the ED is 7.5 percentage points higher. Panel C in Figure 110, however, indicates diverging trends over time in the subgroups at risk of poverty and lower middle class. Among individuals at risk of poverty, we observe a decreasing trend for the subpopulation with unmet needs, resulting in a decreasing difference over time between the subpopulations with and without unmet needs. Among individuals in the lower middle class, there is an upward trend in visits to the ED for the subpopulation with unmet needs, resulting in an increasing difference over time between the subpopulations with and without unmet needs.
5. Among the subpopulation with unmet needs, there is a substantially higher usage of antidepressants.
6. Among the subpopulation with unmet needs, there is a substantially lower visit rate to the dentist. This is not surprising given the important overlap between unmet needs for medical care for financial reasons and unmet need for dental care for financial reasons (see section 2.3.1). This difference is driven by the discrepancies in the lower middle class. Among individuals at risk of poverty, the difference in dental care use is small between the subpopulations with and without unmet needs, and even reversed in 2008.
The differences between the subpopulations with and without unmet needs for medical care are less pronounced than the difference between the subpopulations with and without unmet needs for dental care (see section 2.4.5)

Figure 110 – Evolution (2008, 2012, 2016) for subset of characteristics related to healthcare supply and use for the population with and without unmet needs for medical care



C


Population
At risk of poverty
Lower middle class
Probability
40%
30%
20%
10%
0%
2008
2012
2016
Year
ED contact
With unmet needs: Probability of contact
Without unmet needs: Probability of contact

D

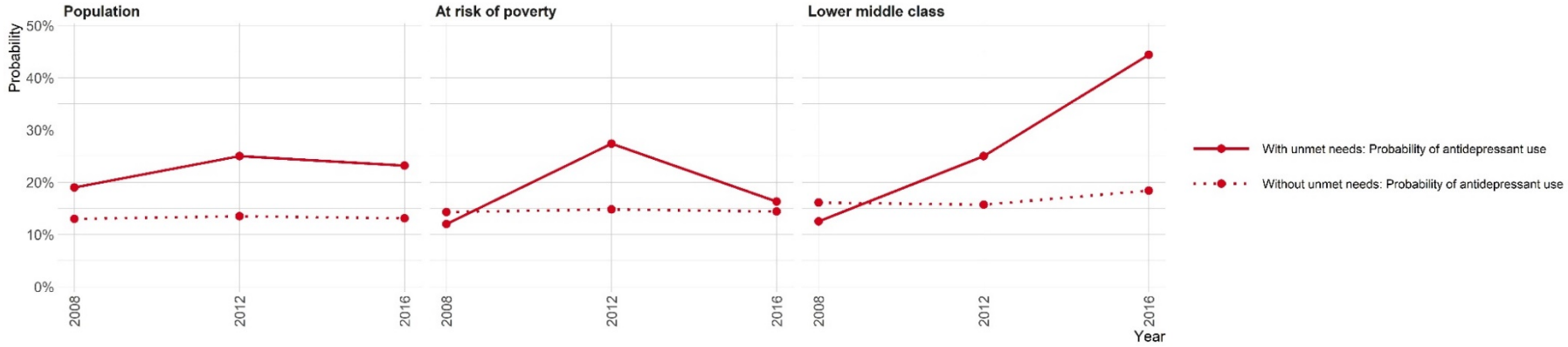

Population
At risk of poverty
Lower middle class
Probability
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Probability of antidepressant use
Without unmet needs: Probability of antidepressant use

Table 81 – Overview of the distribution of healthcare supply and use in the subpopulations with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by healthcare use

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Healthcare supply (density per 10 000 population, distance in km)									
Density of GPs in municipality		11.6	12.7***		11.3	11.2		11.8	12.7°
Density of specialists in municipality		13.0	14.2		12.6	12.1		12.9	16.3**
Density of dentists in municipality		7.7	8.0		7.4	7.5		7.5	8.3*
Distance to nearest hospital site with emergency department		6.1	5.7		5.7	3.5***		5.4	4.7
Doctor consultation (GP, SP)									
Probability of visit	2.0%	91.3%	86.6%°	1.6%	90.1%	86.3%	0.3%	89.8%	67.9%**
Deviation population probability after needs correction		0.1%	-5.2%*		0.1%	-5.2%°		0.1%	-23.3%**
Number of visits		9.7	12.3**		9.5	9.8		9.0	9.0
Deviation population mean visits after needs correction		0.0	-1.2°		0.0	-1.6*		0.0	-2.3°
GP consultation									
Probability of visit	2.0%	85.4%	80.7%	1.6%	83.9%	81.8%	0.3%	83.1%	56.4%**
Deviation population probability after needs correction		0.1%	-5.3%°		0.0%	-3.0%		0.1%	-28.5%***
Number of visits		6.3	7.9**		6.3	5.6		6.0	6.4
Deviation population mean visits after needs correction		0.0	0.0		0.0	-1.1°		0.0	-0.5
Global Medical Record (GMR)									
Probability of having GMR	1.8%	66.7%	58.4%*	1.4%	55.3%	46.0%*	0.3%	48.3%	35.3%
Deviation population probability after needs correction		0.0%	-2.6%		0.1%	-7.6%°		0.0%	-10.4%
Specialist consultation									
Probability of visit	2.2%	67.3%	63.8%	1.6%	64.5%	61.0%	0.4%	64.0%	56.8%

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Deviation population probability after needs correction		0.2%	-10.8%***		0.2%	-10.5%**		0.1%	-14.0%*
Number of visits		4.6	6.0**		4.5	6.3***		4.2	3.3
Deviation population mean visits after needs correction		0.0	-0.9°		0.0	0.2		0.0	-2.7***
Contact with Emergency Department (ED)									
Probability of contact	4.2%	15.7%	29.4%***	2.7%	14.7%	24.6%*	0.8%	11.6%	22.5%
Deviation population probability after needs correction		-0.2%	7.5%*		-0.1%	6.5%°		0.0%	8.6%
Number of contacts		1.4	1.8		1.4	1.4		1.3	1.1*
Deviation population mean contacts after needs correction		0.0	0.1		0.0	0.0		0.0	-0.2°
Inpatient admissions									
Probability of inpatient admission	2.9%	12.4%	16.0%	1.7%	11.6%	12.1%	0.4%	11.0%	9.7%
Deviation population probability after needs correction		0.1%	-2.5%		0.0%	-3.2%		0.0%	-4.5%
Number of inpatient admissions		1.4	1.4		1.4	1.8°		1.4	1.0***
Deviation population mean inpatient admissions after needs correction		0.0	-0.2		0.0	0.4*		0.0	-0.4*
Regular dentist visits (2 visits in 3 years)									
Probability of regular visit	1.2%	57.9%	29.7%***	1.0%	51.7%	32.3%***	0.3%	52.0%	33.3%*
Deviation population probability ^		0.6%	-24.6%***		0.3%	-17.5%***		0.1%	-16.8%*
Regular preventive dentist visits (2 visits in 3 years)									
Probability of regular visit	0.8%	32.7%	11.4%***	0.8%	25.8%	12.8%***	0.2%	26.7%	12.4%*
Deviation population probability ^		0.4%	-16.2%***		0.2%	-12.3%***		0.0%	-13.2%*
Antidepressant use									
Probability of antidepressant use	4.0%	13.1%	23.2%**	3.0%	13.5%	25.0%**	0.6%	13.0%	19.0%
Deviation population probability after needs correction		0.0%	-0.8%		0.0%	2.5%		0.0%	-2.6%

	2016 – 2.3% with unmet needs			2012 – 1.7% with unmet needs			2008 – 0.4% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*
^ For dental care, no adjustment for healthcare needs is made, only the control variables (place of residence and membership of a community health centre) are neutralized.

Table 82 – Overview of the distribution of healthcare supply and use in the subpopulations at risk of poverty with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by healthcare use

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Healthcare supply (density per 10 000 population, distance in km)									
Density of GPs in municipality		11.3	12.5**		11.2	10.8		11.8	11.5
Density of specialists in municipality		11.8	14.9**		12.2	12.1		12.6	16.2**
Density of dentists in municipality		7.2	8.0°		7.1	7.5		7.3	8.1
Distance to nearest hospital site with emergency department		5.4	5.3		5.2	3.2***		5.1	2.2***
Doctor consultation (GP, SP)									
Probability of visit	7.8%	88.4%	84.6%	5.2%	89.0%	84.5%	0.9%	89.2%	58.9%*
Deviation population probability after needs correction		0.3%	-3.2%		0.3%	-4.4%		0.4%	-29.4%*
Number of visits		11.0	11.9		10.3	9.4		10.0	5.8**
Deviation population mean visits after needs correction		0.0	0.0		0.0	-0.9		0.0	-4.9*
GP consultation									
Probability of visit	7.5%	82.3%	76.3%	5.4%	82.1%	79.8%	0.7%	81.1%	42.8%**
Deviation population probability after needs correction		0.4%	-4.7%		0.1%	-1.3%		0.5%	-37.7%**
Number of visits		7.5	7.4		7.2	5.0***		7.0	4.5*

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Deviation population mean visits after needs correction		0.0	0.0		0.1	-1.6**		0.0	-2.6
Global Medical Record (GMR)									
Probability of having GMR	7.0%	63.1%	54.0%	3.6%	52.7%	34.2%**	0.5%	45.3%	18.5%*
Deviation population probability after needs correction		0.1%	-1.2%		0.7%	-12.6%*		0.3%	-25.0%**
Specialist consultation									
Probability of visit	8.4%	64.5%	61.7%	5.2%	63.6%	61.4%	1.0%	64.3%	49.9%
Deviation population probability after needs correction		0.5%	-5.1%		0.3%	-5.7%		0.2%	-13.9%
Number of visits		4.8	6.1°		4.4	6.9**		4.2	2.4*
Deviation population mean visits after needs correction		0.0	0.1		-0.1	1.5°		0.0	-1.8°
Contact with Emergency Department (ED)									
Probability of contact	9.6%	23.4%	25.9%	8.1%	19.2%	29.9%	2.9%	16.1%	36.3%
Deviation population probability after needs correction		0.1%	-0.8%		-0.4%	7.8%		-0.3%	20.3%
Number of contacts		1.6	1.9		1.5	1.5		1.4	1.1*
Deviation population mean contacts after needs correction		0.0	0.0		0.0	0.0		0.0	-0.2
Inpatient admission									
Probability of inpatient admission	6.9%	14.9%	11.6%	3.7%	13.7%	9.2%	1.8%	13.0%	17.8%
Deviation population probability after needs correction		0.5%	-5.0%°		0.3%	-5.5%°		-0.1%	7.0%
Number of inpatient admissions		1.4	1.4		1.6	1.4		1.4	1.0***
Deviation population mean inpatient admissions after needs correction		0.0	0.1		0.0	0.0		0.0	-0.2**
Regular dentist visits (2 visits in 3 years)									
Probability of regular visit	7.1%	39.7%	31.8%	3.8%	38.3%	26.3%°	1.8%	40.5%	56.0%
Deviation population probability ^		0.5%	-5.4%		0.6%	-10.0%°		-0.2%	15.7%

	2016 – 8.7% with unmet needs			2012 – 5.4% with unmet needs			2008 – 1.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Regular preventive dentist visits (2 visits in 3 years)									
Probability of regular visit	7.8%	16.9%	15.0%	3.5%	15.1%	9.7%	2.0%	16.4%	25.0%
Deviation population probability ^		-0.1%	0.7%		0.3%	-5.0%		-0.1%	7.3%
Antidepressant use									
Probability of antidepressant use	9.8%	14.4%	16.3%	9.6%	14.8%	27.4%*	1.1%	14.3%	12.0%
Deviation population probability after needs correction		0.3%	-2.9%		-0.3%	4.9%		0.0%	-3.5%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*
^ For dental care, no adjustment for healthcare needs is made, only the control variables (place of residence and membership of a community health centre) are neutralized.

Table 83 – Overview of the distribution of healthcare supply and use in the subpopulations of the lower middle class with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by healthcare use

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Healthcare supply (density per 10 000 population, distance in km)									
Density of GPs in municipality		11.3	12.6°		11.0	11.3		11.7	14.1*
Density of specialists in municipality		12.1	11.3		11.8	10.0°		12.6	17.1*
Density of dentists in municipality		7.4	7.7		7.0	7.4		7.2	8.6**
Distance to nearest hospital site with emergency department		5.9	6.1		6.0	4.1*		5.2	5.6
Doctor consultation (GP, SP)									
Probability of visit	2.8%	91.5%	88.4%	2.5%	91.1%	84.6%	0.5%	91.6%	78.4%
Deviation population probability after needs correction		0.1%	-2.1%		0.2%	-6.4%		0.1%	-12.7%

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Number of visits		11.6	13.7		11.5	11.7		10.8	11.3
Deviation population mean visits after needs correction		0.0	-1.1		0.0	-0.9		0.0	-1.7
GP consultation									
Probability of visit	2.8%	86.7%	85.6%	2.5%	86.5%	80.7%	0.4%	85.5%	61.8%
Deviation population probability after needs correction		0.0%	-0.6%		0.1%	-4.2%		0.1%	-23.7%
Number of visits		7.8	8.9		7.9	7.0		7.2	7.9
Deviation population mean visits after needs correction		0.0	0.1		0.0	-0.7		0.0	0.2
Global Medical Record (GMR)									
Probability of having GMR	2.6%	71.9%	64.5%	2.5%	61.1%	57.6%	0.6%	53.0%	55.6%
Deviation population probability after needs correction		0.0%	-1.2%		0.0%	-0.7%		-0.1%	10.8%
Specialist consultation									
Probability of visit	2.9%	68.4%	68.3%	2.5%	65.5%	65.1%	0.7%	67.4%	74.3%
Deviation population probability after needs correction		0.1%	-4.1%		0.1%	-3.8%		0.0%	-0.7%
Number of visits		5.0	6.3		5.0	6.2°		4.8	3.1°
Deviation population mean visits after needs correction		0.0	-1.3		0.0	-0.5		0.0	-3.8*
Contact with Emergency Department (ED)									
Probability of contact	6.3%	17.9%	40.8%**	3.1%	19.1%	23.5%	0.3%	15.5%	7.2%
Deviation population probability after needs correction		-0.5%	16.6%*		0.0%	1.6%		0.1%	-12.9%°
Number of contacts		1.4	1.9		1.4	1.0***		1.4	1.0***
Deviation population mean contacts after needs correction		0.0	0.4		0.0	-0.4***		0.0	-0.5***
Inpatient admission									
Probability of inpatient admission	3.5%	16.7%	20.8%	2.7%	16.7%	17.8%	0.3%	15.3%	7.0%

	2016 – 2.9% with unmet needs			2012 – 2.5% with unmet needs			2008 – 0.7% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Deviation population probability after needs correction		0.0%	-0.6%		0.1%	-2.7%		0.1%	-15.4%°
Number of inpatient admissions		1.5	1.5		1.4	1.7		1.5	1.0***
Deviation population mean inpatient admissions after needs correction		0.0	-0.3**		0.0	0.3		0.0	-0.9***
Regular dentist visits (2 visits in 3 years)									
Probability of regular visit	1.4%	47.3%	23.1%***	2.2%	42.1%	36.6%	0.3%	43.7%	19.7%*
Deviation population probability ^		0.6%	-21.1%***		0.1%	-4.2%		0.2%	-21.6%°
Regular preventive dentist visits (2 visits in 3 years)									
Probability of regular visit	0.6%	22.3%	4.6%***	2.5%	16.3%	16.2%	0.0%	19.3%	0.0%***
Deviation population probability ^		0.4%	-12.9%***		0.0%	0.7%		0.1%	-16.5%***
Antidepressant use									
Probability of antidepressant use	6.6%	18.4%	44.4%***	4.0%	15.7%	25.0%	0.5%	16.1%	12.5%
Deviation population probability after needs correction		-0.4%	13.8%°		0.0%	1.8%		0.1%	-13.5%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

^ For dental care, no adjustment for healthcare needs is made, only the control variables (place of residence and membership of a community health centre) are neutralized.

2.3.6. *Characteristics related to healthcare out-of-pocket payments*

Table 84 provides information on the distribution of the characteristics related to healthcare out-of-pocket payments in the subpopulations with and without unmet needs for medical care (see Box 2 on how to interpret the results in the Tables and Figures). Table 85 and Table 86 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 111 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) out-of-pocket payments; (panel B) catastrophic payments.

The concept of catastrophic payments as well as its calculation is explained in the Scientific report section 3.1. In this section we apply the EU-SILC/IMA-AIM baseline definition of out-of-pocket payments (all co-payments and supplements after correction of the system of maximum billing) and disposable income corrected for basic needs expenses as capacity to pay. Out-of-pocket payments are considered catastrophic in two instances: either (1) the household has a negative capacity to pay (i.e. the disposable income is insufficient to cover basic needs expenses for food, utilities and rent); in this case any out-of-pocket payment is considered as catastrophic; or (2) the household is able to pay for healthcare, and healthcare expenses amount to 40% or more of the capacity to pay.

Main conclusions

1. There is an association between catastrophic payments and unmet need for medical care for financial reasons (see Figure 111, panel B). Individuals in households with catastrophic payments are more likely to report postponement of medical care for financial reasons. This shows that, although both indicators are to some extent related, the subpopulation with catastrophic payments and with unmet needs are not entirely the same. An individual with unmet needs that forgoes or delays care so that out-of-pocket payments are low or even zero, does not necessarily have catastrophic payments. And vice versa, an individual without unmet needs who has a small amount of out-of-pocket payments can have catastrophic payments simply because his or her ability to pay for healthcare is low or negative. In 2016, 10.5% of the individuals with catastrophic payments indicate to have unmet needs, up from 0.6% in 2008 and 7.1% in 2012. The small fraction with catastrophic payments in 2008 is possibly related to the lower use of healthcare services in 2008 by individuals with unmet needs (see section 2.3.5). Without healthcare contacts and out-of-pocket payments, one cannot have catastrophic payments. Hence, both concepts provide different and complementary information.
2. Household out-of-pocket expenses are increasing over time. They are in general lower in the subpopulation with unmet needs (€ 288.3; € 429.1 and € 593.1 in respectively 2008, 2012 and 2016) compared to the subpopulation without unmet needs (€ 584.2; € 636.8 and € 784.5 in respectively 2008, 2012 and 2016) (see also Figure 111, panel A). The growth in out-of-pocket payments over time is more pronounced in the subgroup with unmet needs. Out-of-pocket payments can be lower in the subpopulation with unmet needs, because of postponement of care or thanks to the protective measures in place that reduce co-payments, e.g. increased reimbursement and maximum billing.

   The growth over time of co-payments, on the other hand, is much smaller than the growth of out-of-pocket payments. This implies that the growth in out-of-pocket payments is caused by increasing supplements. For the subpopulation with unmet needs, supplements amount to € 262.6 (= € 593.1 – € 330.5) on average in 2016, while only € 36.5 in 2008 and € 117.0 in 2012. Supplements can be problematic for the subpopulation with unmet needs. Given their activity status and difficult financial situation, it is likely that these individuals do not have a hospital (or supplementary dental) insurance. As a case in point, in the subpopulation at risk of poverty, co-payments in 2016 were similar (group without unmet needs) or lower (group with unmet needs) than in 2012, while out-of-pocket payments increased over the same period.
   The fraction of households with high co-payments in the current and previous year, i.e. above € 450 in both years (an eligibility criterion for the receipt of the chronic MAB), has increased over time, it nearly

doubled in the subpopulation with unmet needs from 11.0% in 2008 to 20.1% in 2016 and increased from 26.4% in 2008 to 31.3% in 2016 in the subpopulation without unmet needs. There is important variation by income groups. The increase over time is driven by the lower middle class (from 11.0% in 2008 to 31.5% in 2016 in the group with unmet needs), while no upward trend is observed among individuals at risk of poverty (stable at 9%).

As a share of disposable income or total household expenses, out-of-pocket payments have increased more sharply over time for the subpopulation with unmet needs, likely because household income has not increased over time for this group (and hence also total household expenses has likely remained at the same level) (see section 2.3.3). The same pattern can be seen in the subgroup of individuals at risk of poverty; in the subgroup of the lower middle class, we observe a sharp increase in out-of-pocket expenses in 2016, related to supplements.
The composition of out-of-pocket payments appears to be rather similar between the subpopulations with and without unmet needs, with a slightly higher share of medication and inpatient care cost for the subpopulation with unmet needs and a lower share of dental care costs.

Figure 111 – Evolution (2008, 2012, 2016) for subset of characteristics related to healthcare out-of-pocket payments for the population with and without unmet needs for medical care

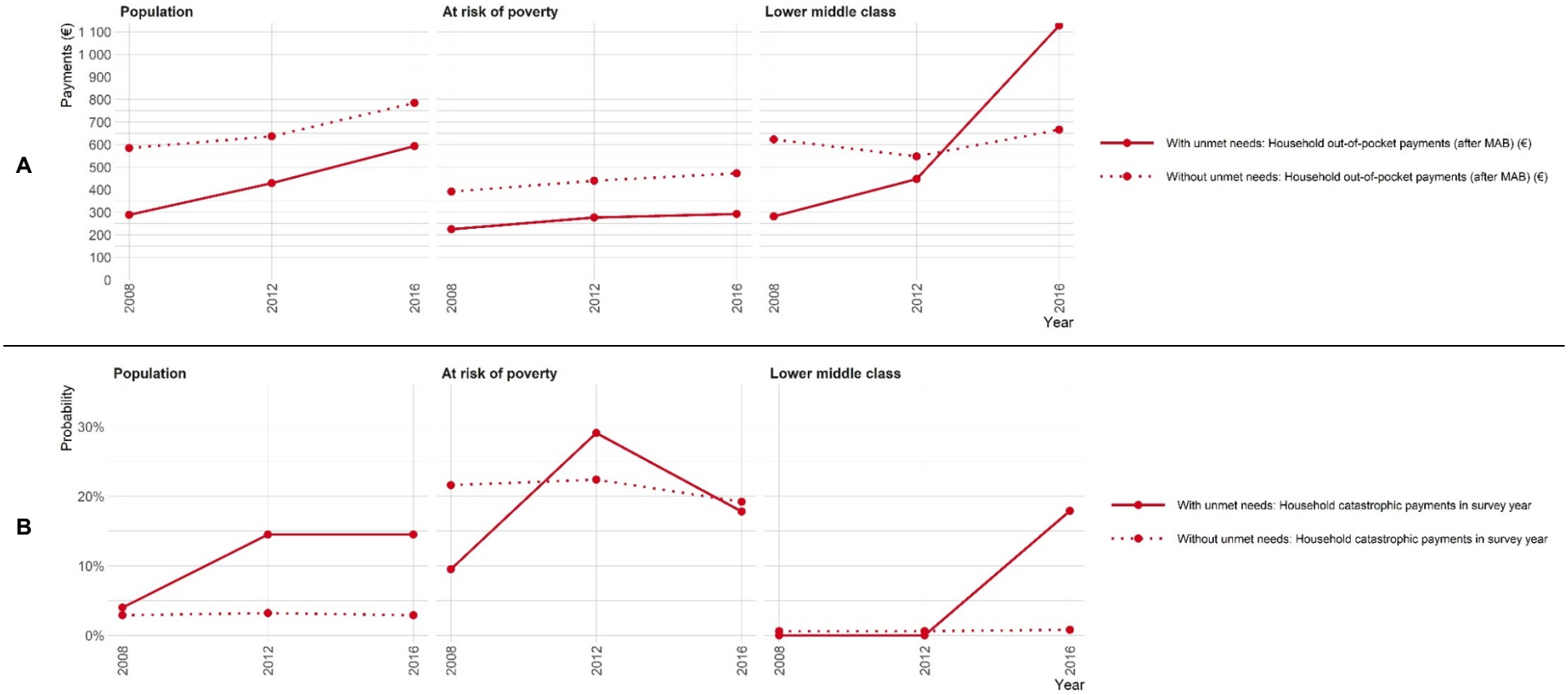




Table 84 – Overview of the distribution of healthcare out-of-pocket payments in the subpopulations with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by healthcare out-of-pocket payments

	2016			2012			2008		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household out-of-pocket payments (€)		784.5	593.1*		636.8	429.1**		584.2	288.3***
Household co-payments (€)		475.6	330.5***		441.3	312.1***		428.0	251.8***
Household co-payments above € 450 (before MAB) in current and previous year	1.5%	31.3%	20.1%***	0.9%	28.9%	16.4%***	0.2%	26.4%	11.0%***
Household out-of-pocket payments as share of total household expenses		2.3%	2.4%		2.0%	2.0%		2.0%	1.3%***
Household out-of-pocket payments as share of disposable income		2.1%	2.5%		2.0%	2.2%		2.0%	1.4%**
Share of household out-of-pocket payments related to GP		9.8%	7.2%**		13.1%	10.2%**		13.3%	11.6%
Share of household out-of-pocket payments related to specialist		31.3%	27.3%*		28.2%	29.3%		26.8%	24.0%
Share of household out-of-pocket payments related to inpatient care		10.7%	15.5%*		10.3%	11.4%		9.4%	11.0%
Share of household out-of-pocket payments related to day care		4.2%	3.5%		3.4%	3.6%		3.1%	4.1%
Share of household out-of-pocket payments related to dental care		10.5%	2.3%***		8.9%	5.4%°		9.5%	3.3%***
Share of household out-of-pocket payments related to medication		20.8%	30.9%***		25.9%	27.3%		29.9%	31.0%
Share of household out-of-pocket payments related to other care		11.5%	8.8%*		8.6%	9.0%		6.7%	6.9%
Household catastrophic payments in survey year	10.5%	2.9%	14.5%***	7.1%	3.2%	14.5%***	0.6%	2.9%	4.0%
Household catastrophic payments in previous year	9.0%	2.9%	12.2%***	8.1%	3.0%	15.7%***	0.8%	2.9%	5.6%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 85 – Overview of the distribution of healthcare out-of-pocket payments in the subpopulations at risk of poverty with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by healthcare out-of-pocket payments

	2016			2012			2008		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household out-of-pocket payments (€)		472.4	292.4***		439.9	276.8***		391.3	224.8**
Household co-payments (€)		302.9	205.1***		300.5	223.4**		316.3	179.9**
Household co-payments above € 450 (before MAB) in current and previous year	4.8%	16.5%	8.8%**	3.1%	19.7%	10.8%*	0.7%	17.7%	9.3%
Household out-of-pocket payments as share of total household expenses		2.0%	1.7%		2.4%	1.6%**		2.2%	1.1%***
Household out-of-pocket payments as share of disposable income		2.6%	1.8%**		3.7%	2.0%**		3.1%	1.3%***
Share of household out-of-pocket payments related to GP		7.8%	6.3%		11.8%	9.4%°		11.5%	5.9%**
Share of household out-of-pocket payments related to specialist		28.9%	28.6%		24.2%	31.2%*		24.1%	23.5%
Share of household out-of-pocket payments related to inpatient care		11.2%	10.5%		10.3%	8.9%		9.7%	12.9%
Share of household out-of-pocket payments related to day care		3.7%	2.8%		4.1%	2.5%		3.1%	6.6%
Share of household out-of-pocket payments related to dental care		6.4%	1.9%***		5.2%	2.5%*		6.4%	3.5%*
Share of household out-of-pocket payments related to medication		27.2%	33.7%°		32.5%	29.4%		35.1%	25.5%
Share of household out-of-pocket payments related to other care		12.5%	9.2%°		8.4%	11.9%		7.2%	10.3%
Household catastrophic payments in survey year	8.2%	19.2%	17.8%	6.9%	22.4%	29.1%	0.6%	21.6%	9.5%*
Household catastrophic payments in previous year	9.5%	18.9%	20.7%	8.4%	20.9%	33.2%*	0.6%	21.2%	9.5%*

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 86 – Overview of the distribution of healthcare out-of-pocket payments in the subpopulations of the lower middle class with and without unmet needs for medical care (2008, 2012, 2016) and percentage of unmet needs by healthcare out-of-pocket payments

	2016			2012			2008		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household out-of-pocket payments (€)		666.1	1 127.8°		547.3	447.3		623.0	281.7**
Household co-payments (€)		419.2	450.4		390.4	366.3		423.8	259.5°
Household co-payments above € 450 (before MAB) in current and previous year	3.0%	30.2%	31.5%	2.2%	28.1%	24.5%	0.3%	29.0%	11.0%°
Household out-of-pocket payments as share of total household expenses		2.6%	4.2%*		2.2%	1.9%		2.6%	1.4%**
Household out-of-pocket payments as share of disposable income		2.7%	4.4%*		2.4%	1.9%		2.8%	1.5%**
Share of household out-of-pocket payments related to GP		9.3%	8.1%		12.0%	8.4%*		12.8%	8.8%
Share of household out-of-pocket payments related to specialist		28.8%	23.0%*		25.7%	26.2%		24.2%	25.7%
Share of household out-of-pocket payments related to inpatient care		11.8%	24.7%*		12.1%	10.7%		10.8%	9.0%
Share of household out-of-pocket payments related to day care		4.3%	4.2%		3.4%	6.6%		3.5%	1.0%***
Share of household out-of-pocket payments related to dental care		7.6%	1.5%***		6.2%	8.6%		7.0%	4.8%
Share of household out-of-pocket payments related to medication		25.6%	28.0%		30.3%	28.4%		34.5%	34.7%
Share of household out-of-pocket payments related to other care		11.0%	8.1%*		8.7%	6.5%		6.2%	5.6%
Household catastrophic payments in survey year	39.3%	0.8%	17.9%**	0.0%	0.6%	0.0%**	0.0%	0.6%	0.0%***
Household catastrophic payments in previous year	6.1%	0.7%	1.6%	0.0%	0.5%	0.0%**	3.7%	0.9%	5.3%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.4. Unmet needs for dental care for financial reasons

2.4.1. Characteristics related to health status and care needs

Table 87 provides information on the distribution of the characteristics related to health status and care needs in the subpopulations with and without unmet needs for dental care (see Box 2 on how to interpret the results in the Tables and Figures). Table 88 and Table 89 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 112 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) individuals with (very) bad self-assessed health, chronic disorder and limitations; (panel B) individuals with (very) good and fair self-assessed health; (panel C) individuals with an allowance for invalidity or disability; (panel D) individuals taking prescribed medication for cardiovascular diseases or asthma/COPD; (panel E, F, G, H) individuals in age groups 35-49, 50-64, 65-79, 80+.

Main conclusions

1. There is an important overlap between unmet need for dental care for financial reasons and unmet need for medical care for financial reasons (see also section 2.3.1). No less than 17.7%, 44.5% and 47.7% of the individuals with unmet needs for dental care also have unmet needs for medical care in 2008, 2012 and 2016, respectively; whereas only 0.1%, 0.5% and 0.5% of the individuals without unmet needs for dental care report unmet needs for medical care in 2008, 2012 and 2016, respectively. The overlap is increasing over time and is stronger among individuals at risk of poverty than individuals in the lower middle class.
2. Unmet needs for dental care are concentrated among individuals aged 35 to 49 and females in the age category 50 to 64. Individuals aged 65+ and males between 18 and 34 are underrepresented among the subpopulation with unmet needs. Although there are some differences, this pattern is quite similar irrespective of the income group. Contrary to the other income groups, we find a similar share of over-80 year old in the subpopulations with and without unmet needs for dental care in the core middle class (household equivalized income between 80% and 120% of the median income).
3. The self-reported health status of individuals in the subgroup with unmet needs is worse than in the subgroup without unmet needs. The difference in the fraction of individuals with bad or very bad self-assessed health or a chronic disorder between the subpopulation with and without unmet needs for dental care is, however, less outspoken than for unmet needs for medical care. This is not surprising, given that we found that the association between self-reported health status and regular dentist visits is less important than the association between self-reported health status and use of GP, specialist or hospital care (see sections 1.3, 1.4, 1.6, 1.7 and 1.8). Also the increase of individuals with worse self-reported health status in the subpopulation with unmet needs is smaller for dental care than for medical care.
    - 36.1% of the individuals in the group with unmet needs for dental care reports to have bad or very bad self-assessed health in 2016 (up from 35.9% in 2008) compared to 8.5% in the group without unmet needs;
    - 51.4% of the individuals in the group with unmet needs for dental care reports to have both a chronic disorder and limitations to daily living in 2016 (up from 41.7% in 2008) compared to 19.7% in the group without unmet needs;
    - 30.8% of the individuals in the group with unmet needs for dental care reports to have both conditions listed above (bad or very bad self-assessed health, a chronic disorder and limitations to daily living) in 2016 (up from 27.4% in 2008) compared to 7.5% in the group without unmet needs.

    A share of 0.8%, 1.7% and 1.7% of the individuals with good or very good self-assessed health has unmet needs for dental care in 2008, 2012 and 2016, respectively; with respect to unmet needs for medical care, the rate was below 1% for the subgroup with (very) good self-assessed health. On the other hand, 7.3%, 8.6% and 14.0% of the individuals with bad or very bad self-assessed health reported to have

unmet needs for dental care in 2008, 2012 and 2016, respectively. The latter is multiple times higher than the population rate of unmet needs for dental care, which was 1.6%, 2.7% and 3.7% in 2008, 2012 and 2016, respectively.

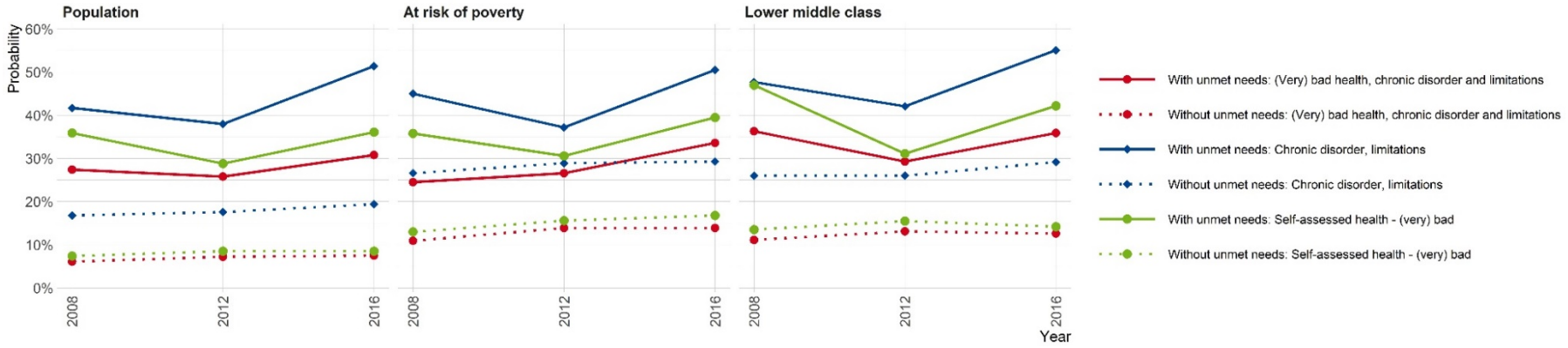
Moreover, there are interactions between income group and unmet needs for dental care. For example, we find that 25.6% of individuals with bad or very bad self-assessed health indicated to have unmet needs for dental care in the subgroup at risk of poverty, while the fraction was 12.5% in the lower middle class. In addition, while bad or very bad self-assessed health is the dominant health status for individuals with unmet needs at risk of poverty and in the lower middle class, this is not the case in the core middle class, where 40.3% of the individuals with unmet needs for dental care report to have fair self-assessed health (results not shown).

4. The intake of prescribed medication for specific disorders can be seen as a proxy for higher care needs (and hence potentially higher unmet needs), but on the other hand, the lack of intake may signal a problem of affordability (and hence postponement of care for financial reasons). Therefore, it is a priori difficult to assess whether individuals taking specific types of medication will be concentrated in the subpopulation with or without unmet needs. Moreover, lower rates of medication use may be related to postponement of medical care for financial reasons, which is (as discussed in point 1) strongly associated with postponement of dental care for financial reasons.
   The findings in Table 87 indicate that the differences between both groups are fairly small and generally not significant. For specific disorders, there are however differences by income group. We find e.g. a lower fraction of individuals with unmet needs for dental care who take medication for cardiovascular disease in the subgroup at risk of poverty, indicating that they possibly do not receive or cannot afford the (appropriate) care that they require.

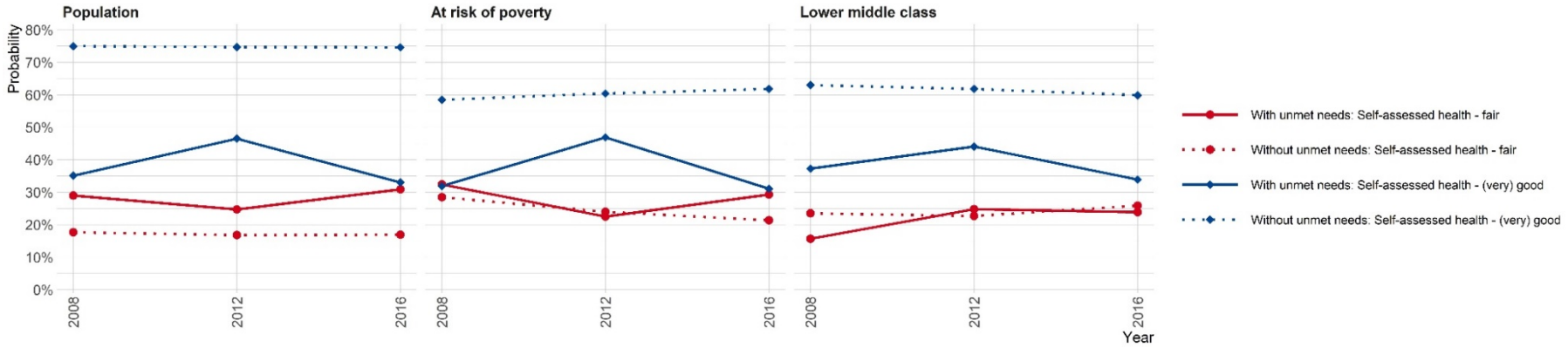
5. Individuals confronted with long-term health shocks, i.e. individuals receiving disability or invalidity allowances, have an increased risk of unmet needs for dental care. This effect increased sharply over time with 5.2%, 8.4% and 15.1% (or more than 1 in 7) of the individuals with invalidity or disability allowance reporting to have unmet needs for dental care in 2008, 2012 and 2016, respectively. This is 3 to 4 times above the population rates of 1.6%, 2.7% and 3.7% in 2008, 2012 and 2016, respectively. Overall, individuals who receive an invalidity or disability allowance constitute about 20.5% of the subpopulation with unmet needs for dental care. For individuals at risk of poverty, the rate of unmet needs for dental care in 2016 ran up to 28.3% or more than 1 in 4 poor individuals with an invalidity or disability allowance has postponed dental care for financial reasons (up from 11.6% in 2008).
   The probability to report unmet needs for dental care is also above the population fraction for individuals being incapacitated from work, with 6.8% of individuals incapacitated from work reporting to have unmet needs in 2016. On the other hand, the risk for unmet needs is clearly smaller than for individuals with invalidity or disability. Hence, we conclude that unmet needs for dental care are lower when related to a (possibly) temporary health shock compared to a long-term health shock and the financial implications thereof. This difference is present in all income groups.

Figure 112 – Evolution (2008, 2012, 2016) for subset of characteristics related to health status for the population with and without unmet needs for dental care

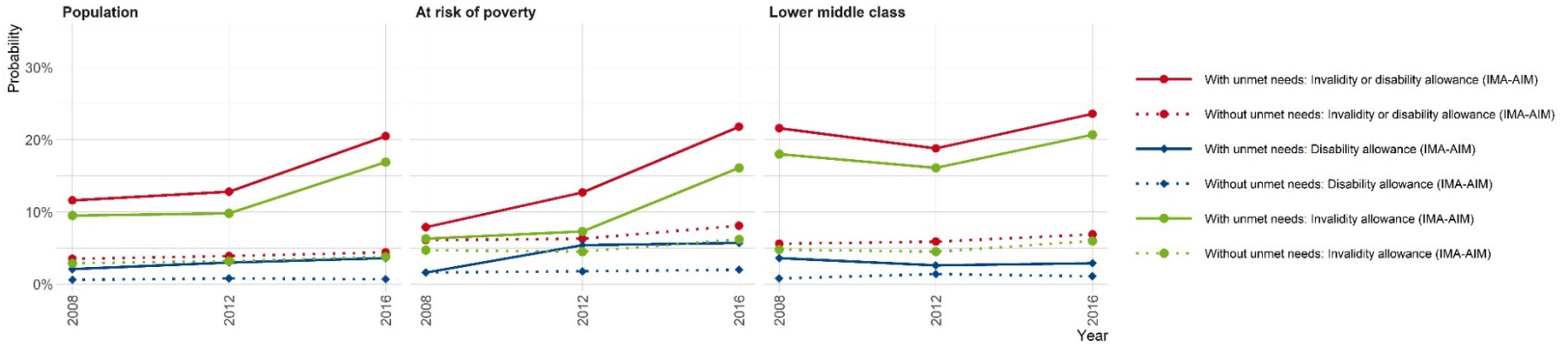
A



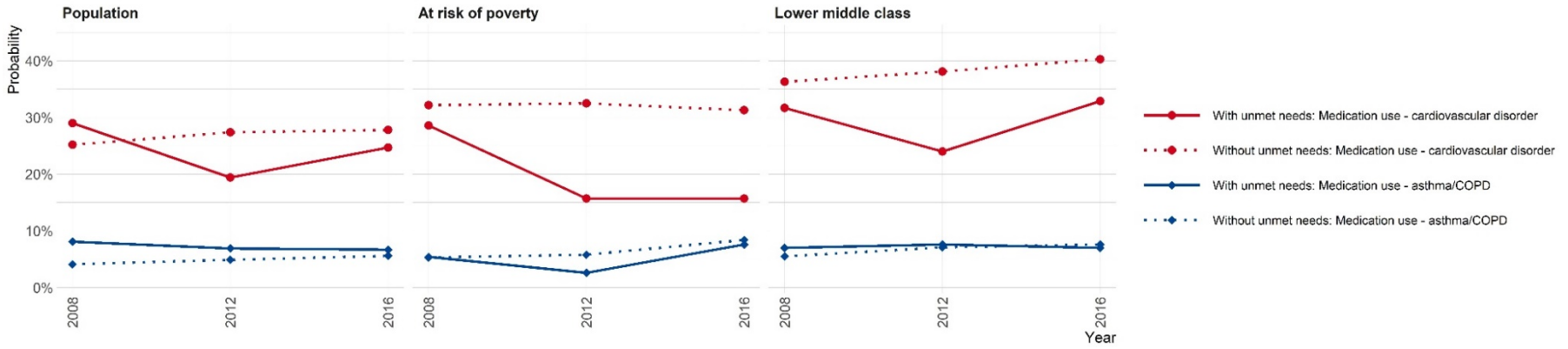
B



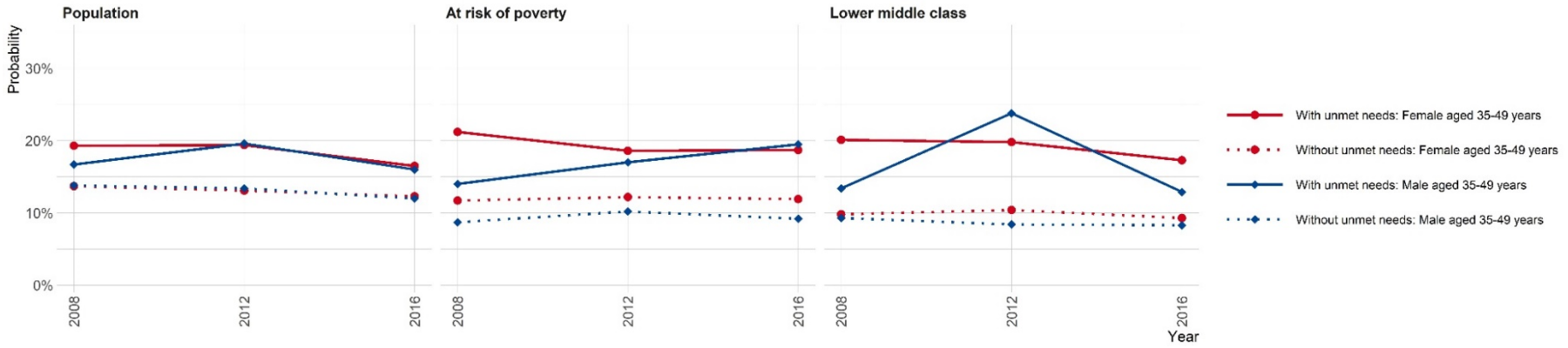
C


Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Invalidity or disability allowance (IMA-AIM)
Without unmet needs: Invalidity or disability allowance (IMA-AIM)
With unmet needs: Disability allowance (IMA-AIM)
Without unmet needs: Disability allowance (IMA-AIM)
With unmet needs: Invalidity allowance (IMA-AIM)
Without unmet needs: Invalidity allowance (IMA-AIM)

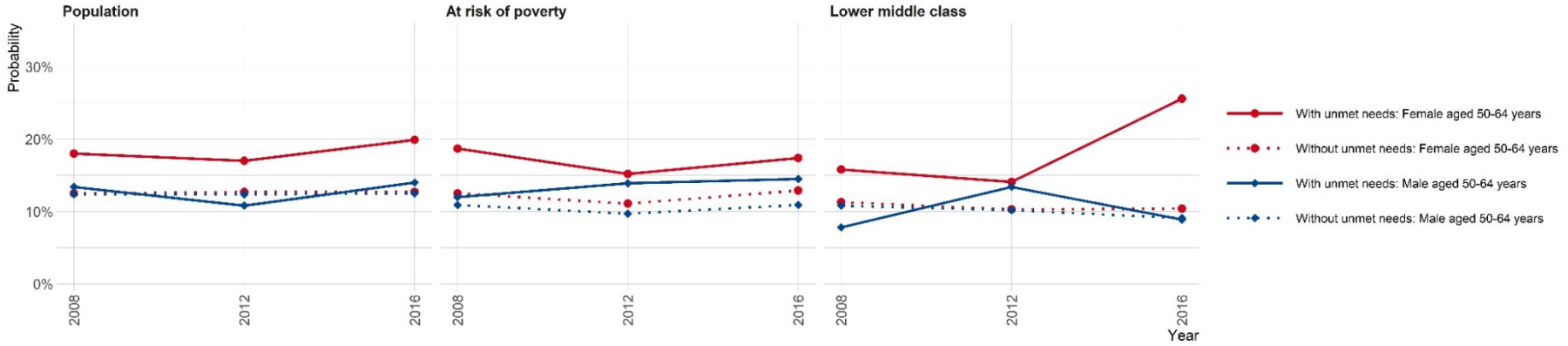
D


Population
At risk of poverty
Lower middle class
Probability
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Medication use - cardiovascular disorder
Without unmet needs: Medication use - cardiovascular disorder
With unmet needs: Medication use - asthma/COPD
Without unmet needs: Medication use - asthma/COPD

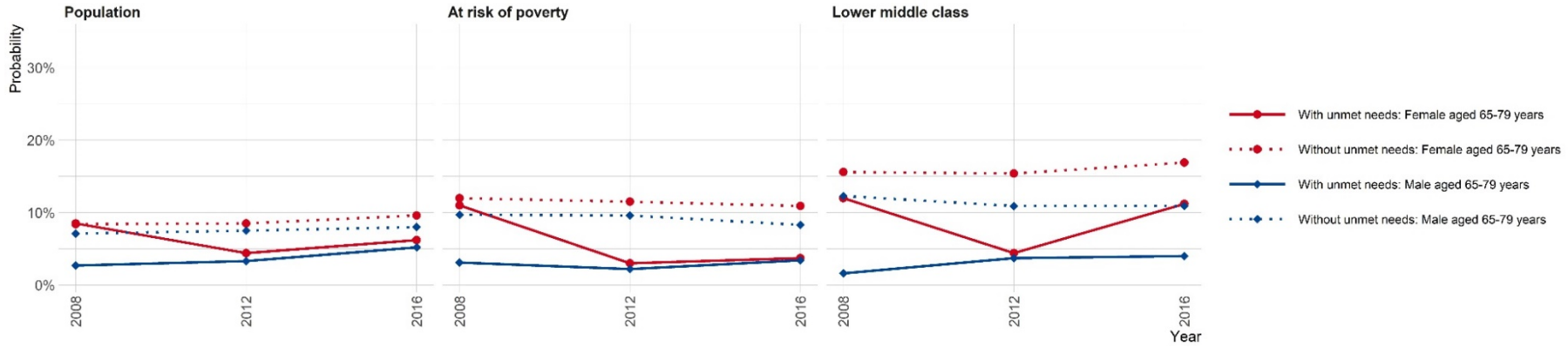
E


Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 35-49 years
Without unmet needs: Female aged 35-49 years
With unmet needs: Male aged 35-49 years
Without unmet needs: Male aged 35-49 years

F


Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 50-64 years
Without unmet needs: Female aged 50-64 years
With unmet needs: Male aged 50-64 years
Without unmet needs: Male aged 50-64 years

G


Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 65-79 years
Without unmet needs: Female aged 65-79 years
With unmet needs: Male aged 65-79 years
Without unmet needs: Male aged 65-79 years

H

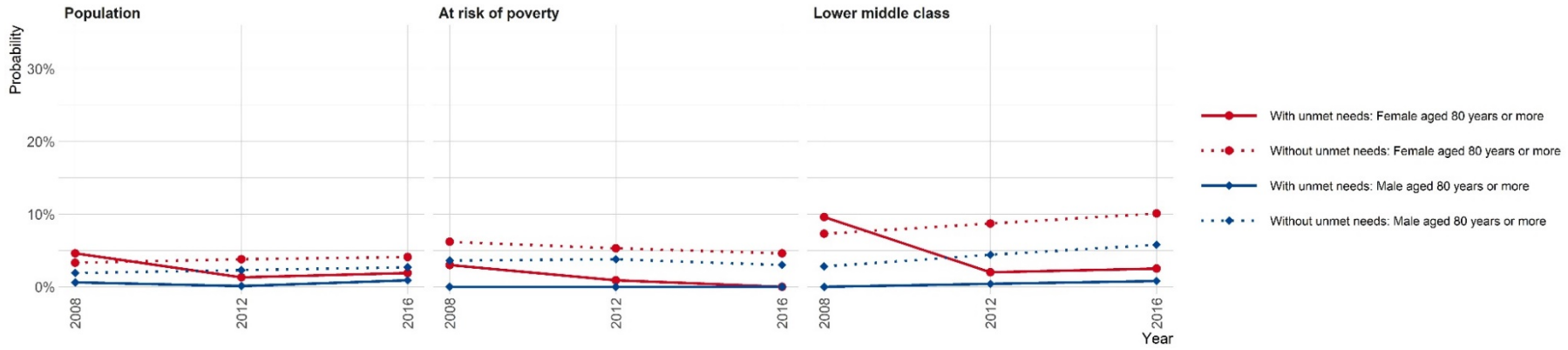

Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Female aged 80 years or more
Without unmet needs: Female aged 80 years or more
With unmet needs: Male aged 80 years or more
Without unmet needs: Male aged 80 years or more

Table 87 – Overview of the distribution of health status in the subpopulations with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by health status

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unmet needs									
Unmet needs for medical care	78.1%	0.5%	47.7%***	73.1%	0.5%	44.5%***	70.6%	0.1%	17.7%***
Age and gender									
Female aged 18-34 years	3.0%	13.1%	10.5%	2.3%	13.2%	11.2%	1.1%	13.3%	9.3%
Male aged 18-34 years	2.6%	13.1%	8.9%*	2.6%	13.3%	12.8%	0.8%	13.7%	7.0%***
Female aged 35-49 years	4.9%	12.3%	16.5%°	4.0%	13.1%	19.4%*	2.2%	13.7%	19.3%°
Male aged 35-49 years	4.9%	12.0%	16.0%°	4.0%	13.4%	19.6%*	1.9%	13.8%	16.7%
Female aged 50-64 years	5.7%	12.7%	19.9%**	3.6%	12.7%	17.0%°	2.3%	12.5%	18.0%°
Male aged 50-64 years	4.2%	12.5%	14.0%	2.4%	12.4%	10.8%	1.7%	12.4%	13.4%
Female aged 65-79 years	2.4%	9.6%	6.2%*	1.4%	8.5%	4.4%**	1.6%	8.4%	8.5%
Male aged 65-79 years	2.5%	8.0%	5.2%*	1.2%	7.5%	3.3%***	0.6%	7.1%	2.7%***
Female aged 80 years or more	1.8%	4.1%	1.9%*	1.0%	3.8%	1.3%**	2.2%	3.3%	4.6%
Male aged 80 years or more	1.3%	2.7%	0.9%*	0.1%	2.3%	0.1%***	0.5%	1.9%	0.6%*
Self-reported health status									
(Very) bad health, chronic disorder and limitations	13.7%	7.5%	30.8%***	9.1%	7.2%	25.8%***	6.9%	6.1%	27.4%***
No chronic disorder, no limitations	1.8%	70.4%	33.8%***	1.9%	71.3%	49.6%***	0.9%	70.5%	40.5%***
No chronic disorder, limitations	6.2%	4.7%	8.1%°	2.7%	4.2%	4.1%	3.1%	5.2%	10.3%°
Chronic disorder, no limitations	4.4%	5.5%	6.6%	3.3%	6.9%	8.3%	1.6%	7.5%	7.6%
Chronic disorder, limitations	9.3%	19.4%	51.4%***	5.7%	17.6%	38.0%***	3.9%	16.8%	41.7%***
Self-assessed health - (very) bad	14.0%	8.5%	36.1%***	8.6%	8.5%	28.8%***	7.3%	7.4%	35.9%***
Self-assessed health - fair	6.6%	16.9%	30.9%***	4.0%	16.8%	24.7%**	2.6%	17.7%	29.0%**
Self-assessed health - (very) good	1.7%	74.6%	33.0%***	1.7%	74.7%	46.5%***	0.8%	75.0%	35.1%***

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Clinical profile based on medication use									
Medication use - diabetes	5.7%	6.6%	10.4%*	2.3%	6.2%	5.2%	1.7%	5.0%	5.4%
Medication use - cardiovascular disorder	3.3%	27.8%	24.7%	1.9%	27.4%	19.4%**	1.8%	25.2%	29.0%
Medication use - thrombosis	4.6%	14.2%	18.0%	1.6%	13.6%	8.0%**	2.3%	6.4%	9.4%
Medication use - asthma/COPD	4.4%	5.6%	6.7%	3.8%	4.9%	6.9%	3.1%	4.1%	8.1%°
Medication use - epilepsy	7.9%	1.7%	3.8%°	4.1%	1.4%	2.2%	3.7%	1.3%	3.0%
Medication use - neurological disorder	6.9%	2.0%	3.8%	5.3%	1.7%	3.4%	4.5%	1.6%	4.6%
Medication use - thyroid disorder	5.0%	5.6%	7.6%	2.2%	5.2%	4.1%	2.1%	4.1%	5.3%
Administrative sources (IMA-AIM): Invalidity, disability, incapacity									
Incapacity to work	6.8%	4.7%	8.9%**	5.1%	4.7%	9.1%*	3.5%	4.8%	10.7%*
Invalidity or disability	15.1%	4.4%	20.5%***	8.4%	3.9%	12.8%***	5.2%	3.5%	11.6%**
Disability	15.9%	0.7%	3.6%*	10.1%	0.8%	3.0%°	5.3%	0.6%	2.1%
Invalidity	14.8%	3.8%	16.9%***	7.9%	3.2%	9.8%***	5.0%	2.9%	9.5%**

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 88 – Overview of the distribution of health status in the subpopulations at risk of poverty with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by health status

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unmet needs									
Unmet needs for medical care	78.3%	2.2%	53.5%***	78.8%	1.2%	56.7%***	94.4%	0.1%	23.3%***
Age and gender									
Female aged 18-34 years	13.7%	14.1%	15.3%	8.8%	14.3%	17.0%	5.3%	12.5%	12.5%
Male aged 18-34 years	7.2%	14.0%	7.5%*	7.4%	12.3%	12.2%	2.0%	12.2%	4.6%**
Female aged 35-49 years	18.7%	11.9%	18.7%*	11.0%	12.2%	18.6%	9.1%	11.7%	21.2%°
Male aged 35-49 years	23.6%	9.2%	19.5%**	11.9%	10.2%	17.0%	8.2%	8.7%	14.0%
Female aged 50-64 years	16.5%	12.9%	17.4%	10.0%	11.1%	15.2%	7.7%	12.5%	18.7%
Male aged 50-64 years	16.3%	10.9%	14.5%	10.5%	9.7%	13.9%	5.8%	10.9%	12.0%
Female aged 65-79 years	4.7%	10.9%	3.7%***	2.1%	11.5%	3.0%***	4.8%	12.0%	11.0%
Male aged 65-79 years	5.7%	8.3%	3.4%***	1.8%	9.6%	2.2%***	1.8%	9.7%	3.1%**
Female aged 80 years or more	0.0%	4.6%	0.0%***	1.4%	5.3%	0.9%***	2.6%	6.2%	3.0%
Male aged 80 years or more	0.0%	3.0%	0.0%***	0.0%	3.8%	0.0%***	0.0%	3.6%	0.0%***
Self-reported health status									
(Very) bad health, chronic disorder and limitations	26.1%	13.9%	33.6%***	13.4%	13.9%	26.6%*	11.1%	10.9%	24.5%*
No chronic disorder, no limitations	8.4%	59.3%	37.1%***	6.8%	60.2%	53.9%	3.5%	57.3%	37.9%**
No chronic disorder, limitations	15.6%	5.8%	7.3%	7.6%	5.6%	5.7%	6.0%	7.4%	8.5%
Chronic disorder, no limitations	11.8%	5.6%	5.1%	4.6%	5.3%	3.2%	5.3%	8.6%	8.7%
Chronic disorder, limitations	20.1%	29.3%	50.5%***	9.5%	28.9%	37.2%	8.6%	26.6%	45.0%**
Self-assessed health - (very) bad	25.6%	16.8%	39.5%***	13.7%	15.6%	30.6%**	13.2%	13.0%	35.8%***
Self-assessed health - fair	16.7%	21.4%	29.3%°	7.1%	24.0%	22.5%	5.9%	28.5%	32.4%
Self-assessed health - (very) good	6.9%	61.8%	31.1%***	5.9%	60.4%	46.9%*	2.9%	58.5%	31.9%***

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Clinical profile based on medication use									
Medication use - diabetes	8.5%	10.5%	6.7%	1.5%	8.8%	1.6%***	3.9%	7.6%	5.6%
Medication use - cardiovascular disorder	6.9%	31.3%	15.7%***	3.8%	32.5%	15.7%***	4.7%	32.2%	28.6%
Medication use - thrombosis	10.2%	17.7%	13.7%	3.9%	18.1%	9.0%*	3.2%	7.8%	4.7%
Medication use - asthma/COPD	11.7%	8.4%	7.6%	3.5%	5.8%	2.6%*	5.3%	5.3%	5.4%
Medication use - epilepsy	15.6%	2.1%	2.6%	0.0%	2.2%	0.0%***	5.8%	1.6%	1.7%
Medication use - neurological disorder	19.3%	2.7%	4.5%	20.5%	1.6%	5.1%	6.8%	2.3%	3.0%
Medication use - thyroid disorder	16.9%	4.8%	6.7%	5.7%	5.4%	4.0%	3.4%	3.7%	2.3%
Administrative sources (IMA-AIM): Invalidity, disability, incapacity									
Incapacity to work	22.3%	4.5%	8.8%°	14.9%	3.3%	7.1%	15.6%	4.6%	15.5%*
Invalidity or disability	28.3%	8.1%	21.8%***	14.0%	6.3%	12.7%°	6.7%	6.1%	7.9%
Disability	29.5%	2.0%	5.7%	19.6%	1.8%	5.4%	5.1%	1.6%	1.6%
Invalidity	27.7%	6.2%	16.1%**	11.6%	4.5%	7.3%	7.0%	4.7%	6.3%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 89 – Overview of the distribution of health status in the subpopulations of the lower middle class with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by health status

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Unmet needs									
Unmet needs for medical care	72.5%	0.8%	45.2%***	68.4%	0.8%	36.6%***	36.1%	0.4%	9.5%*
Age and gender									
Female aged 18-34 years	3.7%	10.8%	8.6%	3.7%	11.1%	8.5%	2.5%	11.8%	11.5%
Male aged 18-34 years	4.6%	8.3%	8.3%	4.6%	10.2%	9.9%	2.4%	8.8%	8.2%
Female aged 35-49 years	8.2%	9.3%	17.3%°	8.7%	10.4%	19.8%*	5.1%	9.8%	20.1%°
Male aged 35-49 years	6.9%	8.3%	12.9%	12.4%	8.4%	23.8%**	3.7%	9.3%	13.4%
Female aged 50-64 years	10.5%	10.4%	25.6%**	6.4%	10.3%	14.1%	3.6%	11.3%	15.8%
Male aged 50-64 years	4.5%	9.1%	8.9%	6.2%	10.2%	13.4%	1.9%	10.8%	7.8%
Female aged 65-79 years	3.1%	16.9%	11.2%	1.4%	15.4%	4.4%***	2.0%	15.6%	12.0%
Male aged 65-79 years	1.7%	10.9%	4.0%***	1.7%	10.9%	3.7%***	0.4%	12.3%	1.6%***
Female aged 80 years or more	1.2%	10.1%	2.5%***	1.1%	8.7%	2.0%***	3.4%	7.3%	9.6%
Male aged 80 years or more	0.6%	5.8%	0.8%***	0.4%	4.4%	0.4%***	0.0%	2.8%	0.0%***
Self-reported health status									
(Very) bad health, chronic disorder and limitations	12.0%	12.6%	35.9%***	10.1%	13.1%	29.3%**	8.0%	11.1%	36.3%**
No chronic disorder, no limitations	2.2%	58.1%	27.7%***	3.7%	61.0%	47.3%*	1.6%	59.0%	36.4%**
No chronic disorder, limitations	8.3%	6.2%	11.6%	2.8%	6.1%	3.6%	4.3%	8.2%	14.0%
Chronic disorder, no limitations	3.9%	6.5%	5.5%	4.8%	6.9%	7.0%	0.7%	6.8%	1.9%*
Chronic disorder, limitations	8.3%	29.2%	55.1%***	7.5%	26.0%	42.1%**	4.6%	26.0%	47.7%**
Self-assessed health - (very) bad	12.5%	14.2%	42.2%***	9.1%	15.5%	31.1%**	8.5%	13.5%	47.0%***
Self-assessed health - fair	4.3%	25.9%	23.9%	5.2%	22.7%	24.8%	1.7%	23.5%	15.7%
Self-assessed health - (very) good	2.6%	59.9%	33.9%***	3.4%	61.8%	44.1%**	1.5%	63.0%	37.3%**

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Clinical profile based on medication use									
Medication use - diabetes	9.0%	9.9%	20.2%°	4.8%	8.4%	8.5%	1.2%	7.9%	3.7%
Medication use - cardiovascular disorder	3.8%	40.3%	32.9%	3.1%	38.1%	24.0%**	2.3%	36.3%	31.7%
Medication use - thrombosis	4.3%	23.4%	22.1%	2.7%	20.6%	11.5%**	4.2%	10.5%	17.2%
Medication use - asthma/COPD	4.3%	7.6%	7.0%	5.1%	7.1%	7.6%	3.3%	5.5%	7.0%
Medication use - epilepsy	15.5%	2.4%	9.3%°	12.3%	1.4%	3.8%	10.0%	1.7%	7.0%
Medication use - neurological disorder	3.8%	3.8%	3.1%	7.6%	1.9%	3.1%	9.1%	2.6%	9.8%
Medication use - thyroid disorder	5.8%	7.2%	9.3%	3.0%	6.4%	4.0%	4.7%	5.9%	11.1%
Administrative sources (IMA-AIM): Invalidity, disability, incapacity									
Incapacity to work	8.9%	3.5%	7.1%	8.5%	5.7%	10.7%	3.1%	5.1%	6.3%
Invalidity or disability	14.1%	6.9%	23.6%***	13.7%	5.9%	18.8%**	9.2%	5.6%	21.6%*
Disability	11.5%	1.1%	2.9%	8.4%	1.4%	2.6%	10.1%	0.8%	3.6%
Invalidity	14.2%	6.0%	20.7%**	15.1%	4.5%	16.1%**	9.1%	4.8%	18.0%*

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.4.2. Characteristics related to the healthcare system

Table 90 provides information on the distribution of the characteristics related to health system variables in the subpopulations with and without unmet needs for dental care (see Box 2 on how to interpret the results in the Tables and Figures). Table 91 and Table 92 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

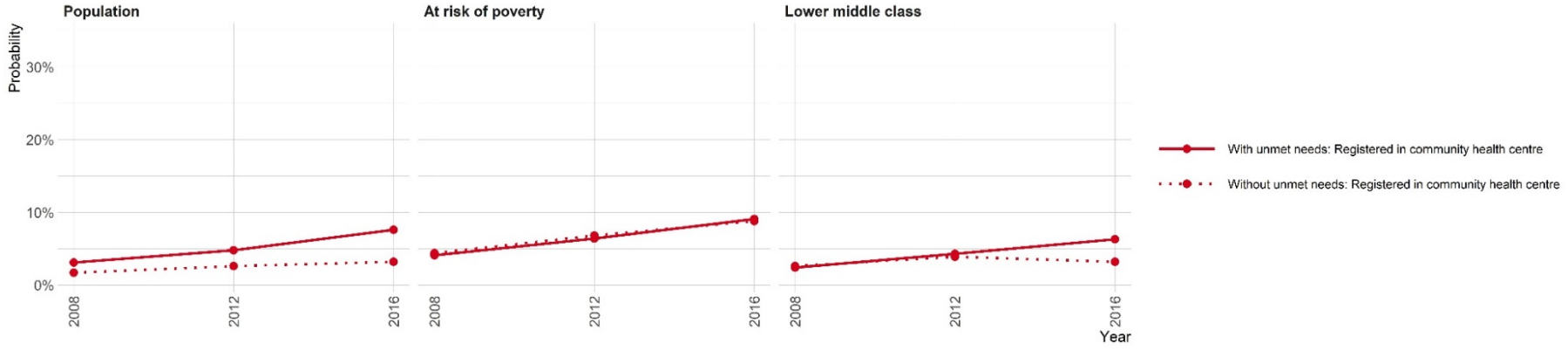
Figure 113 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) individuals registered in a community health centre; (panel B) individuals with increased reimbursement status.

Main conclusions

1. We find that the fraction of individuals that is registered in a community health centre is higher in 2016 among the subpopulation with unmet needs, i.e. 7.6% in 2016 up from 3.1% in 2008 compared to the subpopulation without unmet needs, i.e. 3.2% in 2016 up from 1.7% in 2008. These results are, however, different from those discussed for unmet needs for medical care (see section 2.3.2). First, the enrolment rate among the subpopulation with unmet needs for dental care is lower than among the subpopulation with unmet needs for medical care. Second, the difference in enrolment rate between the subpopulations with and without unmet needs is not driven by the population at risk of poverty, but by individuals in the lower and core middle class.
   It is difficult to assess what is driving these results. In addition to the explanations already put forward in section 2.3.2, one explanation is that individuals at risk of poverty find registration in a community health centre an effective strategy to cope with unmet needs for medical care and less effective for unmet needs for dental care; while it is reversed for individuals in the lower middle class. This might be related to a different perspective, for individuals at risk of poverty enrolment might be primarily related to the accessibility of primary care without financial barrier when needed, while for individuals in the lower middle class, the reduced payments for primary care that can be used for other types of care might drive the decision.
2. Individuals who benefit from measures designed to decrease the burden of healthcare costs are overrepresented in the subpopulation with unmet needs. The overrepresentation is, however, less outspoken in 2016 than for unmet needs for medical care, implying that individuals with unmet needs for dental care, but not medical care, are more likely not to be benefiting from these protective measures.
   We find a higher share of individuals with increased reimbursement, with receipt of reimbursement through the system of maximum billing (in 2016), with the status chronic illness (in 2016) and with eligibility to the lump sum chronic illness (in 2016) in the subgroup with unmet needs for dental care compared to the subgroup without unmet needs. However, while differences between the subpopulation with and without unmet needs exist in 2016 for protection measures related to high healthcare use or co-payments (reimbursement through the system of maximum billing that sets an income-dependent annual cap on household co-payments, eligibility for the status or lump sum chronic illness), these differences are primarily situated in the lower middle class (and to a lesser extent core middle class); they are small(er) or even reversed and not significant among the population at risk of poverty. It is likely that individuals in households at risk of poverty do not have sufficient means to spend on medical and dental care and therefore postpone care and at the same time do not reach the required thresholds for eligibility or reimbursement.
   With respect to increased reimbursement, we find an increase in coverage rates over time in both the subpopulation with and without unmet needs: 56.0% of the individuals with unmet needs benefitted from increased reimbursement in 2016, up from 43.5% in 2008, compared to 17.0% of the individuals without unmet needs in 2016 and 13.1% in 2008. Put differently, 11.3% of the individuals with increased reimbursement reports to have unmet needs for dental care in 2016. These fractions are even higher among the subgroup at risk of poverty and lower in the lower middle class (where fewer individuals benefit from the means-tested measures).

Figure 113 – Evolution (2008, 2012, 2016) for subset of characteristics related to the healthcare system for the population with and without unmet needs for dental care

A



B

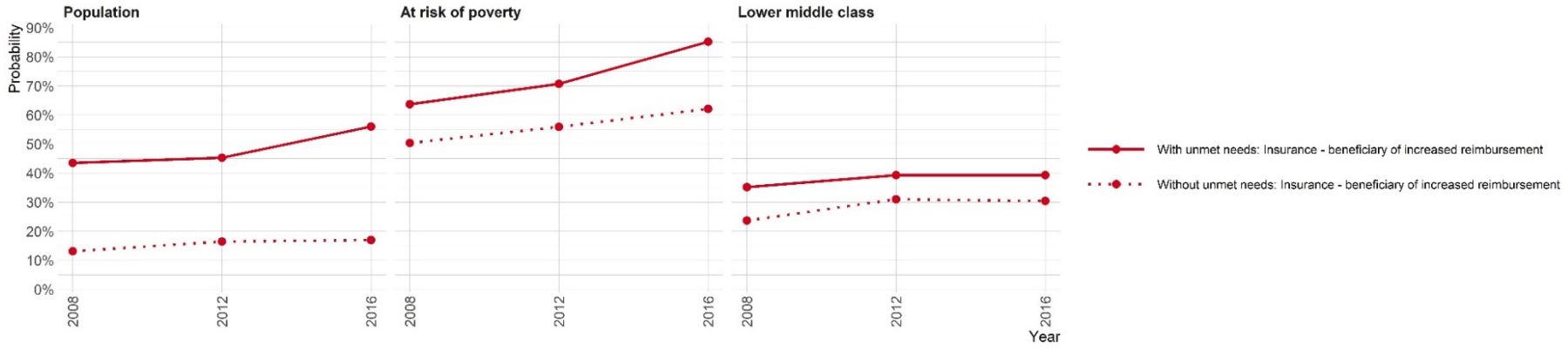


Table 90 – Overview of the distribution of health system variables in the subpopulations with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by health system variables

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Community health centre									
Registered in community health centre	8.4%	3.2%	7.6%**	5.0%	2.6%	4.8%	2.9%	1.7%	3.1%
Registered in community health centre previous year	9.2%	3.0%	7.9%***	5.3%	2.5%	5.0%	2.2%	1.6%	2.2%
Insurance status									
Insurance - beneficiary of increased reimbursement	11.3%	17.0%	56.0%***	7.1%	16.5%	45.3%***	5.1%	13.1%	43.5%***
Receipt of reimbursements in system maximum billing	5.4%	11.8%	17.4%*	3.0%	10.5%	11.4%	2.8%	9.9%	17.7%*
Status chronic illness	5.5%	12.4%	18.9%**						
Entitled to lump sum chronic illness	7.4%	6.4%	13.3%**	3.5%	6.1%	7.9%	3.9%	4.9%	12.1%**

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 91 – Overview of the distribution of health system variables in the subpopulations at risk of poverty with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by health system variables

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Community health centre									
Registered in community health centre	13.1%	8.8%	9.1%	7.1%	6.8%	6.4%	4.9%	4.4%	4.1%
Registered in community health centre previous year	14.0%	9.1%	10.1%	8.1%	6.4%	7.0%	4.2%	3.7%	2.9%
Insurance status									
Insurance - beneficiary of increased reimbursement	16.7%	62.1%	85.2%***	9.3%	55.9%	70.7%**	6.6%	50.4%	63.7%*
Receipt of reimbursements in system maximum billing	10.8%	18.6%	15.4%	7.3%	14.7%	14.2%	3.2%	13.7%	8.2%
Status chronic illness	12.7%	15.9%	15.8%						
Entitled to lump sum chronic illness	18.1%	10.5%	15.9%	5.7%	9.6%	7.1%	5.0%	9.5%	9.1%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 92 – Overview of the distribution of health system variables in the subpopulations of the lower middle class with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by health system variables

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Community health centre									
Registered in community health centre	8.8%	3.2%	6.3%	5.3%	3.9%	4.3%	2.4%	2.6%	2.4%
Registered in community health centre previous year	9.0%	2.7%	5.6%	5.1%	4.0%	4.3%	2.5%	2.6%	2.4%
Insurance status									
Insurance - beneficiary of increased reimbursement	5.8%	30.4%	39.3%	6.0%	31.0%	39.3%	3.8%	23.7%	35.2%
Receipt of reimbursements in system maximum billing	5.9%	22.3%	29.2%	2.8%	20.0%	11.6%**	4.3%	21.8%	37.0%°
Status chronic illness	6.8%	19.0%	28.8%°						
Entitled to lump sum chronic illness	5.8%	10.8%	13.9%	4.8%	11.6%	11.7%	6.6%	8.0%	21.1%°

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.4.3. Characteristics related to socioeconomic status

Table 93 provides information on the distribution of the characteristics related to socioeconomic status in the subpopulations with and without unmet needs for dental care (see Box 2 on how to interpret the results in the Tables and Figures). Table 94 and Table 95 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 114 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) inactivity; (panel B) welfare support; (panel C) material deprivation; (panel D) tenure status; (panel E) educational attainment.

Main conclusions

All major conclusions are in line with what was observed for unmet needs for medical care (see section 2.3.3).

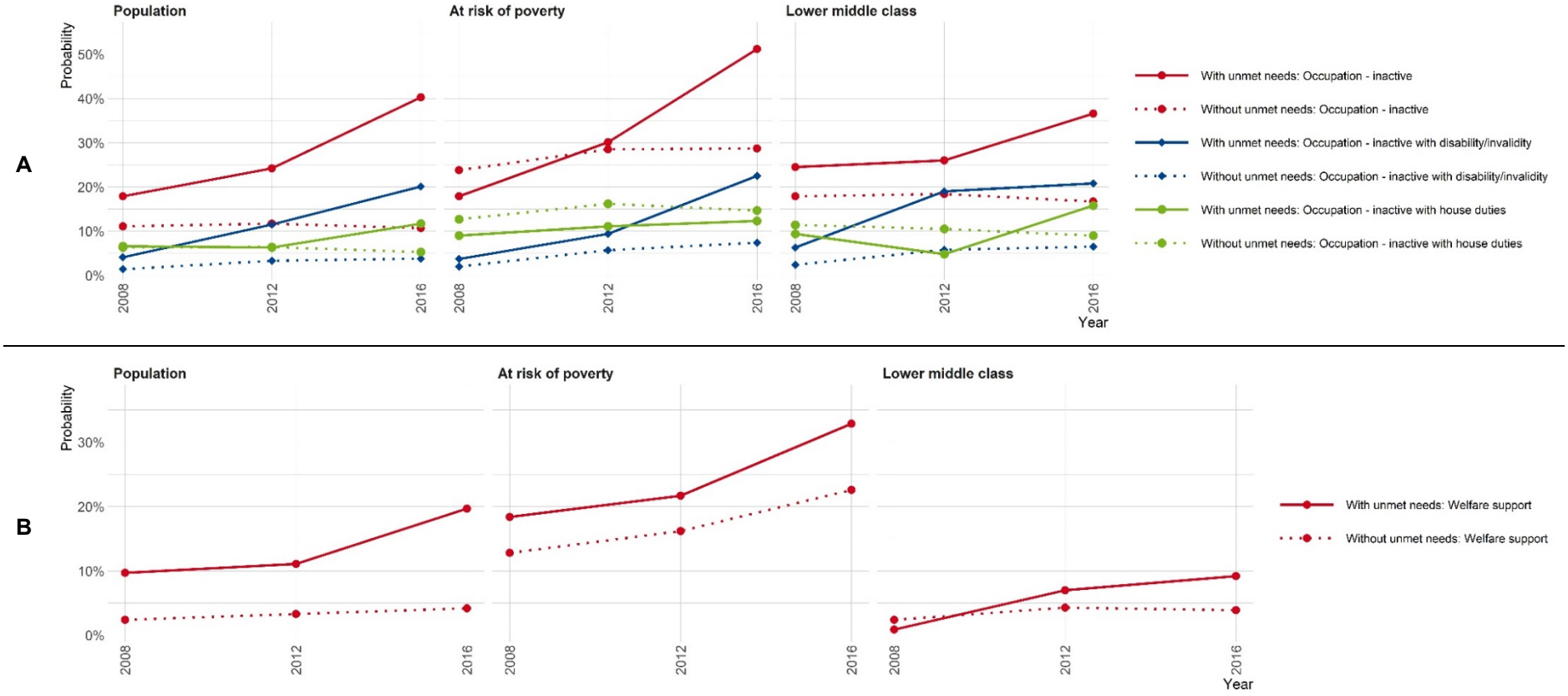
1. Individuals with unmet needs for dental care for financial reasons have on average a lower income than individuals without unmet needs. The discrepancy has increased over time. The average equivalized household income has increased steadily over time in the subpopulation without unmet needs, while in the subpopulation with unmet needs it has increased between 2008 and 2012 and decreased between 2012 and 2016. This implies that this group consists increasingly of poor individuals. The average equivalized household income in the subpopulation with unmet needs for dental care is, however, higher than in the subpopulation with unmet needs for medical care, indicating that individuals with higher incomes also experience postponement of dental care. This suggests that measures for financial accessibility for medical care are better developed than for dental care.
   This pattern is confirmed in the composition of the income groups. While in 2008 43.3% of the subpopulation with unmet needs was at risk of poverty and 6.1% belonged to the upper middle class, this has changed in 2016 to 50.8% at risk of poverty and 2.1% in the upper middle class. The fraction in the lower middle class has decreased slightly over time from 28.4% in 2008 to 23.6% in 2016 and the fraction in the core middle class has remained more or less stable over time with 22.2% in 2008 and 23.5% in 2016.
   When comparing the average income within income groups, we find little difference in income level between the subpopulations with and without unmet needs.
2. The subpopulation with unmet needs has a significantly larger fraction of individuals with low educational attainment and a smaller fraction of individuals with tertiary education (see also Figure 114, panel E).
3. The results clearly demonstrate that there is an increased risk of unmet needs among the population at working age, but not at work, i.e. either in unemployment or inactivity. Individuals in retirement on the other hand have a lower risk for unmet needs, a trend that was already found when looking at age patterns (see section 2.4.1). This difference found at the population level partly results from the low activity status in the income groups in which unmet needs prevail. An analysis by income group shows that individuals at work (full-time or part-time employment) in the population at risk of poverty or in the lower middle class have about the same risk (or even higher risk) to have unmet needs for dental care. This was not the case for unmet needs for medical care (see section 2.3.3).
   The fraction of individuals in inactivity among the subpopulation with unmet needs has increased drastically over time, and this both among individuals at risk of poverty and in the lower middle class (see also Figure 114, panel A). In 2008, 17.9% of the individuals with unmet needs were in inactivity, while in 2016 this increased up to 40.3%; for individuals in unemployment the fractions were 29.4% in 2008 and 15.9% in 2016 (still significantly above the fraction unemployed in the subpopulation without unmet needs). The inactivity nor unemployment rate has drastically changed in the subpopulation without unmet needs for dental care, indicating that this is not a generally increase in the rates across the population.
   Moreover there are two aggravating circumstances. First, it concerns individuals in long-term unemployment or long-term inactivity, as unemployment/inactivity rates of individuals who are currently *and* in the

previous year unemployed/inactive are nearly as high as the unemployment/inactivity rates of individuals who are currently unemployed/inactive. Second, in the subpopulation with unmet needs, about 50% to 60% of the population (in 2016: 82.9% in the subgroup at risk of poverty; 46.5% in the lower middle class) belongs to a household with very low working intensity. In such households, individuals at working age spend less than 20% of their combined available time in paid employment, self-employment or traineeship. Put differently, 15.8% of the individuals who live in a household with very low working intensity, report to have unmet needs in 2016 (up from 7.2% in 2008); this fraction was about 20.3% among individuals at risk of poverty (or 1 in 5 individuals) and 12.1% (or 1 in 8 individuals) in the lower middle class.

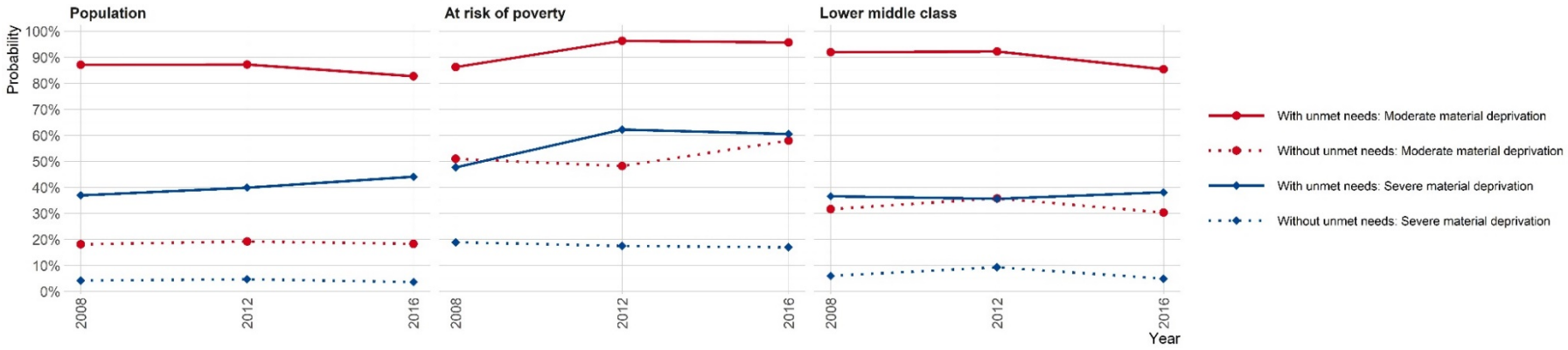
4. There is an overrepresentation of individuals on welfare support among the individuals with unmet needs for dental care. As for individuals in inactivity, this fraction has increased over time (see also Figure 114, panel B). In 2016, 15.4% of individuals (or 1 in 7 individuals) receiving welfare support indicate to have unmet needs for dental care for financial reasons, this fraction was 17.6% (or 1 in 6 individuals) among individuals at risk of poverty and 10.0% in the lower middle class.
   When looking at individuals who receive either welfare support or an allowance for invalidity or disability, we find that in 2016 about 40.2% of the individuals with unmet needs received such support and that 15.4% of the individuals receiving such support indicates to have unmet needs. These are high rates and indicate that despite the social safety net, an important number of individuals have unmet needs for dental care On the other hand, individuals receiving welfare support or invalidity/disability allowance are registered in administrative databases and can be identified. These individuals enter into contact with a medical doctor (invalidity/disability) or a social worker (welfare support), contacts that provide an opportunity to better understand and cope with unmet needs in this specific population.

5. Most striking, however, is the difference in financial situation between the subpopulation with and without unmet needs and in particular the difference and trend in material deprivation (see Figure 114, panel C). In 2016, 82.7% of the individuals with unmet needs indicate to be moderately materially deprived and 44.1% of the individuals were severely materially deprived. 86.6% of the individuals in the subpopulation with unmet needs indicates to be unable to cope with unexpected expenses compared to 21.6% in the subpopulation without unmet needs. Similar figures are found in other years. While these percentages are very high, they are somewhat lower compared to those reported for unmet needs for medical care (see section 2.3.3). This suggests that postponement of dental care also occurs in household who are financially less vulnerable relative to the subpopulation with unmet needs for medical care.
   Reducing material deprivation can be a lever for avoiding delayed or forgone care. It becomes clear that individuals who are not able to afford basic necessities (food, utilities, housing, basic hygiene) find it increasingly more difficult to afford care and hence experience unmet needs for dental care for financial reasons, some examples: 23.4% of individuals who cannot afford a hot meal every second day in 2016 (up from 11.4% in 2008, 17.0% in 2012); 21.8% of individuals who cannot afford a washing machine in 2016 (up from 11.3% in 2008, 22.4% in 2012); 26.4% of individuals with arrears on utility, rent or mortgage in 2016 (up from 8.6% in 2008, 17.0% in 2012). Overall, 32.2% (or 1 in 3) of the individuals with severe material deprivation report to have unmet needs for dental care for financial reasons in 2016 (up from 12.4% in 2008, 194.1% in 2012). These fractions are even more outspoken in this subpopulation at risk of poverty but remain a distinctive criterion in the lower middle class and even in the core middle class (results not shown). Expenses for basic necessities compete with the required expenses for healthcare.
   Moreover, we find that housing costs are a higher burden for individuals with unmet needs, amounting to almost 40% of their disposable income in 2016, leaving little room for other expenses, let alone the ability to cope with unexpected expenses. The results indicate that individuals who own a house are less at risk to experience unmet needs for dental care for financial reasons compared to tenants. In the subpopulation at risk of poverty, the majority of individuals are tenants, whereas in the lower middle class, the majority owns their own house.

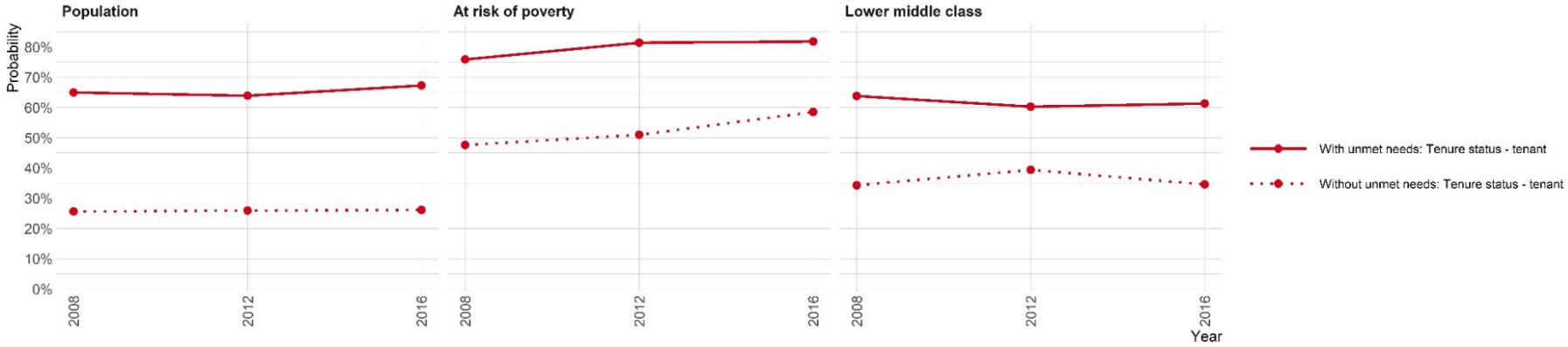
Figure 114 – Evolution (2008, 2012, 2016) for subset of characteristics related to socioeconomic status for the population with and without unmet needs for dental care



C


Population
At risk of poverty
Lower middle class
Probability
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Moderate material deprivation
Without unmet needs: Moderate material deprivation
With unmet needs: Severe material deprivation
Without unmet needs: Severe material deprivation

D


Population
At risk of poverty
Lower middle class
Probability
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Tenure status - tenant
Without unmet needs: Tenure status - tenant

E

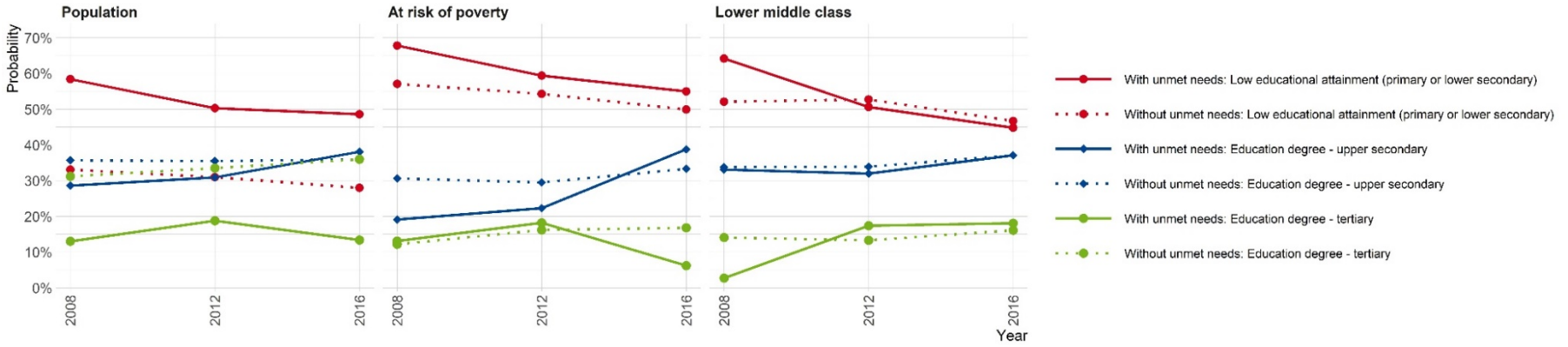


Table 93 – Overview of the distribution of socioeconomic status in the subpopulations with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by socioeconomic status

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household income									
Equivalized disposable household income		24 529.6	14 463.0***		22 159.3	14 941.2***		20 388.1	12 642.7***
Household at risk of poverty (<60% of median income)	12.8%	13.4%	50.8%***	7.5%	13.6%	39.4%***	5.3%	12.7%	43.3%***
Lower middle class ([60%-80%) of median income)	4.6%	18.9%	23.6%°	4.8%	18.4%	32.9%***	2.6%	17.4%	28.4%**
Core middle class ([80%-120%) of median income)	2.7%	32.7%	23.5%***	2.0%	33.0%	24.4%**	1.1%	33.8%	22.2%***
Upper middle class ([120%-200%) of median income)	0.3%	29.9%	2.1%***	0.3%	30.2%	3.0%***	0.3%	31.0%	6.1%***
Top middle class (>=200% of median income)	0.0%	5.1%	0.0%***	0.2%	4.7%	0.4%***	0.0%	5.2%	0.0%***
Self-reported occupation									
Low working intensity household (intensity < 0.20)	15.8%	13.5%	58.7%***	11.9%	12.9%	50.6%***	7.2%	11.5%	52.6%***

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Occupation - full-time employee	1.6%	31.4%	13.0%***	1.2%	33.3%	14.2%***	1.0%	34.2%	20.8%***
Occupation - part-time employee	3.1%	12.0%	9.8%	2.6%	12.7%	12.3%	1.0%	11.8%	7.7%°
Occupation - self-employed	1.3%	5.6%	2.0%***	0.9%	5.2%	1.7%***	0.6%	6.4%	2.4%***
Occupation - retired	2.2%	27.3%	15.6%***	1.1%	24.7%	10.1%***	1.4%	24.4%	21.0%
Occupation - unemployed	10.5%	5.2%	15.9%***	14.0%	5.4%	31.6%***	8.1%	5.4%	29.4%***
Occupation - unemployed (currently and in previous year)	11.9%	3.5%	12.3%***	15.9%	4.0%	26.8%***	8.8%	4.2%	24.8%***
Occupation - inactive	12.7%	10.7%	40.3%***	5.5%	11.7%	24.2%***	2.6%	11.1%	17.9%*
Occupation - inactive with disability/invalidity	16.8%	3.8%	20.1%***	8.9%	3.3%	11.5%***	4.4%	1.4%	4.1%
Occupation - inactive with house duties	7.8%	5.3%	11.7%***	2.7%	6.4%	6.3%	1.7%	6.3%	6.6%
Occupation - inactive for other reason	17.4%	1.6%	8.5%***	8.2%	2.0%	6.4%*	3.4%	3.4%	7.3%°
Occupation - inactive (currently and in previous year)	13.5%	9.5%	38.4%***	5.8%	10.0%	21.8%***	2.8%	9.6%	17.1%*
Welfare support	15.4%	4.2%	19.7%***	8.7%	3.3%	11.1%***	6.3%	2.4%	9.7%**
Welfare support or invalidity/disability allowance	15.4%	8.5%	40.2%***	8.5%	7.1%	23.4%***	5.7%	5.7%	21.3%***
Material deprivation									
Moderately materially deprived	14.8%	18.3%	82.7%***	11.3%	19.2%	87.2%***	7.2%	18.1%	87.1%***
Severely materially deprived	32.2%	3.6%	44.1%***	19.1%	4.7%	39.9%***	12.4%	4.2%	36.9%***
Unable to cope with unexpected expenses	13.4%	21.6%	86.6%***	10.1%	21.6%	86.6%***	6.2%	20.2%	81.7%***
Unable to afford 1 week holiday	12.1%	23.5%	83.8%***	8.6%	24.6%	82.8%***	5.7%	23.3%	87.0%***
Arrears on utility, rent, mortgage	26.4%	4.4%	41.2%***	17.0%	5.9%	42.9%***	8.6%	5.0%	28.8%***
Unable to afford meal every second day	23.4%	4.6%	36.4%***	17.0%	4.3%	31.7%***	11.4%	4.1%	32.7%***
Unable to afford washing machine	21.8%	1.2%	8.7%***	22.4%	1.3%	13.8%***	11.3%	1.5%	11.9%***
Unable to afford car	22.0%	5.2%	38.4%***	14.4%	5.9%	35.3%***	8.8%	5.3%	31.7%***
Unable to keep home adequately warm	24.3%	3.7%	30.4%***	15.0%	5.4%	33.7%***	7.2%	5.6%	27.0%***

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Heavy burden loan or mortgage	10.0%	28.6%	82.1%***	6.8%	31.4%	81.0%***	3.7%	30.1%	71.3%***
Share housing costs (% of disposable income)		18.9%	38.0%***		21.9%	36.3%***		25.3%	37.4%***
Tenure status									
Tenure status - owner	1.7%	73.9%	32.7%***	1.3%	74.1%	36.1%***	0.8%	74.4%	35.0%***
Tenure status - tenant	9.1%	26.1%	67.3%***	6.5%	25.9%	63.9%***	4.0%	25.6%	65.0%***
Highest obtained educational degree									
Low educational attainment (primary or lower secondary)	6.3%	28.0%	48.6%***	4.4%	31.0%	50.3%***	2.8%	33.1%	58.4%***
Education degree - upper secondary	3.9%	36.0%	38.1%	2.4%	35.5%	30.9%	1.3%	35.7%	28.6%°
Education degree - tertiary	1.4%	36.0%	13.4%***	1.6%	33.5%	18.8%***	0.7%	31.2%	13.0%***

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 94 – Overview of the distribution of socioeconomic status in the subpopulations at risk of poverty with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by socioeconomic status

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household income									
Equivalized disposable household income		10 676.2	10 441.9		9 426.9	9 937.8*		8 519.3	8 720.1
Self-reported occupation									
Low working intensity household (intensity < 0.20)	20.3%	61.6%	82.9%***	13.1%	57.6%	74.1%**	10.1%	49.3%	78.9%***
Occupation - full-time employee	11.0%	6.5%	5.4%	2.9%	7.3%	2.7%**	3.4%	7.6%	4.8%
Occupation - part-time employee	18.1%	6.0%	9.1%	7.8%	7.7%	8.1%	6.3%	8.4%	10.2%
Occupation - self-employed	5.0%	6.0%	2.2%**	3.6%	4.7%	2.2%	1.0%	6.1%	1.1%***
Occupation - retired	3.1%	27.0%	5.8%***	1.8%	28.8%	6.4%***	4.2%	30.9%	24.4%
Occupation - unemployed	17.9%	13.9%	20.7%°	20.1%	14.1%	43.7%***	13.3%	14.9%	41.1%***
Occupation - unemployed (currently and in previous year)	16.9%	11.8%	16.4%	20.0%	12.0%	37.1%***	13.4%	13.4%	37.5%***
Occupation - inactive	20.7%	28.7%	51.2%***	7.9%	28.5%	30.1%	4.0%	23.8%	17.9%
Occupation - inactive with disability/invalidity	30.9%	7.4%	22.5%***	11.8%	5.7%	9.4%	9.5%	2.0%	3.7%
Occupation - inactive with house duties	10.9%	14.7%	12.3%	5.2%	16.2%	11.1%°	3.8%	12.7%	9.0%
Occupation - inactive for other reason	26.7%	6.6%	16.4%**	10.6%	6.5%	9.6%	3.1%	9.1%	5.2%
Occupation - inactive (currently and in previous year)	22.2%	25.5%	49.6%***	7.9%	25.4%	27.0%	4.2%	20.3%	16.0%
Welfare support	17.6%	22.6%	32.9%*	9.8%	16.2%	21.7%	7.4%	12.8%	18.4%
Welfare support or invalidity/disability allowance	21.1%	29.9%	54.7%***	10.8%	22.1%	33.2%*	7.3%	18.5%	26.3%
Material deprivation									
Moderately materially deprived	19.5%	57.9%	95.7%***	13.9%	48.2%	96.3%***	8.6%	51.0%	86.2%***
Severely materially deprived	34.2%	17.0%	60.5%***	22.4%	17.5%	62.2%***	12.3%	18.9%	47.7%***
Unable to cope with unexpected expenses	19.7%	57.9%	96.8%***	13.2%	50.0%	93.7%***	8.8%	51.3%	89.6%***
Unable to afford 1 week holiday	18.1%	62.3%	94.2%***	11.5%	56.9%	91.0%***	8.0%	57.0%	89.4%***

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Arrears on utility, rent, mortgage	33.4%	14.7%	50.2%***	22.2%	13.9%	48.9%***	7.1%	14.4%	19.9%
Unable to afford meal every second day	32.8%	15.7%	52.4%***	21.4%	13.6%	45.6%***	10.6%	15.8%	33.9%**
Unable to afford washing machine	31.3%	4.7%	14.6%**	27.2%	5.0%	23.3%***	12.0%	6.5%	16.0%°
Unable to afford car	24.8%	23.0%	51.8%***	17.6%	19.1%	50.7%***	10.3%	20.2%	41.6%***
Unable to keep home adequately warm	33.8%	12.0%	41.6%***	22.6%	14.8%	53.4%***	10.4%	14.8%	30.9%**
Heavy burden loan or mortgage	18.3%	54.2%	83.1%***	12.5%	48.5%	85.6%***	8.3%	50.6%	82.7%***
Share housing costs (% of disposable income)		37.3%	46.6%***		43.7%	44.3%		60.5%	43.9%*
Tenure status									
Tenure status - owner	6.0%	41.5%	18.2%***	3.0%	49.0%	18.6%***	2.5%	52.4%	24.1%***
Tenure status - tenant	17.0%	58.5%	81.8%***	11.5%	51.0%	81.4%***	8.1%	47.6%	75.9%***
Highest obtained educational degree									
Low educational attainment (primary or lower secondary)	13.9%	49.9%	55.0%	8.2%	54.3%	59.4%	6.2%	57.1%	67.8%°
Education degree - upper secondary	14.6%	33.3%	38.8%	5.8%	29.5%	22.3%	3.3%	30.6%	19.1%*
Education degree - tertiary	5.1%	16.8%	6.2%***	8.4%	16.2%	18.2%	5.6%	12.2%	13.1%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 95 – Overview of the distribution of socioeconomic status in the subpopulations of the lower middle class with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by socioeconomic status

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household income									
Equivalized disposable household income		15 631.6	15 158.3**		14 162.9	14 040.7		12 600.3	11 974.3***
Self-reported occupation									
Low working intensity household (intensity < 0.20)	12.1%	23.3%	46.5%**	15.5%	23.5%	54.4%***	6.7%	25.0%	53.7%**
Occupation - full-time employee	4.9%	12.8%	13.6%	3.5%	15.6%	11.2%	2.5%	15.7%	15.3%
Occupation - part-time employee	5.3%	8.3%	9.7%	7.2%	8.2%	12.9%	1.5%	6.9%	3.9%
Occupation - self-employed	1.6%	4.2%	1.4%*	3.7%	3.5%	2.7%	1.4%	4.8%	2.6%
Occupation - retired	2.3%	43.4%	20.9%***	1.4%	39.3%	11.4%***	1.9%	39.5%	29.3%
Occupation - unemployed	10.4%	7.2%	17.4%*	15.1%	8.2%	29.0%***	7.3%	8.2%	24.5%*
Occupation - unemployed (currently and in previous year)	10.5%	4.9%	11.9%°	17.0%	6.1%	25.2%***	6.7%	6.8%	18.3%*
Occupation - inactive	9.5%	16.7%	36.6%***	6.6%	18.4%	26.0%	3.5%	17.9%	24.5%
Occupation - inactive with disability/invalidity	13.4%	6.5%	20.8%**	14.1%	5.8%	19.0%**	6.5%	2.4%	6.3%
Occupation - inactive with house duties	7.8%	9.0%	15.8%	2.3%	10.5%	4.8%*	2.1%	11.4%	9.4%
Occupation - inactive for other reason	0.0%	1.2%	0.0%***	4.8%	2.1%	2.1%	5.4%	4.1%	8.8%
Occupation - inactive (currently and in previous year)	9.7%	14.9%	33.2%**	7.0%	15.8%	24.0%°	3.7%	16.7%	24.5%
Welfare support	10.0%	3.9%	9.2%	7.4%	4.3%	7.0%	1.0%	2.4%	0.9%
Welfare support or invalidity/disability allowance	12.8%	10.7%	32.7%***	11.4%	10.0%	25.7%**	7.0%	8.0%	22.5%*
Material deprivation									
Moderately materially deprived	12.0%	30.3%	85.4%***	11.4%	35.8%	92.2%***	7.2%	31.6%	91.9%***
Severely materially deprived	27.0%	4.9%	38.1%***	16.1%	9.3%	35.6%***	14.0%	6.0%	36.6%***
Unable to cope with unexpected expenses	10.9%	34.9%	88.4%***	10.7%	38.0%	91.2%***	6.1%	31.4%	76.8%***
Unable to afford 1 week holiday	9.1%	39.8%	82.9%***	9.2%	44.1%	89.1%***	5.7%	39.5%	89.8%***

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Arrears on utility, rent, mortgage	26.6%	5.3%	39.8%***	21.2%	8.9%	47.9%***	14.3%	6.6%	41.4%***
Unable to afford meal every second day	16.8%	7.0%	29.5%***	15.4%	7.8%	28.5%***	15.7%	5.5%	38.9%***
Unable to afford washing machine	11.7%	1.8%	4.9%	20.2%	2.6%	13.3%*	13.3%	1.8%	10.3%°
Unable to afford car	17.1%	7.3%	31.1%***	13.2%	10.9%	33.0%***	7.0%	9.0%	25.4%*
Unable to keep home adequately warm	13.5%	5.8%	18.8%**	9.7%	9.5%	20.5%*	6.1%	9.6%	23.5%°
Heavy burden loan or mortgage	9.8%	36.5%	82.0%***	9.3%	39.4%	80.9%***	3.9%	39.7%	60.0%*
Share housing costs (% of disposable income)		24.1%	32.9%***		27.4%	36.7%***		29.2%	39.5%**
Tenure status									
Tenure status - owner	2.8%	65.4%	38.7%***	3.2%	60.6%	39.7%***	1.4%	65.7%	36.2%***
Tenure status - tenant	7.9%	34.6%	61.3%***	7.1%	39.4%	60.3%***	4.7%	34.3%	63.8%***
Highest obtained educational degree									
Low educational attainment (primary or lower secondary)	4.4%	46.7%	44.8%	4.6%	52.7%	50.6%	3.2%	52.1%	64.2%
Education degree - upper secondary	4.6%	37.1%	37.1%	4.5%	33.9%	32.0%	2.5%	33.8%	33.1%
Education degree - tertiary	5.1%	16.1%	18.1%	6.1%	13.3%	17.4%	0.5%	14.1%	2.7%***

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.4.4. Characteristics related to sociodemographic situation

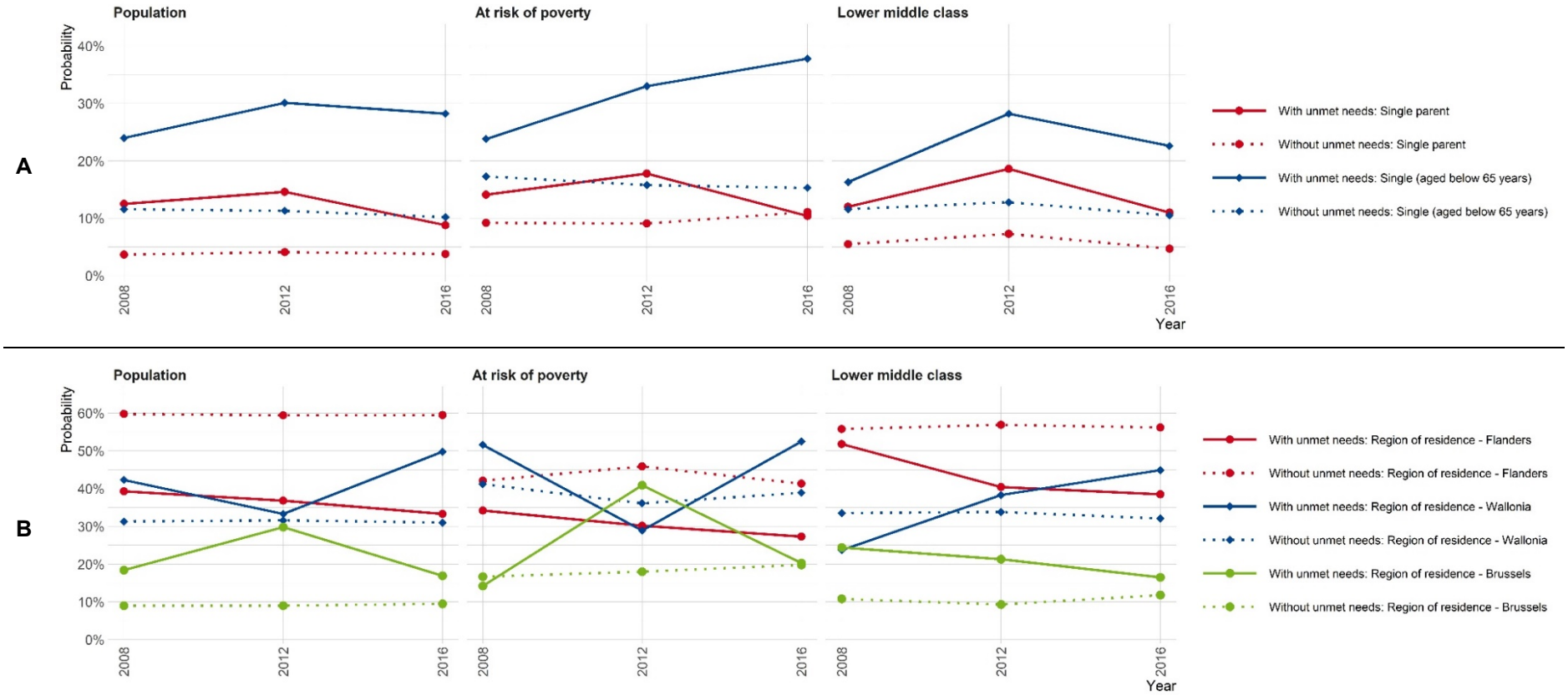
Table 96 provides information on the distribution of the characteristics related to sociodemographic features in the subpopulations with and without unmet needs for dental care (see Box 2 on how to interpret the results in the Tables and Figures). Table 97 and Table 98 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 115 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) singles and single parents; (panel B) region of residence; (panel C) urbanization; (panel D) country of birth.

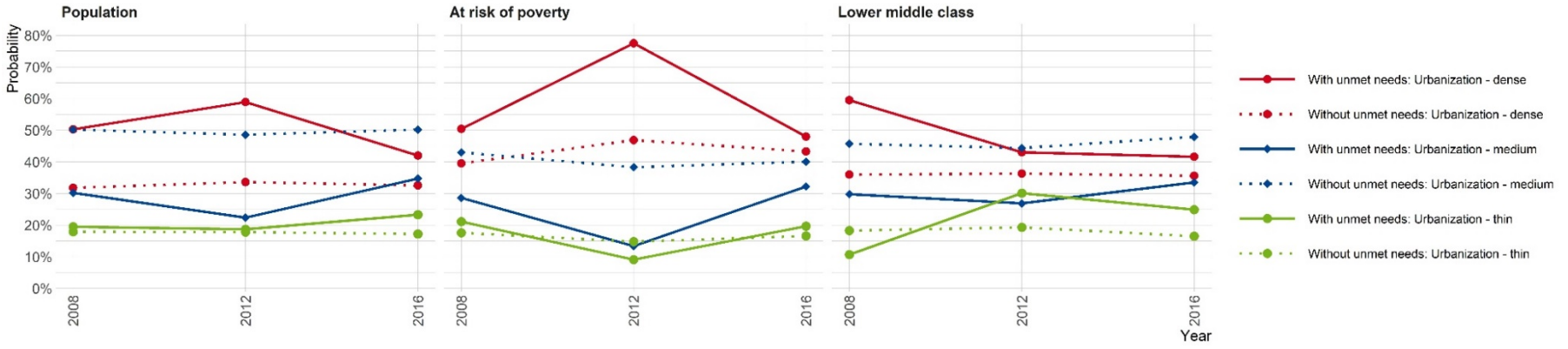
Main conclusions

1. Single persons (with and without children), but in particular single adults without children aged below 65 years have an increased risk to report unmet needs for dental care for financial reasons (see also Figure 115, panel A). For singles below 65, the risk has increased over time, in particular among those at risk of poverty where 26.5% (or 1 in 4 individuals) report to have postponed dental care for financial reasons in 2016. For single parent households, the overrepresentation in the subpopulation with unmet needs, has decreased over time.
2. There is a striking regional difference and differential trend in unmet needs for dental care for financial reasons between the regions (see Figure 115, panel B and KCE HSPA report 313[18]), with relatively lower rates of postponement of dental care for financial reasons in Flanders and higher rates in Wallonia (in 2008 and 2016) and Brussels. The regional differences have increased over time.
   The regional differences should be considered in combination with other distinctive characteristics that are associated with unmet needs and differ between the regions, such as the age structure (Brussels has a younger population), the (in)activity rates (activity rate is higher in Flanders), the unemployment rate (the unemployment rate is lower in Flanders), the poverty risk (lower in Flanders), etc. For example, while about 10% of the Belgian population lives in Brussels, about 20% of the households at risk of poverty live in Brussels. Given that postponement of care for financial reasons is more important in the population at risk of poverty, it is also not surprising that the risk for unmet needs is higher in Brussels. When a subgroup analysis by income group is performed, we do not find a higher risk for unmet needs for dental care in Brussels among the subpopulation at risk of poverty in 2016.
3. Individuals with unmet needs for dental care for financial reasons predominantly live in densely populated areas (see also Figure 109, panel C). Also when zooming in on the subpopulation at risk of poverty, we find an overrepresentation of individuals in densely populated areas among the subgroup with unmet needs. This is of course linked to the results for Brussels. In the lower middle class, we also find an increased risk to have unmet needs for dental care for individuals living in rural areas.
4. Individuals who reside in Belgium, but were not borne in Belgium are at increased risk of unmet need for dental care for financial reasons (see also Figure 115, panel D). This is, in particular, the case among the population at risk of poverty.

Figure 115 – Evolution (2008, 2012, 2016) for subset of characteristics related to sociodemographic features for the population with and without unmet needs for dental care



C


Population
At risk of poverty
Lower middle class
Probability
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Urbanization - dense
Without unmet needs: Urbanization - dense
With unmet needs: Urbanization - medium
Without unmet needs: Urbanization - medium
With unmet needs: Urbanization - thin
Without unmet needs: Urbanization - thin

D

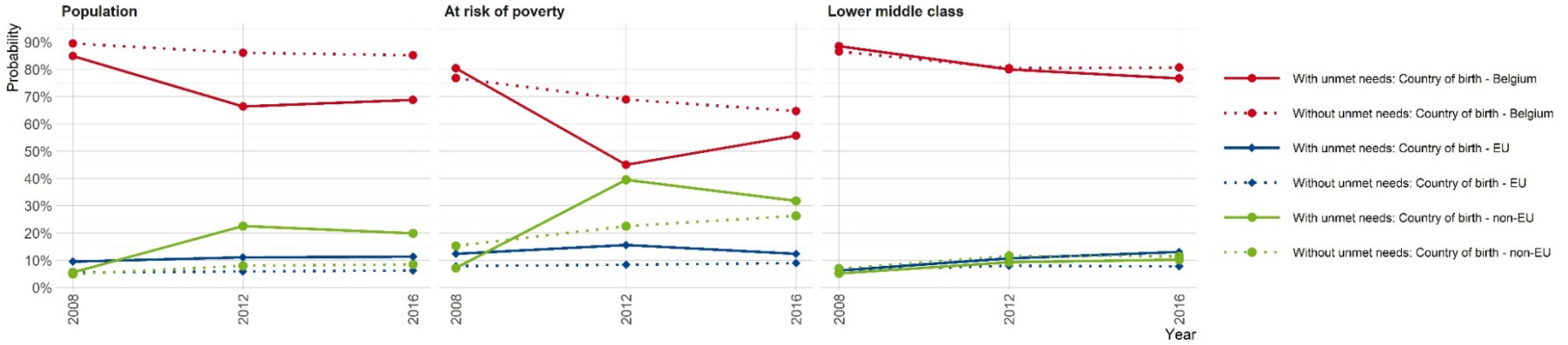

Population
At risk of poverty
Lower middle class
Probability
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
With unmet needs: Country of birth - Belgium
Without unmet needs: Country of birth - Belgium
With unmet needs: Country of birth - EU
Without unmet needs: Country of birth - EU
With unmet needs: Country of birth - non-EU
Without unmet needs: Country of birth - non-EU

Table 96 – Overview of the distribution of sociodemographic features in the subpopulations with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by sociodemographic feature

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household composition									
Household size		2.8	2.6°		2.7	2.4**		2.8	2.4**
Couple without children	2.8%	31.2%	23.0%**	1.3%	31.6%	15.0%***	0.9%	32.0%	17.1%***
Couple with children	2.6%	29.0%	19.9%***	2.2%	28.9%	23.1%*	1.4%	27.6%	24.7%
Single without children	7.0%	18.0%	35.3%***	5.1%	18.9%	36.1%***	3.1%	19.1%	37.0%***
Single parent	8.2%	3.8%	8.8%***	9.0%	4.1%	14.6%***	5.3%	3.7%	12.5%***
Household composition - other	2.7%	18.0%	13.0%*	1.9%	16.5%	11.2%*	0.8%	17.6%	8.7%***
Single (aged below 65 years)	9.7%	10.2%	28.2%***	6.9%	11.3%	30.1%***	3.2%	11.6%	24.0%**
Place of residence									
Region of residence - Flanders	2.1%	59.5%	33.3%***	1.7%	59.4%	36.8%***	1.1%	59.8%	39.3%***
Region of residence - Wallonia	5.8%	31.0%	49.8%***	2.9%	31.6%	33.3%	2.2%	31.3%	42.3%**
Region of residence - Brussels	6.4%	9.5%	16.9%***	8.5%	9.0%	29.8%***	3.2%	9.0%	18.4%**
Urbanization - dense	4.7%	32.6%	42.0%**	4.7%	33.6%	58.9%***	2.5%	31.8%	50.3%***
Urbanization - medium	2.6%	50.2%	34.7%***	1.3%	48.6%	22.4%***	1.0%	50.2%	30.2%***
Urbanization - thin	5.0%	17.2%	23.3%*	2.9%	17.8%	18.7%	1.7%	17.9%	19.5%
Country of birth									
Country of birth - Belgium	3.0%	85.2%	68.8%***	2.1%	86.1%	66.4%***	1.5%	89.5%	84.9%
Country of birth - EU	6.5%	6.3%	11.3%*	5.0%	5.9%	11.1%**	2.7%	5.5%	9.5%
Country of birth - non-EU	8.3%	8.5%	19.9%***	7.3%	8.0%	22.6%***	1.8%	5.0%	5.6%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 97 – Overview of the distribution of sociodemographic features in the subpopulations at risk of poverty with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by sociodemographic feature

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household composition									
Household size		2.7	2.7		2.6	2.4		2.6	2.5
Couple without children	7.3%	24.9%	13.3%***	3.5%	31.4%	13.8%***	3.2%	28.6%	17.3%*
Couple with children	12.7%	23.4%	23.2%	7.5%	22.4%	22.5%	6.0%	19.1%	21.9%
Single without children	19.9%	25.2%	42.7%***	10.3%	25.6%	36.2%°	6.3%	31.1%	37.5%
Single parent	12.1%	11.1%	10.4%	13.7%	9.1%	17.8%*	7.8%	9.2%	14.1%
Household composition - other	9.0%	15.4%	10.4%°	6.4%	11.6%	9.7%	4.1%	11.9%	9.2%
Single (aged below 65 years)	26.5%	15.3%	37.8%***	14.5%	15.8%	33.0%**	7.1%	17.3%	23.8%
Place of residence									
Region of residence - Flanders	8.8%	41.3%	27.3%**	5.1%	45.9%	30.2%**	4.3%	42.1%	34.2%
Region of residence - Wallonia	16.5%	38.9%	52.5%**	6.1%	36.1%	28.9%	6.5%	41.2%	51.6%
Region of residence - Brussels	13.0%	19.8%	20.3%	15.6%	18.0%	40.9%***	4.5%	16.7%	14.2%
Urbanization - dense	14.0%	43.3%	48.0%	11.8%	46.9%	77.5%***	6.6%	39.5%	50.4%
Urbanization - medium	10.5%	40.1%	32.2%°	2.8%	38.3%	13.4%***	3.6%	43.0%	28.6%*
Urbanization - thin	14.8%	16.6%	19.7%	4.8%	14.8%	9.1%*	6.2%	17.6%	21.1%
Country of birth									
Country of birth - Belgium	11.2%	64.7%	55.7%°	5.0%	69.0%	45.0%***	5.5%	76.8%	80.4%
Country of birth - EU	16.8%	9.0%	12.4%	13.0%	8.4%	15.6%*	8.1%	7.9%	12.4%
Country of birth - non-EU	15.1%	26.3%	31.8%	12.4%	22.5%	39.5%**	2.5%	15.3%	7.2%*

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 98 – Overview of the distribution of sociodemographic features in the subpopulations of the lower middle class with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by sociodemographic feature

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household composition									
Household size		2.5	2.3		2.4	2.4		2.6	2.4
Couple without children	4.4%	30.1%	28.7%	2.9%	29.8%	17.6%**	0.8%	33.2%	9.6%***
Couple with children	2.3%	20.9%	10.2%***	3.7%	20.6%	15.7%	4.4%	21.3%	37.4%*
Single without children	5.0%	31.2%	34.3%	5.0%	32.4%	34.2%	3.5%	28.0%	37.9%
Single parent	10.1%	4.7%	11.0%*	11.3%	7.3%	18.6%**	5.5%	5.5%	12.0%
Household composition - other	5.5%	13.1%	15.8%	6.7%	9.8%	13.9%	0.7%	11.9%	3.2%***
Single (aged below 65 years)	9.4%	10.5%	22.6%**	10.0%	12.8%	28.2%**	3.6%	11.6%	16.3%
Place of residence									
Region of residence - Flanders	3.2%	56.2%	38.5%**	3.4%	56.9%	40.4%**	2.4%	55.8%	51.8%
Region of residence - Wallonia	6.3%	32.1%	44.9%*	5.4%	33.8%	38.3%	1.8%	33.5%	23.7%
Region of residence - Brussels	6.3%	11.8%	16.5%	10.3%	9.3%	21.3%*	5.7%	10.8%	24.4%°
Urbanization - dense	5.3%	35.6%	41.6%	5.6%	36.3%	43.0%	4.2%	36.0%	59.5%**
Urbanization - medium	3.3%	47.9%	33.5%**	2.9%	44.4%	26.9%***	1.7%	45.7%	29.8%*
Urbanization - thin	6.8%	16.5%	24.9%	7.2%	19.3%	30.1%°	1.5%	18.3%	10.7%°
Country of birth									
Country of birth - Belgium	4.4%	80.7%	76.7%	4.7%	80.4%	80.0%	2.6%	86.6%	88.5%
Country of birth - EU	7.4%	7.8%	13.1%	6.3%	8.0%	10.7%	2.6%	6.4%	6.3%
Country of birth - non-EU	4.1%	11.5%	10.2%	3.9%	11.6%	9.3%	1.9%	7.0%	5.2%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

2.4.5. Characteristics related to healthcare supply and use

Table 99 provides information on the distribution of the characteristics related to healthcare supply and use in the subpopulations with and without unmet needs for dental care (see Box 2 on how to interpret the results in the Tables and Figures). Remark that in Table 99, negative values can occur in the rows labelled "Deviation population". These deviations depict the difference between healthcare use (probability of healthcare contact or number of contacts) in the population and the subpopulation with/without unmet needs after a correction for healthcare needs is made (according to the methodology of the fairness gap, see Scientific report section 2.4.2). Negative values indicate that – after accounting for healthcare needs – the subgroup has a lower healthcare use than the population in general. Positive values, on the other hand, indicate that – after accounting for healthcare needs – the subgroup has a higher healthcare use than the population in general. Table 100 and Table 101 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

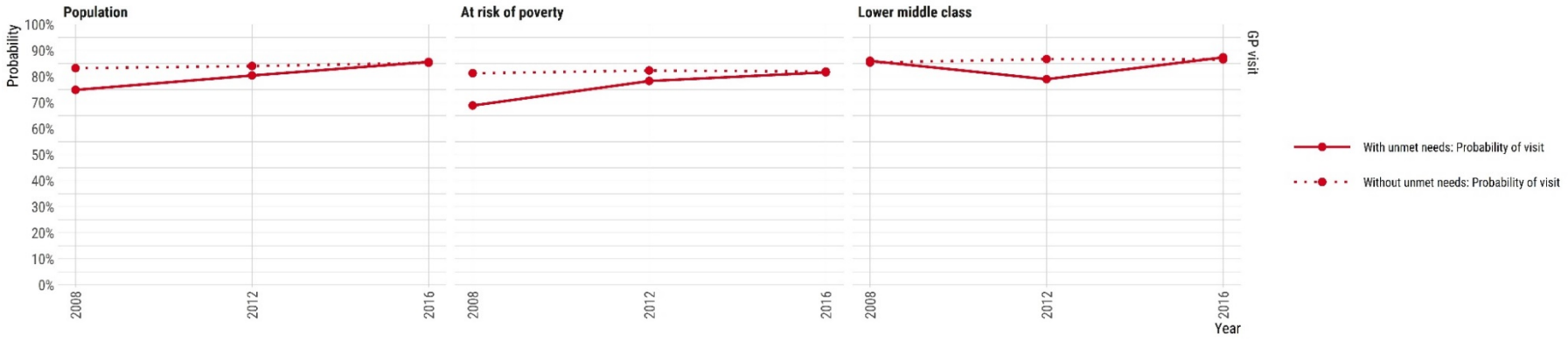
Figure 116 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) the probability to consult a GP; (panel B) the probability to consult a specialist; (panel C) the probability of an ED contact; (panel D) the probability to have regular dentist visits (visits in two of the past three years); (panel E) the probability to use antidepressants over the period of 1 year.

Main conclusions

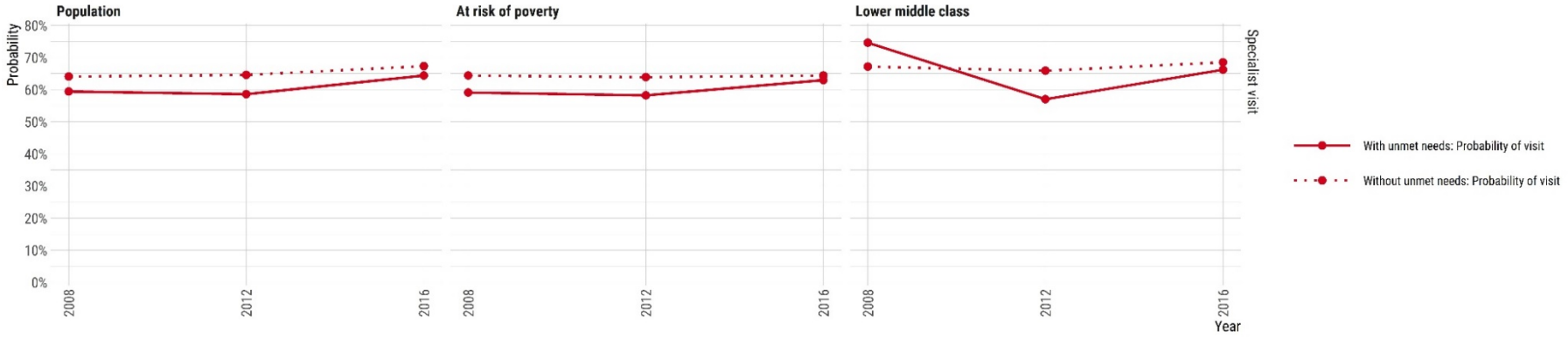
1. The probability to report unmet needs does not appear to be associated with the availability of healthcare providers. There are barely differences between the subpopulations with and without unmet needs for dental care with respect to the included healthcare supply variables.
2. With respect to regular visits to the dentist (i.e. one or more visits in at least two of the past three years), we observe a significantly lower probability in the subpopulation with unmet needs compared to the subpopulation without unmet needs (see also Figure 116, panel D). The lower use of dental care is more pronounced than in the subpopulation with unmet needs for medical care (see section 2.3.5). In 2008, the probability to have regular dentist visits (based on the registration of healthcare in the years 2007, 2008, and 2009, see section 1.8) was 21.1% in the subpopulation with unmet needs for dental care compared to 52.4% in the subpopulation without unmet needs; in 2012 and 2016 the probabilities were 32.7% (versus 51.9%) and 32.9% (versus 58.2%), respectively. The gap between the subpopulations with and without unmet needs is present in all income groups.
   With respect to regular preventive visits to the dentist, we find a significantly lower use of preventive dental care, with regular visits for 9% to 10% of the subpopulation with unmet needs for dental care and rates between 26% to 33% in the subpopulation without unmet needs. No clear break is observed between 2008 and 2012.
3. With respect to GP and specialist care, we find a lower use in the subpopulation with unmet needs for dental care, and a small break between 2008 and 2012. However, both the break and the lower use are less outspoken compared to the subpopulation with unmet needs for medical care. This is likely the result of the overlap between both subpopulations with unmet needs. In 2016, there was no difference in the use of GP care between the subpopulations with and without unmet needs for dental care, while there was still a lower probability to use specialist care, amounting to a 10% lower probability to consult a specialist in 2016 (after correcting for healthcare needs according to the baseline inequity scenario, see Scientific report section 2.4).
4. Among the subpopulation with unmet needs, there is a higher probability to go to an emergency department (ED), but as for GP and specialist care, the differences between the subpopulations with and without unmet needs for dental care are less outspoken than the differences observed between the subpopulations with and without unmet needs for medical care.
5. Among the subpopulation with unmet needs, there is a substantially higher usage of antidepressants.

Figure 116 – Evolution (2008, 2012, 2016) for subset of characteristics related to healthcare supply and use for the population with and without unmet needs for dental care

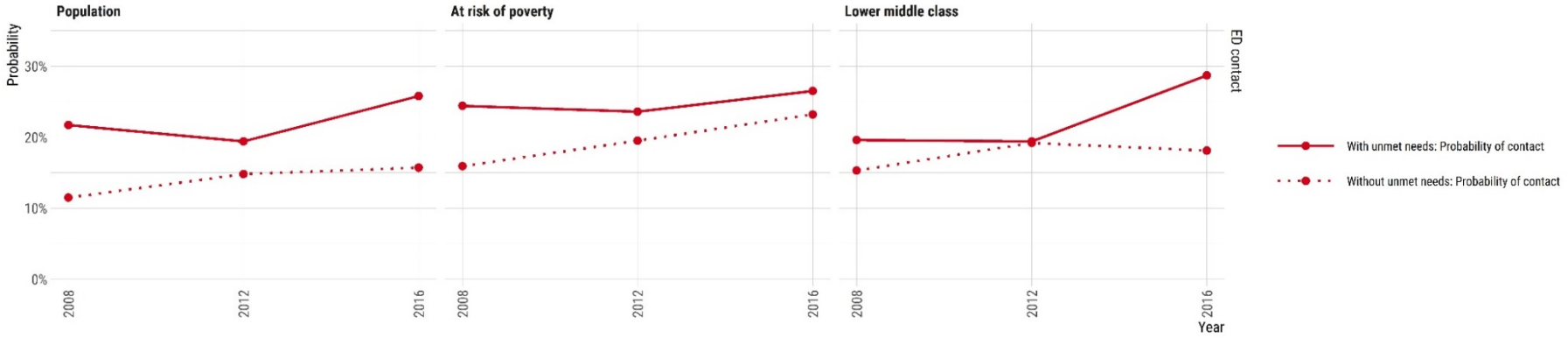
A



B



C


Population
At risk of poverty
Lower middle class
Probability
30%
20%
10%
0%
2008
2012
2016
Year
ED contact
With unmet needs: Probability of contact
Without unmet needs: Probability of contact

D


Population
At risk of poverty
Lower middle class
Probability
60%
50%
40%
30%
20%
10%
0%
2008
2012
2016
Year
Dentist visit
With unmet needs: Probability of regular visit
Without unmet needs: Probability of regular visit

E

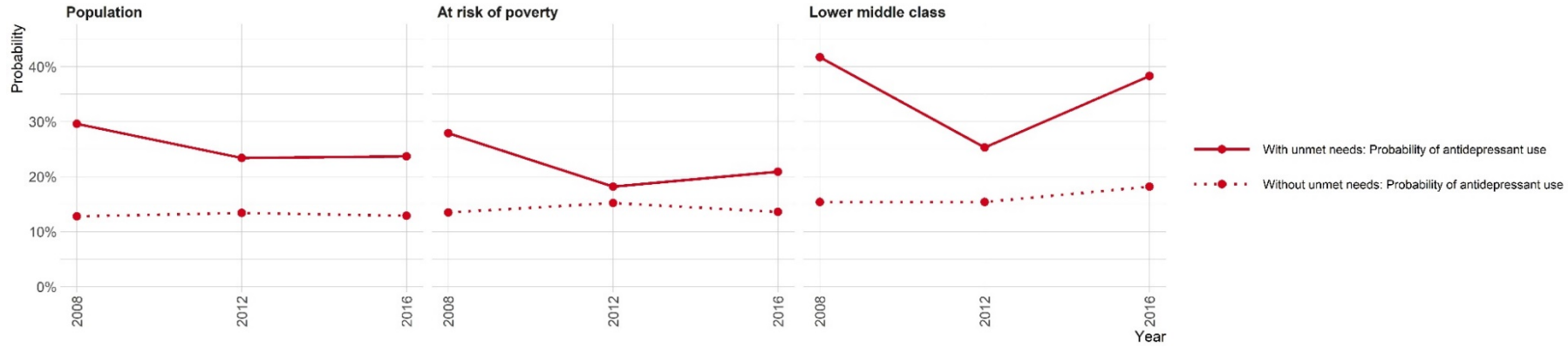


Table 99 – Overview of the distribution of healthcare supply and use in the subpopulations with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by healthcare use

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Healthcare supply (density per 10 000 population, distance in km)									
Density of GPs in municipality		11.6	12.2**		11.3	11.5		11.8	12.1
Density of specialists in municipality		13.0	12.9		12.6	12.8		12.9	13.2
Density of dentists in municipality		7.7	7.6		7.4	7.8		7.5	7.3
Distance to nearest hospital site with emergency department		6.1	5.6		5.7	4.3***		5.4	4.6*
Doctor consultation (GP, SP)									
Probability of visit	3.6%	91.1%	91.8%	2.5%	90.1%	85.0%°	1.5%	89.9%	83.0%*
Deviation population probability after needs correction		0.0%	-0.3%		0.2%	-5.6%*		0.2%	-10.0%***
Number of visits		9.7	11.1*		9.5	10.5		8.9	11.1*

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Deviation population mean visits after needs correction		0.0	-1.3*		0.0	-0.2		0.0	-2.4**
GP consultation									
Probability of visit	3.6%	85.3%	85.6%	2.6%	84.0%	80.4%	1.4%	83.2%	74.9%*
Deviation population probability after needs correction		0.0%	-0.8%		0.1%	-3.0%		0.2%	-11.9%***
Number of visits		6.3	7.4*		6.3	6.3		6.0	8.0**
Deviation population mean visits after needs correction		0.0	0.1		0.0	-0.2		0.0	-0.3
Global Medical Record (GMR)									
Probability of having GMR	3.3%	66.7%	61.7%	2.2%	55.4%	45.4%**	1.2%	48.4%	36.1%**
Deviation population probability after needs correction		0.0%	-1.2%		0.2%	-6.0%°		0.2%	-11.6%**
Specialist consultation									
Probability of visit	3.6%	67.3%	64.4%	2.5%	64.6%	58.6%°	1.5%	64.1%	59.4%
Deviation population probability after needs correction		0.4%	-9.7%***		0.3%	-10.9%***		0.2%	-13.2%***
Number of visits		4.6	5.2°		4.5	6.1***		4.2	4.6
Deviation population mean visits after needs correction		0.0	-1.1***		0.0	0.4		0.0	-1.9***
Contact with Emergency Department (ED)									
Probability of contact	6.0%	15.7%	25.8%***	3.5%	14.8%	19.4%°	3.0%	11.5%	21.7%**
Deviation population probability after needs correction		-0.2%	5.6%*		0.0%	1.5%		-0.1%	6.2%°
Number of contacts		1.4	1.9°		1.4	1.4		1.3	1.3
Deviation population mean contacts after needs correction		0.0	0.2		0.0	0.0		0.0	0.0
Inpatient admission									
Probability of inpatient admission	4.4%	12.4%	14.6%	3.1%	11.5%	13.3%	2.8%	10.8%	19.2%*
Deviation population probability after needs correction		0.1%	-2.5%		0.0%	-0.9%		0.0%	1.8%

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Number of inpatient admissions		1.4	1.5		1.4	1.5		1.4	1.3
Deviation population mean inpatient admissions after needs correction		0.0	-0.1		0.0	0.1		0.0	-0.2
Regular dentist visits (2 visits in 3 years)									
Probability of regular visit	2.1%	58.2%	32.9%***	1.7%	51.9%	32.7%***	0.6%	52.4%	21.1%***
Deviation population probability ^		0.9%	-22.4%***		0.5%	-17.2%***		0.5%	-29.3%***
Regular preventive dentist visits (2 visits in 3 years)									
Probability of regular visit	1.2%	33.1%	10.4%***	1.1%	26.0%	10.6%***	0.5%	26.9%	9.0%***
Deviation population probability ^		0.7%	-18.9%***		0.4%	-14.2%***		0.3%	-16.5%***
Antidepressant use									
Probability of antidepressant use	6.6%	12.9%	23.7%***	4.6%	13.4%	23.4%***	3.6%	12.8%	29.6%***
Deviation population probability after needs correction		0.0%	0.6%		-0.1%	2.8%		-0.1%	4.2%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

^ For dental care, no adjustment for healthcare needs is made, only the control variables (place of residence and membership of a community health centre) are neutralized.

Table 100 – Overview of the distribution of healthcare supply and use in the subpopulations at risk of poverty with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by healthcare use

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Healthcare supply (density per 10 000 population, distance in km)									
Density of GPs in municipality		11.3	12.1*		11.2	11.2		11.8	11.7
Density of specialists in municipality		11.9	13.1		12.1	13.3		12.6	11.6
Density of dentists in municipality		7.2	7.5		7.0	8.1**		7.3	6.6*
Distance to nearest hospital site with emergency department		5.4	5.5		5.2	3.3***		5.1	4.1*
Doctor consultation (GP, SP)									
Probability of visit	12.7%	88.2%	87.7%	7.2%	89.1%	84.6%	4.9%	89.1%	82.5%
Deviation population probability after needs correction		0.0%	-0.2%		0.3%	-3.2%		0.5%	-8.5%°
Number of visits		11.1	10.6		10.4	8.5*		9.9	11.3
Deviation population mean visits after needs correction		0.1	-0.9		0.1	-0.8		0.0	-0.9
GP consultation									
Probability of visit	12.7%	81.9%	81.6%	7.2%	82.3%	78.3%	4.5%	81.3%	68.9%°
Deviation population probability after needs correction		0.0%	0.3%		0.1%	-0.9%		0.8%	-14.5%**
Number of visits		7.5	7.2		7.2	4.7***		6.9	8.7
Deviation population mean visits after needs correction		0.0	-0.1		0.1	-1.4**		0.0	0.8
Global Medical Record (GMR)									
Probability of having GMR	11.5%	63.2%	56.4%	3.9%	53.7%	26.7%***	3.7%	45.7%	31.5%*
Deviation population probability after needs correction		0.1%	-0.7%		1.5%	-18.9%***		0.6%	-11.4%*
Specialist consultation									
Probability of visit	12.5%	64.4%	63.0%	6.9%	63.9%	58.2%	4.8%	64.4%	59.1%

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Deviation population probability after needs correction		0.6%	-4.0%		0.5%	-5.9%		0.6%	-10.6%°
Number of visits		5.0	5.0		4.4	6.1*		4.2	4.0
Deviation population mean visits after needs correction		0.1	-0.7°		-0.1	1.2°		0.1	-1.1*
Contact with Emergency Department (ED)									
Probability of contact	14.3%	23.2%	26.5%	8.9%	19.5%	23.6%	7.8%	15.9%	24.4%
Deviation population probability after needs correction		-0.1%	0.5%		-0.2%	2.3%		-0.3%	5.7%
Number of contacts		1.6	2.4		1.5	1.2*		1.4	1.5
Deviation population mean contacts after needs correction		0.0	0.1		0.0	-0.3*		0.0	0.0
Inpatient admission									
Probability of inpatient admission	10.2%	15.0%	11.6%	4.8%	13.8%	8.7%°	6.9%	12.9%	17.3%
Deviation population probability after needs correction		0.7%	-4.7%*		0.4%	-5.2%°		0.0%	0.1%
Number of inpatient admissions		1.4	1.6		1.6	1.4		1.4	1.3
Deviation population mean inpatient admissions after needs correction		0.0	0.1		0.0	-0.1		0.0	-0.1
Regular dentist visits (2 visits in 3 years)									
Probability of regular visit	10.5%	40.1%	32.0%°	4.6%	38.8%	23.2%**	2.9%	41.8%	22.2%***
Deviation population probability ^		0.9%	-6.1%		1.1%	-13.6%**		1.0%	-18.1%***
Regular preventive dentist visits (2 visits in 3 years)									
Probability of regular visit	9.7%	17.3%	12.7%	4.9%	15.2%	9.7%	3.5%	16.9%	11.1%
Deviation population probability ^		0.4%	-2.7%		0.4%	-5.5%		0.3%	-5.0%
Antidepressant use									
Probability of antidepressant use	18.4%	13.6%	20.9%°	8.8%	15.2%	18.2%	10.3%	13.5%	27.9%*
Deviation population probability after needs correction		-0.1%	0.5%		0.1%	-1.2%		-0.3%	5.8%

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*
^ For dental care, no adjustment for healthcare needs is made, only the control variables (place of residence and membership of a community health centre) are neutralized.

Table 101 – Overview of the distribution of healthcare supply and use in the subpopulations of the lower middle class with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by healthcare use

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Healthcare supply (density per 10 000 population, distance in km)									
Density of GPs in municipality		11.3	12.5*		11.1	11.1		11.7	12.1
Density of specialists in municipality		12.1	12.1		11.9	10.3		12.6	14.6
Density of dentists in municipality		7.4	7.9		7.0	7.1		7.2	8.4*
Distance to nearest hospital site with emergency department		6.0	5.2		6.0	5.4		5.2	3.5**
Doctor consultation (GP, SP)									
Probability of visit	4.6%	91.2%	95.6%°	4.3%	91.4%	82.6%	2.6%	91.5%	91.6%
Deviation population probability after needs correction		-0.2%	3.8%°		0.3%	-7.1%		0.0%	-1.8%
Number of visits		11.6	13.3		11.5	12.0		10.7	13.1
Deviation population mean visits after needs correction		0.0	-0.3		0.0	0.4		0.0	-1.5
GP consultation									
Probability of visit	4.5%	86.6%	87.4%	4.3%	86.7%	79.0%	2.6%	85.4%	86.0%
Deviation population probability after needs correction		0.0%	0.2%		0.2%	-4.6%		0.1%	-2.1%
Number of visits		7.8	8.8		7.9	7.2		7.2	8.5

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Deviation population mean visits after needs correction		0.0	0.5		0.0	-0.3		0.0	-0.6
Global Medical Record (GMR)									
Probability of having GMR	4.1%	71.9%	65.5%	4.7%	61.0%	61.0%	2.2%	53.3%	44.6%
Deviation population probability after needs correction		0.1%	-2.5%		-0.3%	6.4%		0.3%	-10.4%
Specialist consultation									
Probability of visit	4.5%	68.5%	66.2%	4.1%	65.9%	57.0%	2.9%	67.2%	74.6%
Deviation population probability after needs correction		0.3%	-6.8%		0.5%	-9.1%°		0.0%	1.7%
Number of visits		5.0	6.3		4.9	6.7*		4.8	5.5
Deviation population mean visits after needs correction		0.0	-0.4		0.0	0.9		0.0	-1.3
Contact with Emergency Department (ED)									
Probability of contact	7.1%	18.1%	28.7%*	4.8%	19.2%	19.4%	3.3%	15.3%	19.6%
Deviation population probability after needs correction		-0.3%	6.9%		0.1%	-2.0%		0.0%	0.5%
Number of contacts		1.4	1.7		1.4	1.8		1.4	1.1*
Deviation population mean contacts after needs correction		0.0	0.2		0.0	0.2		0.0	-0.2°
Inpatient admission									
Probability of inpatient admission	5.0%	16.7%	18.5%	5.5%	16.6%	19.4%	4.8%	14.9%	28.1%°
Deviation population probability after needs correction		0.1%	-1.2%		-0.1%	1.7%		-0.2%	6.3%
Number of inpatient admissions		1.5	1.4		1.4	1.5		1.5	1.2
Deviation population mean inpatient admissions after needs correction		0.0	-0.3		0.0	0.2		0.0	-0.1
Regular dentist visits (2 visits in 3 years)									
Probability of regular visit	3.4%	47.1%	34.6%*	3.9%	42.3%	34.8%	1.1%	44.2%	18.8%***
Deviation population probability ^		0.5%	-10.6%*		0.3%	-6.2%		0.6%	-24.1%***

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Regular preventive dentist visits (2 visits in 3 years)									
Probability of regular visit	1.5%	22.5%	7.1%***	3.3%	16.6%	11.4%	1.1%	19.5%	8.1%*
Deviation population probability ^		0.6%	-12.8%***		0.2%	-3.6%		0.3%	-12.1%*
Antidepressant use									
Probability of antidepressant use	9.2%	18.2%	38.3%***	7.6%	15.4%	25.3%*	6.7%	15.4%	41.7%**
Deviation population probability after needs correction		-0.5%	9.7%*		-0.2%	4.4%		-0.3%	11.6%°

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

^ For dental care, no adjustment for healthcare needs is made, only the control variables (place of residence and membership of a community health centre) are neutralized.

2.4.6. *Characteristics related to healthcare out-of-pocket payments*

Table 102 provides information on the distribution of the characteristics related to healthcare out-of-pocket payments in the subpopulations with and without unmet needs for dental care (see Box 2 on how to interpret the results in the Tables and Figures). Table 103 and Table 104 give the same information for, respectively, the subpopulation at risk of poverty and the subpopulation in the lower middle class.

Figure 117 illustrates trends in the fraction of individuals with a specific characteristic in the subpopulations with and without unmet needs, for a subset of characteristics, i.e. (panel A) out-of-pocket payments; (panel B) catastrophic payments.

The concept of catastrophic payments as well as its calculation are explained in the Scientific report section 3.1. In this section we apply the EU-SILC/IMA-AIM baseline definition of out-of-pocket payments (all co-payments and supplements after correction of the system of maximum billing) and disposable income corrected for basic needs expenses as capacity to pay. Out-of-pocket payments are considered catastrophic in two instances: either (1) the household has out-of-pocket expenses, but is unable to pay for healthcare (i.e. the disposable income is insufficient to cover basic needs expenses for food, utilities and rent, implying a negative capacity to pay); or (2) the household is able to pay for healthcare, and healthcare out-of-pocket payments amount to 40% or more of the capacity to pay.

Main conclusions

1. There is an association between catastrophic payments and unmet needs for dental care for financial reasons (see Figure 117, panel B). Individuals in households with catastrophic payments are more likely to report postponement of dental care for financial reasons. This shows that, although both indicators are to some extent related, the subpopulation with catastrophic payments and with unmet needs are not entirely the same. An individual with unmet needs that forgoes or delays care so that out-of-pocket payments are low or even zero, does not necessarily have catastrophic payments. And vice versa, an individual without unmet needs who has a small amount of out-of-pocket payments can have catastrophic payments simply because his or her ability to pay for healthcare is low or negative. In 2016, 12.4% of the individuals with catastrophic payments indicate to have unmet needs for dental care, up from 4.5% in 2008 and 9.0% in 2012. Hence, both concepts provide different and complementary information.
2. Household out-of-pocket payments are increasing over time. They are in general lower in the subpopulation with unmet needs (€ 386.4; € 433.2 and € 635.9 in respectively 2008, 2012 and 2016) compared to the subpopulation without unmet needs (€ 586.3; € 639.0 and € 586.3 in respectively 2008, 2012 and 2016) (see also Figure 117, panel A). The growth over time for out-of-pocket payments is more pronounced in the subgroup with unmet needs. The growth over time of co-payments, on the other hand, is smaller than the growth of out-of-pocket payments (or put differently the gap between co-payments and out-of-pocket payments increases over time), implying that supplements can be problematic for the subpopulation with unmet needs. Given their activity status and difficult financial situation, it is likely that these individuals do not have a supplementary dental (or hospital) insurance. The fraction of households with high co-payments in the current and previous year, i.e. above € 450 in both years (an eligibility criterion for the receipt of the chronic MAB), has increased over time, from 18.5% in 2008 to 19.7% in 2016 in the subpopulation with unmet needs and from 26.5% in 2008 to 31.5% in 2016 in the subpopulation without unmet needs. There is important variation by income groups. The increase over time is driven by the core middle class while no upward trend is observed among individuals at risk of poverty (stable at 7% in the group with unmet needs) and in the lower middle class (decrease from 31.6% in 2008 to 24.9% in 2016 in the group with unmet needs).
   As a share of disposable income or total household expenses, out-of-pocket payments have remained stable in the subgroup at risk of poverty and increased in the lower middle class; in the subgroup of the lower middle class, we observe a sharp increase in out-of-pocket expenses in 2016, related to supplements.
   The composition of out-of-pocket payments appears to be rather similar

between the subpopulations with and without unmet needs, with a slightly higher share of medication for the subpopulation with unmet needs and a lower share of dental care costs.

Figure 117 – Evolution (2008, 2012, 2016) for subset of characteristics related to healthcare out-of-pocket payments for the population with and without unmet needs for dental care

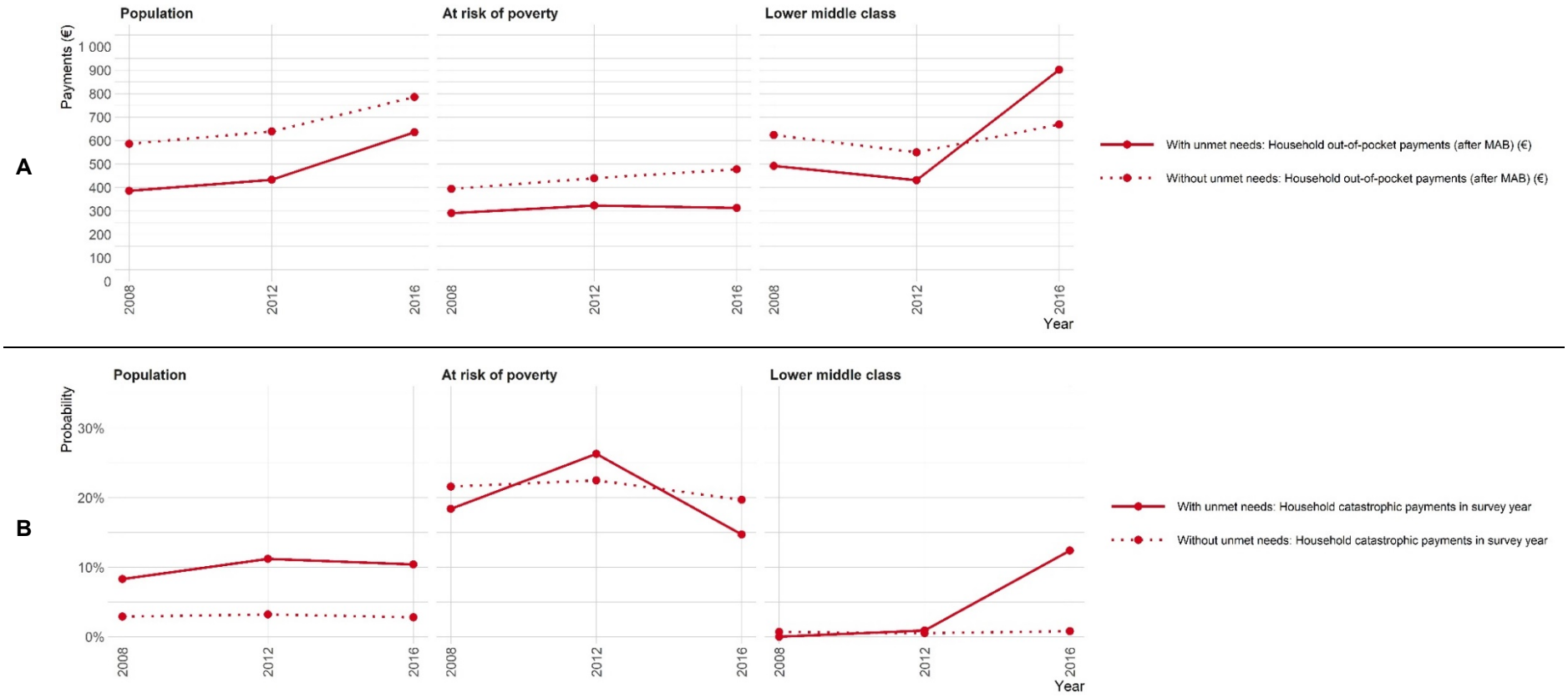


Table 102 – Overview of the distribution of healthcare out-of-pocket payments in the subpopulations with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by healthcare out-of-pocket payments

	2016 – 3.7% with unmet needs			2012 – 2.7% with unmet needs			2008 – 1.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household out-of-pocket payments (after MAB) (€)		785.7	635.9°		639.0	433.2***		586.3	386.4***
Household co-payments (after MAB) (€)		477.7	330.9***		442.9	309.2***		429.3	304.9***
Household co-payments above € 450 (before MAB) in current and previous year	2.4%	31.5%	19.7%***	1.8%	28.9%	18.4%***	1.1%	26.5%	18.5%*
Household out-of-pocket payments as share of total household expenses		2.3%	2.5%		2.0%	1.8%		2.0%	2.1%
Household out-of-pocket payments as share of disposable income		2.0%	2.5%°		2.0%	2.0%		2.0%	2.1%
Share of household out-of-pocket payments related to GP		9.8%	8.0%*		13.1%	11.8%		13.3%	12.8%
Share of household out-of-pocket payments related to specialist		31.3%	28.2%*		28.2%	28.7%		26.9%	20.3%***
Share of household out-of-pocket payments related to inpatient care		10.7%	13.2%		10.3%	11.2%		9.3%	11.1%
Share of household out-of-pocket payments related to day care		4.2%	3.8%		3.5%	3.0%		3.2%	2.9%
Share of household out-of-pocket payments related to dental care		10.6%	3.6%***		9.0%	6.3%°		9.5%	4.7%***
Share of household out-of-pocket payments related to medication		20.7%	30.0%***		25.9%	26.7%		29.8%	35.4%*
Share of household out-of-pocket payments related to other care		11.5%	10.5%		8.6%	8.2%		6.7%	7.0%
Household catastrophic payments in survey year	12.4%	2.8%	10.4%***	9.0%	3.2%	11.2%***	4.5%	2.9%	8.3%**
Household catastrophic payments in previous year	9.3%	2.9%	7.6%***	9.8%	3.0%	11.6%***	5.4%	2.8%	10.0%**

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 103 – Overview of the distribution of healthcare out-of-pocket payments in the subpopulations at risk of poverty with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by healthcare out-of-pocket payments

	2016 – 12.8% with unmet needs			2012 –7.5% with unmet needs			2008 – 5.3% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household out-of-pocket payments (after MAB) (€)		477.6	313.6***		439.8	323.4*		394.6	291.0**
Household co-payments (after MAB) (€)		307.7	203.1***		301.4	233.4**		318.9	235.6***
Household co-payments above € 450 (before MAB) in current and previous year	5.5%	17.2%	6.8%***	4.5%	19.8%	11.4%*	2.2%	18.1%	7.3%***
Household out-of-pocket payments as share of total household expenses		2.0%	1.7%		2.4%	1.7%**		2.2%	1.8%
Household out-of-pocket payments as share of disposable income		2.6%	1.9%**		3.8%	2.1%**		3.1%	2.1%**
Share of household out-of-pocket payments related to GP		7.7%	7.4%		11.8%	9.7%°		11.4%	11.7%
Share of household out-of-pocket payments related to specialist		28.9%	28.8%		24.1%	30.4%*		24.3%	20.5%
Share of household out-of-pocket payments related to inpatient care		11.4%	9.5%		10.2%	10.6%		9.7%	11.1%
Share of household out-of-pocket payments related to day care		3.7%	3.2%		4.1%	3.4%		3.1%	3.2%
Share of household out-of-pocket payments related to dental care		6.5%	2.2%***		5.1%	4.9%		6.6%	2.2%***
Share of household out-of-pocket payments related to medication		26.7%	34.5%**		32.9%	26.2%*		35.0%	34.9%
Share of household out-of-pocket payments related to other care		12.4%	10.9%		8.5%	10.6%		7.2%	8.9%
Household catastrophic payments in survey year	9.9%	19.7%	14.7%°	8.7%	22.5%	26.3%	4.5%	21.6%	18.4%
Household catastrophic payments in previous year	9.4%	19.8%	14.0%*	9.9%	21.1%	28.2%	5.8%	20.9%	23.1%

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

Table 104 – Overview of the distribution of healthcare out-of-pocket payments in the subpopulations of the lower middle class with and without unmet needs for dental care (2008, 2012, 2016) and percentage of unmet needs by healthcare out-of-pocket payments

	2016 – 4.6% with unmet needs			2012 – 4.8% with unmet needs			2008 – 2.6% with unmet needs		
	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs	Pct. reporting unmet needs	Mean in subgroup without unmet needs	Mean in subgroup with unmet needs
Household out-of-pocket payments (after MAB) (€)		668.6	901.8		550.4	431.5°		624.1	492.5°
Household co-payments (after MAB) (€)		421.1	399.7		392.7	330.2		423.9	377.9
Household co-payments above € 450 (before MAB) in current and previous year	3.8%	30.5%	24.9%	3.8%	28.3%	22.2%	2.8%	28.8%	31.6%
Household out-of-pocket payments as share of total household expenses		2.6%	3.5%		2.3%	1.7%*		2.6%	2.7%
Household out-of-pocket payments as share of disposable income		2.7%	3.7%		2.4%	1.7%**		2.8%	2.7%
Share of household out-of-pocket payments related to GP		9.4%	6.8%**		12.0%	10.2%		12.8%	12.0%
Share of household out-of-pocket payments related to specialist		28.8%	26.3%		25.6%	26.7%		24.3%	22.0%
Share of household out-of-pocket payments related to inpatient care		11.9%	18.2%°		11.9%	14.7%		10.7%	14.4%
Share of household out-of-pocket payments related to day care		4.3%	4.9%		3.5%	3.6%		3.5%	3.0%
Share of household out-of-pocket payments related to dental care		7.6%	3.9%**		6.2%	6.8%		7.0%	5.5%
Share of household out-of-pocket payments related to medication		25.6%	27.2%		30.5%	25.7%°		34.5%	35.2%
Share of household out-of-pocket payments related to other care		10.9%	11.0%		8.7%	6.6%°		6.2%	8.0%
Household catastrophic payments in survey year	43.7%	0.8%	12.4%**	7.6%	0.5%	0.9%	0.0%	0.7%	0.0%***
Household catastrophic payments in previous year	13.2%	0.7%	2.2%	8.8%	0.5%	0.9%	0.0%	1.0%	0.0%***

*Significance levels: *** = p<0.001, ** = p<0.01, * = p<0.05, ° = p<0.10*

3. APPENDIX ON CATASTROPHIC AND IMPOVERISHING OUT-OF-POCKET PAYMENTS

3.1. Definitions

There is a near consensus that the financial burden of healthcare payments should not disproportionately rest on those who seek healthcare. The idea to decouple payments from health risks or the receipt of healthcare does not provide guidance on how payments should be allocated. However, it is generally presumed that payments should be determined by ability or capacity to pay.[h] A rationale to relate payments for healthcare to capacity to pay is that one does not want that these payments hinder people's ability to seek healthcare when ill. Another rationale is that one wants to avoid that payments for healthcare reduce households' potential to consume other necessary goods and services such as food, housing and utilities.

The incidence of catastrophic and impoverishing out-of-pocket payments have been used to evaluate the relation between healthcare spending and ability or capacity to pay.[22] For reasons of international comparability, we follow the methodology proposed by the WHO European Region in its latest series on financial protection (in section 3.2.5 the methodology is detailed).[23] This is a capacity-to-pay approach that assumes that households need to spend part of their resources to meet basic needs, such as food, housing and utilities. The underlying idea to implement a correction for basic needs is that poor households devote relatively more of their resources to meeting basic needs and may face a trade-off between consuming basic needs and healthcare. Only after meeting basic needs, resources are available to spend on healthcare. The household's capacity-to-pay (for healthcare) is defined as the total household expenses minus a standard amount to cover basic needs. The standard amount is calculated as the average amount spent on food, housing (rent) and utilities (electricity, water, fuel etc.) by households between the 25th and 35th percentiles of total household expenses distribution[i], adjusted for household composition by the OECD equivalence scale. [j] The amount of basic need expenses is also used as poverty line or basic needs line. If the total household expenses fall below the poverty line, the household is considered poor and its capacity-to-pay is negative.

Out-of-pocket payments are considered impoverishing when the household is not poor, but has out-of-pocket payments that exceed the household's capacity-to-pay. In that case, total household expenses net of healthcare consumption are below the poverty line. Out-of-pocket payments of poor households are considered further impoverishing.

Out-of-pocket payments are considered catastrophic when they exceed 40% of the household's capacity-to-pay. Poor households with [without] out-of-pocket payments and a negative capacity to pay are considered [not] to incur catastrophic payments. Hence out-of-pocket payments that are (further) impoverishing are always catastrophic, but catastrophic out-of-pocket payments are not necessarily impoverishing.

Multiple robustness and sensitivity checks are performed. First, total household expenses are replaced by household income as proxy for the financial resources at the household's disposal. Second, alternative definitions of out-of-pocket payments are used. Third, the sensitivity of the results to lower threshold values (besides 40% of the household's capacity

h Ability and capacity to pay are slightly different concepts. Ability to pay refers to all financial resources at a household's disposal, while capacity to pay refers to all financial resources corrected for a normative amount to cover expenses for basic needs, such as food, housing and utilities. The idea of the latter is that households can only spend resources once basic needs have been met.

i These households are selected based on the assumption that they are able to meet, but not necessarily exceed, basic needs for food, housing and utilities.[24]

j The OECD equivalence scale (1 for the first adult, 0.7 for individuals aged 14 or more, 0.5 for individuals aged 13 or less) is the default choice for the analysis of financial protection by the WHO Europe region.

to pay) to consider out-of-pocket payments as catastrophic are used, i.e. 20%, 25%, and 30%.

Figure 118 illustrates the WHO Regional Office for Europe's approach to measuring catastrophic health spending. The horizontal line represents the poverty line (the standard amount to cover basic needs), while the diagonal line represents total household expenses. The blue dots represent households with different total expenses. When total household expenses are below the poverty line, the consumption level of the household is not enough to meet basic needs and the household is considered poor. The capacity to pay is indicated by the red triangle between the poverty line and the household total expenses. When OOPs are deducted from the total household expenses (i.e. the red dots in Figure 118), and the remaining financial resources fall below the threshold indicated by the dotted line, out-of-pocket payments are considered to be catastrophic. Households that are (further) impoverished always experience catastrophic out-of-pocket payments. The figure illustrates clearly that in order to be labelled catastrophic, the amount of out-of-pocket payments paid by poor households or households with low financial resources is smaller (both in absolute as in relative term, relative to the household's financial resources) than for households with high financial means.

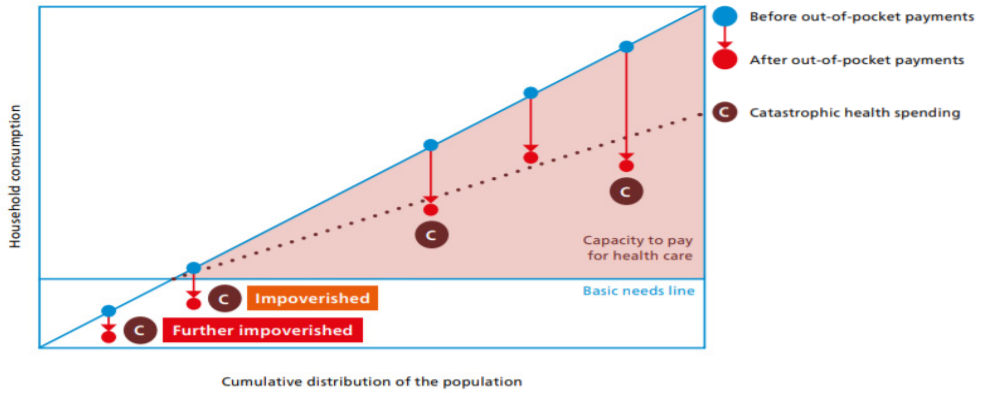
3.2. Method

Two datasets were used to compute catastrophic and impoverishing expenditures, each with its own strengths and weaknesses: the Household Budget Survey (HBS) and coupled data from the European Union Statistics on Income and Living Conditions (EU-SILC) and the Intermutualistic Agency (IMA-AIM).

3.2.1. Household Budget Survey data

For more background on the household budget survey data, see the Scientific report, sections 1.3.2 and 3.1.2.

Figure 118 – Measurement of catastrophic health spending used in this report



Source: WHO regional Office for Europe.[25]

Box 3 – The classification of individual consumption by purpose (COICOP)

The Classification of Individual Consumption According to Purpose (COICOP) is an international nomenclature developed by the United Nations Statistics Division to classify and analyse individual consumption expenditures incurred by households. This nomenclature is divided into several categories and sub-categories according to the level of aggregation of expenditure. Healthcare expenditures are, for instance, included in the COICOP 06 category.[26] Multiple versions of the COICOP exist, adapted to a region (e.g. the EU), country (e.g. Belgium), or purpose (e.g. use in household budget surveys).

Selected variables

HBS variables extracted for the analyses were: household ID, member of the household ID, sickness fund reimbursement, income (excluding benefits in kind, sickness fund reimbursements, insurance reimbursements and tax reimbursement), household size, household weight, the number of children under 14 years included in the household and expenses sorted in:

- food (COICOP 01*)
- utilities including electricity, heating and water (04.4* & 04.5*)
- rent (04.1*), and
- out-of-pocket payments for healthcare (06*):
  - medicines (0611* & 06129D)
    - medicines (06110A)
    - magistral preparation except homeopathic ones (06110B)
    - disinfectants (06110C)
    - serums and vaccines (06110D)
    - vitamins (C, D, etc.) and minerals (magnesium, calcium, iron, zinc, chromium, etc.), cod liver oil, fish oil capsules, omega 3, dietary supplements (06110E)
    - oral contraception (pill) (06110F)
    - other medicines (homeopathic, etc.) (06110G)
    - unspecified purchases at the pharmacy (06129D)
  - medical products and equipment (0612* (excluding 06129D) & 0613*)
    - pregnancy test, contraceptives, intrauterine device (06121A)
    - fever thermometers (06129A)
    - special hosiery and rubber stockings, support stockings (06129B)
    - medical wadding, bandages, plasters, bandages, first aid kit, syringes, heating or cooling device (e.g. cushion) (for medical use) (06129C)
    - glasses (06131A)
    - hearing aids (06132A)
    - repair of therapeutic equipment (eyeglasses, prostheses, dentures, wheelchairs, etc.) (06133A)
    - therapeutic lamps (06139A)
    - wheelchairs and invalid carriages, medical beds, commode chair, crutches, walker, etc. (06139B)
    - orthopaedic shoes and insoles (06139C)
    - prostheses, dentures, etc. (06139D)
    - other therapeutic equipment (aerosol, blood pressure monitor, inhaler, baby scales, neck brace, support belt, etc.) (06139E)
  - outpatient care (0621*)
    - fees paid to general practitioners (06211A)
    - fees paid to medical specialists (including plastic surgeons and orthodontists) (06212A)
  - dental care (0622*)
    - fees paid to dentists (06220A)
  - diagnostic tests and paramedical services (0623*)
    - checks and analyses (of blood, urine, etc.) carried out in laboratories and X-rays (MRI, ultrasound, scanner, etc.) (06231A)
    - thermal cure, sanatorium, rental of therapeutic equipment (06232A)
    - ambulance service (06232B)
    - physiotherapists, remedial gymnastics, medical massages (06232C)
    - other paramedical services (dietician, psychologist, speech therapist, acupuncturist, chiropractor, osteopath, etc.) (06239A)
  - hospital inpatient care (0630*)
    - medical fees billed during hospitalization (including cosmetic surgery) (06300A) and

- payments for inpatient admission, maternity care (private room or not), day treatment, in hospital palliative care, in hospital revalidation (06300B)

- insurance premiums
  - sickness fund contributions (12530A)
  - hospital insurance contribution (12530B) (excluding hospital insurance provided by employer).

Data were annualised and food expenses were corrected (augmented) in case the household was absent for one or more days during the registration period, leading to lower than expected expenses. The latter correction was implemented to be in line with the publicly reported Belgian population figures.

Change in definition of variables between waves

Between 2014 and 2016, the COICOP classification and definition in Belgium changed to the European COICOP (ECOICOP). We investigated the impact of the change on the composition of the OOP categories (see Appendix 1). The most impactful change is the one related to the COICOP 06129D category (indicating unspecified purchases at the pharmacy). In 2014, 25% of the households had such purchases corresponding to an average annual expense of € 151 per household at the national level (see Appendix 1). In 2016, there were nearly zero expenditures in this category due to a much more stringent definition of the 06129D category. This resulted into a change in composition of OOP categories between 2014 and 2016. The hypothesis made is that these unspecified purchases are now recorded mainly in subcategories of COICOP 0611 (medicines) as we observed some important increases in expenditures between 2014 and 2016 (Table 105). Hence, there has been a transfer from COICOP 0612* to 0611* or from "Other medical products & equipment" to "medicines" which is not related to a change in consumption pattern but to a change in COICOP classification.

To remedy that, and in consultation with the WHO, we transferred "unspecified purchases at the pharmacy" (06129D) expenses from the "medical products and equipment" category to the "medicines" category.

Table 105 – Out-of-pocket payment by category in 2014 and 2016

Category	Average amount per household in 2014 (in euro)	Share of OOPs 2014	Average amount per household in 2016 (in euro)	Share of OOPs 2016
Medicines (COICOP 0611*)	284.3	17.2%	439.2	28.0%
Medical products and equipment (COICOP 0612* & 0613*)	390.3	23.6%	213.5	13.6%
Unspecified purchases at the pharmacy (06129D)	150.6	9.10%	0.1	0.01%
Other (excluding 06129D)	239.7	14.5%	213.4	13.6%
Outpatient care (COICOP 0621*)	424.7	25.7%	359	22.9%
Dental care (COICOP 0622*)	164.2	9.9%	204.1	13.0%
Diagnostic tests and paramedical services (COICOP 0623*)	206.6	12.5%	222.2	14.1%
Hospital inpatient care (COICOP 063*)	185.2	11.2%	132.8	8.5%

OOPs = out-of-pocket payments

3.2.2. Coupled EU-SILC/IMA-AIM data

For more background on the EU-SILC/IMA-AIM data, see the Scientific report, sections 1.3.1 and 3.1.2.

Selected variables

To estimate and compare catastrophic health expenditures based on the EU-SILC/IMA-AIM database with the HBS database, comparable variables were extracted from both databases, i.e. food, utility, rent and OOPs, household ID, patient ID, number of members in the household, number of children under 14 years in the household and net income. To estimate the OOPs, we summed up expenditures from the medicine (Pharmanet) and health databases (i.e. the sum of co-payments (ss00160) and supplements (ss00165)) by patient and by year and subtracted the reimbursements from the maximum billing system (MAB). Codes of nomenclature corresponding to the MAB are: 780975, 781771, 781793, 781815, 781874, 781896, 781911, 781933, 781955, 781970, 781616, 781631, 781653, 781675, 781690, 781712, 781734, and 781756. Supplements above € 10 000 or below € -10 000 for one nomenclature code (at patient level), were considered to be an outlier and were set to zero. This correction has been applied to two nomenclature codes in wave 2016. Some pharmaceutical nomenclature codes were excluded from the health expenditures database (753550, 753572, 753594, 753616) to avoid a double counting with the medicine expenditure database. OOPs were finally summed-up at the household level as defined in the SILC survey.

An important correction was made for households that receive a reimbursement though the MAB. Reimbursements in the system of the MAB are not necessarily recorded in the year the healthcare costs are made. It is possible that MAB reimbursements in the current year (e.g. 2016) relate to health expenditures in the previous year (e.g. 2015) or that health expenditures in the current year (e.g. 2016) will only be corrected by a reimbursement through the MAB in the next year (e.g. 2017).

We applied the following correction. For households with MAB reimbursements in the survey year, we compared their co-payments reduced by the MAB-reimbursements with the applicable MAB-ceiling. The MAB ceiling was derived from the MAB nomenclature code and eligibility to the social and/or chronic MAB. In case co-payments net of MAB-reimbursements were below the ceiling, we adjusted the MAB-reimbursements so that co-payments minus MAB-reimbursements are equal to the MAB-ceiling. This approach corrects for MAB-reimbursements paid in the current year that are granted for healthcare costs incurred in the previous year. We did not correct for the fact that current health expenditures might potentially be reduced by MAB reimbursements paid in the next year. Therefore, we possibly overestimate co-payments.

Categories of health expenses

We created seven health expenses categories based on IMA-AIM classifications and RIZIV-INAMI Nomensoft variables. Health expenses were attributed to the category:

1. Medicines relate to all registrations in Pharmanet.
2. Hospital inpatient care when
    a. The RIZIV-INAMI nomenclature code is intended for hospitalised care (ambhos_pat_cat_desc_fr variable (French description of the context in which the health expenditure was made) was defined as “Hospitalisé”) and
        - The nomenclature code is part of a hospital admission (it has received a stay_nr in IMA-AIM GZSS database), and the hospital stay is classified as an inpatient admission or as revalidation care (variable stay_cat in IMA-AIM HOSP database equals (“ADM, “JF”, “SP”)).
        - The nomenclature code is not part of a hospital admission (it has received a missing stay_nr in IMA-AIM GZSS database).
        - the RIZIV-INAMI nomenclature code equals 598146 or 598404, i.e. equals to “supervision fees for the hospitalised beneficiary, regardless of the qualification of the doctor to whom they are owed”

b. The RIZIV-INAMI nomenclature code is labelled as neutral (ambhos_pat_cat_desc_fr variable (French description of the context in which the health expenditure was made) was defined as “Neutre”), but is part of a hospital admission (it has received a stay_nr in IMA-AIM GZSS database), and the hospital stay is classified as an inpatient admission or as revalidation care (variable stay_cat in IMA-AIM HOSP database equals (“ADM, “JF”, “SP”)),
and the RIZIV-INAMI nomenclature code belongs to a specific group used for regularisations (nomen_grp_sector_desc_fr (i.e. French label of grouping of RIZIV-INAMI codes) was in ("Régularisations et Refacturation / Régularisations non affectées par discipline", "Montants injustement payés", "Codes bande magnétique","Tickets modérateurs urgence et alimentation (application maximum à facturer)")

3. Hospital day care when

a. The RIZIV-INAMI nomenclature code is intended for hospitalised care (ambhos_pat_cat_desc_fr variable (French description of the context in which the health expenditure was made) was defined as “Hospitalisé”),
and the RIZIV-INAMI nomenclature code does not equal 598146 or 598404 (see above)
and the nomenclature code is part of a hospital admission (it has received a stay_nr in IMA-AIM GZSS database),
and the hospital stay is classified as a day-care treatment (variable stay_cat in IMA-AIM HOSP database equals (“ODC, “ODC-CHI”))

b. The RIZIV-INAMI nomenclature code is intended for ambulatory care (ambhos_pat_cat_desc_fr variable (French description of the context in which the health expenditure was made) was defined as “Ambulant”),
and the nomenclature code is part of a hospital admission (it has received a stay_nr in IMA-AIM GZSS database)

c. The RIZIV-INAMI nomenclature code is labelled as neutral (ambhos_pat_cat_desc_fr variable (French description of the context in which the health expenditure was made) was defined as “Neutre”),
and the nomenclature code is part of a hospital admission (it has received a stay_nr in IMA-AIM GZSS database),
and the hospital stay is classified as a day-care treatment (variable stay_cat in IMA-AIM HOSP database equals (“ODC, “ODC-CHI”)),
and the RIZIV-INAMI nomenclature code belongs to a specific group used for regularisations (nomen_grp_sector_desc_fr (i.e. French label of grouping of RIZIV-INAMI codes) was in ("Régularisations et Refacturation / Régularisations non affectées par discipline", "Montants injustement payés", "Codes bande magnétique","Tickets modérateurs urgence et alimentation (application maximum à facturer)")

4. Dental care (excluding hospital inpatient and hospital day care expenses): based on the procedure grouping of nomenclature codes. RIZIV-INAMI has made categories of nomenclature codes; procedure groups are one level of categories and defined in the variable “procedure_group” in IMA-AIM GZSS database. Dental care is defined as all care in procedure group 8.

5. General practitioner (GP) care (excluding inpatient, day care and dental care expenses): based on the qualification of the healthcare provider. GP care is all care with ss00065B (i.e. IMA-AIM variable in GZSS database on the qualification of the health provider) equal to 1, 2, 3, 4, 5, 6, 7 or 8.

6. Specialist care (excluding inpatient, day care, dental care and GP expenses): based on the qualification of the healthcare provider. Specialist care is all care with ss00065B (i.e. IMA-AIM variable in GZSS database on the qualification of the health provider) equal to 10, 14, 17, 18, 21, 24, 27, 31, 34, 37, 41, 45, 48, 52, 55, 58, 62, 65, 66, 69, 73, 76, 77, 78, 79, 80, 81, 83, 86, 87, 90, 93, 96, 97, 100, 101, 109, 119, 126, 131, 137, 140, 145, 146, 149, 151, 152, 153, 154, 157, 158, 162, 166, 170, 174, 179, 180, 182, 183, 184, 192, 195, 210, 219, 222, 240, 270, 287, 310, 340, 341, 348, 349, 367, 369, 370, 371, 374, 378, 397, 398, 410, 414, 422, 450, 454, 455, 459, 480, 481, 489, 493, 494, 495, 496, 520, 521, 550, 566, 567, 569, 573, 580, 582, 583, 584, 585, 586, 587, 588, 589, 591, 592, 593, 594, 595, 597, 598, 599, 620, 623, 624, 628,

629, 631, 638, 650, 651, 653, 659, 660, 668, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 730, 731, 733, 734, 735, 736, 737, 738, 739, 760, 764, 770, 774, 779, 780, 784, 788, 790, 793, 794, 795, 796, 798, 799, 800, 810, 811, 830, 831, 834, 835, 836, 838, 839, 860, 861, 862, 866, 867, 868, 870, 875, 900, 930, 939, 960, 964, 965, 970, 972, 978, 983, 985, 987, 988, 989, 991, 992, 994, 995, 996 or 997.

7. Nursing care (excluding inpatient, day care, dental care, GP and specialist expenses): based on the profession of the healthcare provider. Nursing care is all care provided by practitioners with practitioner_cat (i.e. IMA-AIM variable in GZSS database on the profession code of the practitioner) equal to 41, 42, 43, 44, 45, 46, 47, 48 or 49.

The remaining health expenses were included in the category “other health expenses”.

Reimbursements of the MAB were attributed to each category of health expenses in proportion to the expenses in each category.

3.2.3. *Definition of out-of-pocket payments with the Household Budget Survey data*

In our baseline definition, out-of-pocket payments consist of all healthcare expenses (COICOP 06), valued at the amount paid at consumption (prior to reimbursement if applicable). It is possible to refine incurred out-of-pocket payments in two ways. First, it is possible to partly correct for reimbursements from the sickness funds, as reimbursements are registered in the HBS as an income category (since 2014). However, these reimbursements refer to reimbursements received over the past four months and are not necessarily in correspondence with the registered healthcare expenses. Second, the premiums paid for private hospital insurance are registered (in case they are (partly) paid by the household and not in full by the employer). If a household is covered by a private hospital insurance, it can be argued that inpatient expenses will be (at least partially) reimbursed.

As listed in Table 106, three definitions are used to capture out-of-pocket payments in the HBS database. The first definition ‘OOP’ simply adds up all expenses registered in COICOP category 06 “Healthcare”. This definition is generally used in the country reports in the WHO series on financial protection.[25]

A second definition ‘OOP**’ corrects ‘OOP’ by extracting sickness fund reimbursements (variable r14). The healthcare expenses and sickness fund reimbursements are not registered over the same period and hence do not necessarily relate to the same healthcare consumption. Indeed healthcare consumption is registered during 1 month in waves 2012, 2014 and 2016 and during 15 days in 2018, sickness fund reimbursements refer to the reimbursement received over the past 4 months. Both amounts are recalculated to annual values. However the reimbursements can be considered as a proxy to correct for reimbursements received and for certain patients that regularly use care, such as patients with a chronic condition, both could be in fact correlated. This correction could not be made in 2012, since sickness fund reimbursements cannot be separately identified in that wave.

A third definition ‘OOP***’ starts from ‘OOP**’ and introduces a second adjustment. Expenses related to inpatient care are put to zero for patients with a hospital insurance. Individuals are assumed to have a hospital insurance if premiums for such an insurance are paid. Again, this correction should be considered as a proxy, since individuals can have a hospital insurance without paying a premium, e.g. if the employer pays the full cost of the insurance, and not necessarily all inpatient costs are covered by a hospital insurance.

Table 106 – Definition of OOPs, HBS database

	Adjustment performed on OOPs
OOP	None
OOP**	OOPs minus sickness fund reimbursements (r14)
OOP***	OOPs minus sickness fund reimbursements (r14) minus inpatient expenses (in case of hospital insurance contributions (COICOP 12530B))

In 2018, 70% of the households paid a premium for a hospital insurance (COICOP 12530B). Households in the 5th quintile of total household expenses (see 3.2.5 for quintile definition) more frequently reported a hospital insurance premium than in the 1st quintile. A similar pattern was observed in 2016 and 2014. 67% and 63% of the households paid a premium for a hospital insurance in 2016 and 2014, respectively, with important variation between quintiles. There is an increase in the proportion of households reporting to pay for hospital insurance between 2014 and 2018 (+7 percentage points) (Table 107).

Table 107 – Households with a premium for hospital insurance, distribution by quintile of total household expenses, 2018, 2016 and 2014

Quintile of total household expenses	% households with hospital insurance premium		
	2014	2016	2018
1st	51%	55%	58%
2nd	62%	64%	69%
3rd	67%	68%	71%
4th	68%	72%	73%
5th	70%	73%	75%
Total	63%	67%	70%

3.2.4. Definition of out-of-pocket payments with coupled EU-SILC/IMA-AIM data

Three definitions are used to capture out-of-pocket payments in the EU-SILC/IMA-AIM database (Table 108). In a first definition, out-of-pocket payments 'OOPs' are defined as the sum of co-payments (ss00160) registered for healthcare and medicines, and supplements (ss00165) registered for healthcare within one registration year. This sum is corrected for potential double counts and MAB reimbursements (section 3.2.2). In a second definition 'OOP^^', inpatient supplements are excluded, under the assumption that these might be covered by private hospital insurance. As there is no information available to determine which patients are covered by such an insurance, the exclusion is applied for all individuals. In a third definition 'OOP^^^', health expenses were not corrected for MAB reimbursements.

Table 108 – Definition of OOPs, EU-SILC/IMA-AIM database

	Adjustment performed on OOPs
OOP	Out-of-pocket payments after adjustment for reimbursements in the system of maximum billing
OOP^^	Out-of-pocket payments after adjustment for reimbursements in the system of maximum billing minus inpatient supplements
OOP^^^	OOPs before adjustment for reimbursements in the system of maximum billing

3.2.5. Estimation of the catastrophic and impoverishing health expenditures with the HBS and the EU-SILC/IMA-AIM database

To estimate the catastrophic and impoverishing health expenditures, we followed the four main steps of the methodology proposed by the WHO European Region in its latest series on financial protection:[24] i.e. estimate of 1) the basic needs lines, 2) the basic needs expenditure levels, 3) the capacity to pay and, 4) the incidence of impoverishing and catastrophic OOPs. The methodology of the WHO European Region was chosen as it allows for a comparison with other countries. A detailed description of the methodology can be found in WHO (2016).[23] Here we detail the most important parts.

Step 1: basic needs lines

Four basic needs lines or poverty lines corresponding to the four types of household-specific basic needs expenses (food, food and utility, food and rent and food, utility and rent) are estimated by household. Households that did not report any utilities or rent expenses have a basic need line that includes food only. To calculate basic needs lines, the OECD household equivalence scale is used to account for economies of scale in household consumption based on the number of adults and children included in the household. The equivalence scale is calculated as follows:

$$eqsize_h = 1 + 0.7 * (number\ of\ adults - 1) + 0.5 * (number\ of\ children\ under\ 13\ years\ of\ age)$$

Next, each household's total expenses (minus imputed rent) and expenses for food, utilities and rent were divided by the equivalent household size to get the equivalized total household expenses ($eqexp_h$), the equivalized food expenses ($eqfood_h$), the equivalized utilities expenses ($equtil_h$) and the equivalized rent ($eqrent_h$). The households whose equivalized total household expenses ($eqexp_h$) are situated between the sample weighted 25th and 35th percentile are selected to calculate the four basic needs lines. Then using the survey weights (for HBS or EU-SILC), we calculate the weighted average of food, utilities and rent expenses among households within the 25th and 35th range that reported positive values for food, utilities and rent expenses, respectively. For households that did not report any rent or utilities expenses, the basic needs line is equal to the food expenditure. For households that reported utilities expenses but did not report any rent expenses, the basic needs line is calculated as the sum of the weighted averages for food and utilities. For households that reported rent but did not report any utilities expenses, the basic needs line is calculated as the sum of the weighted averages for food and rent. For households that did report both rent and utilities, the basic needs line is calculated as the sum of the weighted averages for food, utilities and rent.

Step 2: expenses for basic needs

The household expenses for basic needs (se_h) are calculated by multiplying the basic needs lines with the equivalized household size.

Step 3: capacity to pay

Capacity to pay (ctp_h), i.e. the remaining resources once basic needs expenses are accounted for, is estimated by taking the difference between the total household expenses (exp_h) and the basic needs expenses (se_h). When total household expenses are lower than the estimated basic needs expenses, the consumption level of the household is not enough to meet basic needs and the household is considered poor.

Step 4: incidence of impoverishing and catastrophic OOPs

Finally, the incidence of impoverishing and catastrophic OOPs is estimated.

To calculate the **incidence of (further) impoverishing out-of-pocket payments**, the households are divided into five mutually exclusive categories based on their level of out-of-pocket payments in relation to the poverty line (see Figure 119).

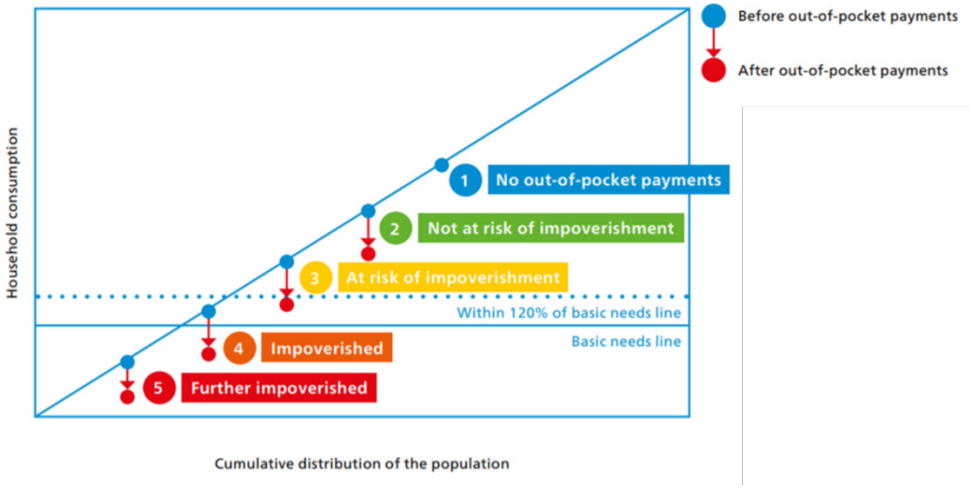
1. Households **without out-of-pocket payments**, irrespective of the household financial resources.
2. Households **not at risk of impoverishment**: non-poor households with out-of-pocket payments. When OOPs are deducted from the total household expenses, the remaining financial resources are above

120% of the poverty line, implying that the household has enough means to cover basic needs.

3. Households **at risk of impoverishment**: non-poor households with out-of-pocket payments. When OOPs are deducted from the total household expenses, the remaining financial resources are between the poverty line and 120% of the poverty line, implying that the household has enough means to cover basic needs, but with (very) limited financial leeway.
4. **Impoverished** households: non-poor households with out-of-pocket payments. When OOPs are deducted from the total household expenses, the remaining financial resources are below the poverty line, implying that the household has not enough means to cover basic needs.
5. **Further impoverished** households: poor households with out-of-pocket payments. OOPs make it more difficult to pay for basic needs.

The **incidence of catastrophic payments** can be calculated using the household's OOPs in relation to its capacity to pay (oop_h/ctp_h) (see Figure 118). Out-of-pocket payments are considered catastrophic when they exceed 40% of the household's capacity to pay. Hence, households that are (further) impoverished always experience catastrophic out-of-pocket payments.

Figure 119 – Measurement of impoverishing health spending used in this report



Source: WHO regional Office for Europe[25]

Robustness of the methodology

Multiple robustness and sensitivity checks are performed. First, total household expenses are replaced by household income (net household income for HBS database and disposable net household income[k] in the EU-SILC/IMA-AIM data) as proxy for the financial resources at the household's disposal. To do so, incomes were adjusted for basic needs expenses in the same way as total household expenses. The incidence rate of catastrophic and impoverishing OOPs is calculated in the same way using net household income minus basic needs expenses as capacity to pay. Second, the sensitivity of the results to lower threshold values (besides 40% of the household's capacity to pay) to consider out-of-pocket payments as

[k] Disposable net income equals net income and fringe benefits (e.g. meal vouchers).

catastrophic is assessed. Any threshold can be considered as an arbitrary choice, hence we consider the sensitivity of the results to other thresholds (20%, 25%, 30% and 40%). Third, alternative definitions of out-of-pocket payments are used (see sections 3.2.3 and 3.2.4).

Subdivision in quintiles

Results on the evolution of out-of-pocket payments and the incidence of catastrophic and impoverishing OOPs are presented by equivalized total household expenses (or equivalized household income where indicated). The 1st quintile represents the 20% households with the lowest equivalized total expenses (i.e. total household expenses adjusted by the OECD household equivalence scale), while the 5th quintile represents the 20% households with the highest equivalized total expenses.

3.2.6. Statistical analysis

ANOVA one-way and post-hoc pairwise comparisons through multiple linear regression models were used to compare OOPs and catastrophic and impoverishing health expenditures across income and quintiles of total household expenses and between years. The survey STATA package [svy] was applied to account for the survey design characteristics (sampling weight, cluster sampling, stratification) of the HBS and EU-SILC/IMA-AIM databases to better estimate the standard errors.[27] A p-value below 0.05 is considered as significant.

3.3. Results

3.3.1. Household Budget Survey data

3.3.1.1. Description of the population

6 578, 6 135, 6 118 and 4 490 households were included in the Household Budget Survey (HBS) for the year 2012, 2014, 2016 and 2018 respectively. While average monthly total household expenses decreased in the period 2012-2018, the average out-of-pocket payments increased (2012: € 125 (95% CI: 118-132); 2018: € 137 (95% CI: 129-144)). In the baseline definition of OOPs, out-of-pocket payments are registered over the period of 1 month in 2012, 2014 and 2016 and 15 days in 2018 (except dental and inpatient care for which the expenses over the past year are requested) (section 3.2.1) without accounting for reimbursements by the sickness fund (section 3.2.3). In 2018, the three most important categories of healthcare spending were medicines ($\bar{X}$ = € 37 (95% CI: 35-39)), outpatient care ($\bar{X}$ = € 34 (95% CI: 32-37)) and other medical products & equipment ($\bar{X}$ = € 19 (95% CI: 16-22)). In 2012, medicines ($\bar{X}$ = € 36 (95% CI: 34-37)), outpatient care ($\bar{X}$ = € 33 (95% CI: 31-35)) and other medical products & equipment (($\bar{X}$ = € 31 (95% CI: 31-35)) were the most important healthcare expenses as well (Table 109).

In 2018, the distribution of household size across the quintiles of total household expenses was homogenous. There was no concentration of small or large families in high or low quintiles of total household expenses. The same distribution was observed for the other years (2012, 2014 and 2016).

3.3.1.2. Out-of-pocket payments

The *average annual (monthly in previous table) OOPs* increased from € 1 497 (95% CI: 1 411-1 584) to € 1 639 (95% CI: 1 547-1 731) in the period 2012-2018 but the amount was not significantly different between years (p=0.06) (Table 110).

Out-of-pocket payments as a share of total expenses

Out-of-pocket payments increase by quintile of total household expenses. The difference in average annual OOPs is significant for all pairwise comparisons of equivalized quintile of total household expenses (1st (Q1) vs. 2nd (Q2), 1st (Q1) vs. 3rd (Q3), etc.) (Figure 120). The same conclusions hold for OOP** (i.e. OOPs minus sickness fund reimbursements) and OOP*** (i.e. OOP** and IF hospital insurance contributions >0 THEN inpatient expenses = 0) in 2014, 2016 and 2018. Figure 120 shows that OOPs decreased between 2012 and 2018 in the 1st quintile.

The OOPs as a share of total household expenses have increased since 2012 (+ 0.6 percentage points) and although this trend is observed in all quintiles of total household expenses, the increase is more pronounced in the 4th quintile (+ 1.4 percentage points). Between 2014 and 2018, a decrease of OOPs as a share of total household expenses is observed for OOP** (-1.2 percentage points) and a stable trend is observed for OOP*** (Table 111, Figure 121).

The share of OOPs as a proportion of total household expenses was significantly different between years (p=0.019), more specifically between 2012 and the other years (2012 vs 2014 (p=0.016), 2012 vs 2016 (p=0.016) and 2012 vs 2018 (p=0.011)). With OOP** and OOP***, significant differences of OOPs as a proportion of total household expenses between years were observed between 2018 and the other years (Table 111).

In 2018, the share of OOPs was significantly different between the 1st quintile (Q1) and the other quintiles of total household expenses (Q1 vs Q2 (p=0.043), Q1 vs Q3 (p<0.001), Q1 vs Q4 (p<0.001) and Q1 vs Q5 (p<0.001)) and between Q2 and the other quintiles of total household expenses (Q2 vs Q3 (p=0.014), Q2 vs Q4 (p=0.001) and Q2 vs Q5 (p=0.002)). For OOP**, the same significant differences were observed as for OOP, except between Q1 vs Q2 and Q2 vs Q3 quintiles for which no significant difference was observed (Q1 vs Q2 (p=0.146) and Q2 vs Q3 (p=0.112)). For the share of OOP*** spending significant differences were observed between Q1 and Q3 (p=0.008), Q1 vs Q4 (p<0.001), Q1 vs Q5 (p=0.001), Q2 vs Q4 (p=0.001) and Q2 vs Q5 (p=0.026) (Table 111, Figure 121).

Table 109 – Main variables extracted from the Household Budget Survey to calculate catastrophic and impoverishing health expenses, 2012, 2014, 2016 & 2018

	2012 (N=6 578)		2014 (N= 6 135)		2016 (N=4 490)		2018 (N=6 118)	
	Weighted mean+ [95% confidence interval]	N>0	Weighted mean+ [95% confidence interval]	N>0	Weighted mean+ [95% confidence interval]	N>0	Weighted mean+ [95% confidence interval]	N>0
Total expenses, monthly (in €)	2 534 [2 485-2 582]	6 578	2 534 [2 482-2 586]	6 135	2374 [2312-2436]	4490	2 469 [2 410-2 529]	6 118
Basic needs expenditures								
Food	391 [384-399]	6 578	393 [385-400]	6 135	382 [373-391]	4490	419 [408-430]	6 118
Utilities	218 [214-221]	6 578	211 [208-215]	6 135	200 [196-204]	4490	191 [187-194]	6 118
Rent	169 [162-177]	2 368	171 [163-179]	2 072	171 [161-181]	1438	174 [164-184]	1 761
Healthcare expenditures, monthly (in €)								

OOP	125 [118-132]	5 503	138 [130-146]	5 188	131 [123-139]	3 732	137 [129-144]	4 263
OOP**			123 [115-131]	4 775	111 [104-118]	3 367	90 [83-97]	2 945
OOP***			111 [104-118]	4 734	104 [97-111]	3 327	83 [77-89]	2 893
Medicines°	36 [34-37]	4 675	36 [35-38]	4 404	37 [34-39]	3 130	37 [35-39]	3 086
Medical products and equipment$	19 [14-24]	1 415	20 [15-25]	1 354	18 [14-22]	1 001	19 [16-22]	917
Dental care	13 [11-16]	779	14 [11-16]	710	17 [14-20]	840	17 [14-20]	486
Diagnostic tests and paramedical services^	14 [13-16]	1 146	17 [15-19]	1 203	19 [16-21]	564	18 [15-21]	795
Outpatient care£	33 [31-35]	3 185	35 [32-38]	2 976	30 [28-32]	2 112	34 [32-37]	2 035
Hospital inpatient care+	10 [8-11]	718	15 [12-19]	780	11 [9-14]	502	12 [8-15]	429
Net income, monthly (in €)%	2 757 [2 698-2817]	6 519	2 943 [2 888-2 999]	6 130	2 869 [2 804-2 933]	4 482	2 970 [2 905-3 036]	6 108
Household size (n)	2 [2-2]	6 578	2 [2-2]	6 135	2 [2-2]	4 490	2 [2-2]	6 118

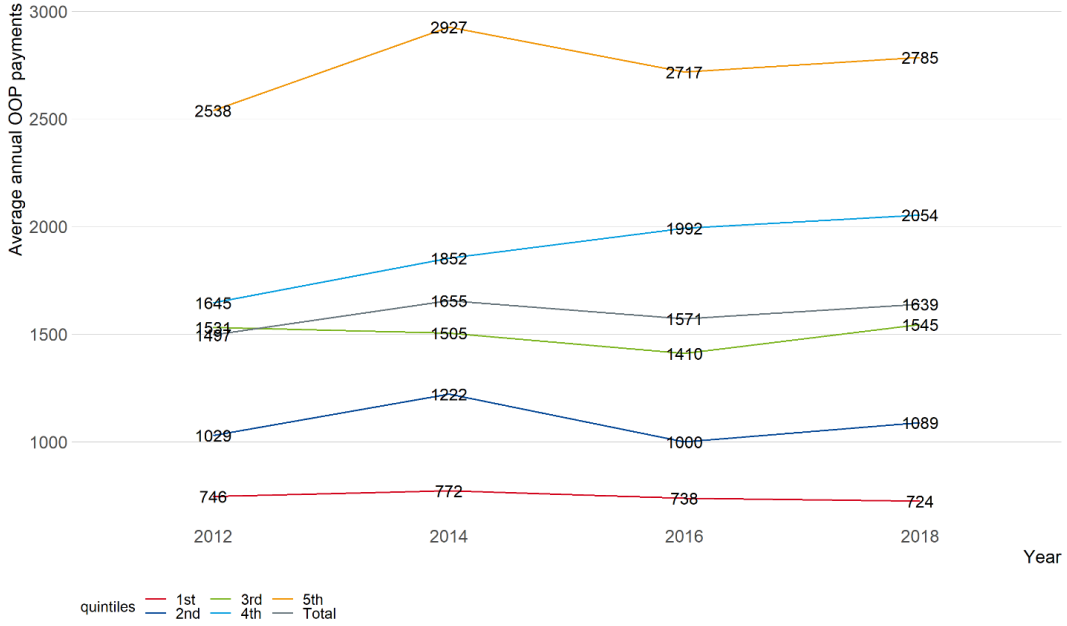
*OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0.° Medicines include: medicines (06110A), magistral preparation except homeopathic ones (06110B), disinfectants (06110C), serums and vaccines (06110D), vitamins (C, D, etc.) and minerals (magnesium, calcium, iron, zinc, chromium, etc.), cod liver oil, fish oil capsules, omega 3, dietary supplements (06110E), oral contraception (pill) (06110F) and other medicines (homeopathic, etc.) (06110G) and unspecified purchases at the pharmacy (06129D). $ Medical products and equipment category include: pregnancy test, contraceptives, intrauterine device (06121A), fever thermometers (06129A), special hosiery and rubber stockings, support stockings (06129B) and medical wadding, bandages, plasters, bandages, first aid kit, syringes, heating or cooling device (e.g. cushion) (for medical use) (06129C), glasses (06131A), hearing aids (06132A), repair of therapeutic equipment (eyeglasses, prostheses, dentures, wheelchairs, etc.) (06133A), therapeutic Lamps (06139A), wheelchairs and invalid carriages, medical beds, commode chair, crutches, walker, etc. (06139B), orthopaedic shoes and insoles (06139C), prostheses, dentures etc. (06139D) and other therapeutic equipment (aerosol, blood pressure monitor, inhaler, baby scales, neck brace, support belt, etc.) (06139E). ^ Diagnostic tests and paramedical services include: checks and analyses (of blood, urine, etc.) carried out in laboratories and X-rays (MRI, ultrasound, scanner, etc.) (06231A), thermal cure, sanatorium, rental of therapeutic equipment (06232A), ambulance service (06232B), physiotherapists, remedial gymnastics, medical massages (06232C) and other paramedical services (dietician, psychologist, speech therapist, acupuncturist, chiropractor, osteopath, etc.) (06239A), £Outpatient care include: fees paid to general practitioners (06211A) and fees paid to medical specialists (including plastic surgeons and orthodontists) (06212A), +Hospital inpatient care include: medical fees billed during hospitalization (including cosmetic surgery) (06300A) and payments for inpatient admission, maternity care (private room or not), day treatment, in hospital palliative care, in hospital revalidation (06300B). %Benefits in kind (r13), sickness fund reimbursements (r14), insurance reimbursements (r15) and tax reimbursement (r16) were excluded from the income estimates; SD=Standard Deviation; + weighted average over the population (including zero-expenses).*

Table 110 – Average annual out-of-pocket payments, by quintile of total household expenses, by OOP definition, 2012-2018

	2012	2014	2016	2018
Average OOP (value in € [95% confidence interval])				
1st	746 [683-809]	772 [703-842]	738 [648-828]	724 [626-821]
2nd	1 029 [954-1 104]	1 222 [1 130-1314]	1 000 [902-1 097]	1 089 [969-1 210]
3rd	1 531 [1 384-1 678]	1 505 [1 378-1633]	1410 [1 271-1 548]	1 545 [1 368-1 722]
4th	1 645 [1 510-1 779]	1 852 [1 687-2017]	1 992 [1 778-2 206]	2 054 [1 837-2 272]
5th	2 538 [2 179-2 897]	2 927 [2 513-3341]	2 717 [2 368-3 065]	2 785 [2 476-3 094]
Total	1497 [1411-1584]	1 655 [1 557-1753]	1 571 [1 477-1 664]	1 639 [1 547-1 731]
Average OOP (value in € [95% confidence interval])**				
1st	NA	657 [591-722]	611 [527-695]	457 [374-540]
2nd	NA	1 052 [966-1 138]	798 [709-886]	660 [565-754]
3rd	NA	1 321 [1 197-1 445]	1 158 [1 032-1 284]	924 [780-1 068]
4th	NA	1 657 [1 497-1 817]	1 678 [1 478-1 878]	1 348 [1 162-1 534]
5th	NA	2 692 [2 281-3 103]	2 415 [2 073-2 757]	2 022 [1 739-2 306]
Total	NA	1 476 [1 379-1 572]	1 332 [1 242-1 421]	1 082 [1 002-1 162]
Average OOP* (value in € [95% confidence interval])**				
1st	NA	630 [566-694]	596 [512-680]	445 [363-526]
2nd	NA	978 [898-1 058]	762 [681-843]	629 [537-721]
3rd	NA	1 200 [1 096-1 303]	1 084 [966-1 202]	851 [735-966]
4th	NA	1 537 [1 384-1 689]	1 590 [1 395-1 785]	1 309 [1 125-1 493]
5th	NA	2 301 [1 944-2 659]	2 188 [1 870-2 506]	1 744 [1 510-1 979]
Total	NA	1 329 [1 244-1 414]	1 244 [1 160-1 328]	996 [925-1 066]

*Data source: HBS 2012, 2014, 2016, 2018, OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0.*

Figure 120 – Average annual out-of-pocket payments, by quintile of total household expenses, 2012-2018



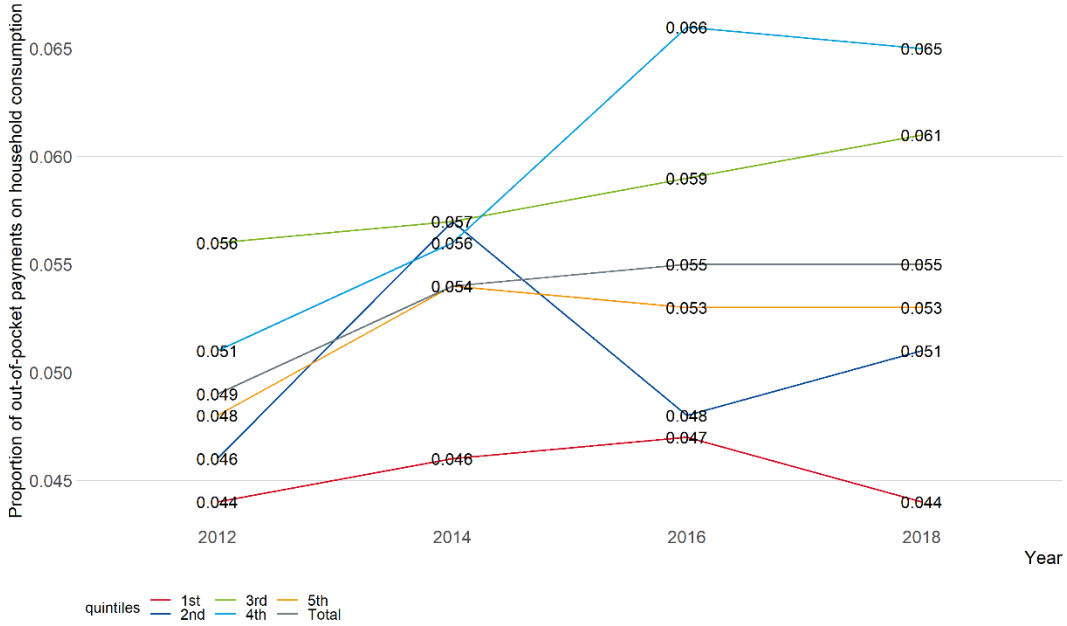
Data source: HBS 2012-2018

Table 111 – Out-of-pocket spending as a proportion of total household expenses, by quintile of total household expenses, by OOP definition, 2012-2018

	2012	2014	2016	2018
Proportion OOP/total expenses (value [95% confidence interval])				
1st	0.044 [0.041-0.048]	0.046 [0.043-0.05]	0.047 [0.042-0.052]	0.044 [0.038-0.050][2,3,4,5]
2nd	0.046 [0.043-0.049]	0.057 [0.053-0.061]	0.048 [0.043-0.052]	0.051 [0.045-0.056][1,3,4,5]
3rd	0.056 [0.051-0.061]	0.057 [0.052-0.061]	0.059 [0.052-0.063]	0.061 [0.054-0.067][1,2]
4th	0.051 [0.047-0.055]	0.056 [0.052-0.061]	0.066 [0.059-0.072]	0.065 [0.058-0.071][1,2]
5th	0.048 [0.041-0.054]	0.054 [0.046-0.062]	0.053 [0.046-0.061]	0.053 [0.047-0.059][1,2]
Total	0.049 [0.046-0.052][14,16,18]	0.054 [0.051-0.058][12]	0.055 [0.052-0.058][12]	0.055 [0.052-0.058][12]
Proportion OOP/total expenses (value [95% confidence interval])**				
1st	NA	0.039 [0.036-0.043]	0.039 [0.034-0.044]	0.028 [0.023-0.033][3,4,5]
2nd	NA	0.049 [0.045-0.053]	0.038 [0.034-0.042]	0.031 [0.026-0.035][4,5]
3rd	NA	0.05 [0.045-0.054]	0.047 [0.042-0.052]	0.036 [0.031-0.042][1]
4th	NA	0.05 [0.046-0.055]	0.055 [0.049-0.062]	0.042 [0.036-0.048][1,2]
5th	NA	0.05 [0.042-0.057]	0.047 [0.041-0.054]	0.038 [0.033-0.044][1,2]
Total	NA	0.049 [0.045-0.052][18]	0.047 [0.044-0.05][18]	0.037 [0.034-0.039][14,16]
Proportion OOP*/total expenses (value [95% confidence interval])**				
1st	NA	0.038 [0.034-0.041]	0.038 [0.033-0.043]	0.027 [0.022-0.032][3,4,5]
2nd	NA	0.045 [0.042-0.049]	0.036 [0.033-0.040]	0.029 [0.025-0.034][4,5]
3rd	NA	0.045 [0.041-0.049]	0.044 [0.040-0.049]	0.033 [0.029-0.038][1]
4th	NA	0.047 [0.042-0.051]	0.052 [0.046-0.059]	0.041 [0.035-0.047][1,2]
5th	NA	0.042 [0.036-0.049]	0.043 [0.037-0.049]	0.033 [0.028-0.037][1,2]
Total	NA	0.044 [0.041-0.046][18]	0.044 [0.041-0.047][18]	0.034 [0.031-0.036][14,16]

*Significant differences (p<0.05): [1] – significantly different from quintile 1; [2] – significantly different from quintile 2; [3] – significantly different from quintile 3; [4] – significantly different from quintile 4; [5] – significantly different from quintile 5; [12] – significantly different from results in 2012; [14] – significantly different from results in 2014; [16] – significantly different from results in 2016; [18] – significantly different from results in 2018. NA=Not available; OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0.*

Figure 121 – Out-of-pocket spending as a proportion of total household expenses, by quintile of total household expenses, 2012-2018



Data source: HBS 2012-2018

Out-of-pocket payments as a share of net income

In Table 112, out-of-pocket payments are related to total net household income. At the population level, there is a constant proportion of OOPs in total income from 2012 to 2018 (2012: 0.045, 2018: 0.046) with no significant difference of proportion across the years (p=0.849). Between 2012 and 2018, the proportion of OOPs in total income increased for the 1st income quintile (+0.8 percentage points) and remained more or less constant for the other income sub-groups. A similar pattern is observed with OOP** and OOP***, but in this case a reduction in the income share of out-of-pocket payments is also observed for the 1st income quintile.

The proportions of OOPs in total household income did not always uniformly decrease by quintile and in 2016, Q2 had a higher proportion of OOPs related to income (proportion OOP/total household income = 0.068) than Q1 (proportion OOP/total household income = 0.054) (Table 112).

In 2018, the proportion of OOPs in total income was significantly different between the income quintiles (p<0.001) and more in particular between the 4th income quintile (Q4) and the 5th income quintile (Q5) with the other income sub-groups. With OOP** and OOP***, no significant difference of proportion of OOPs in total income is observed between Q4 and Q5. With OOP***, a significant difference is observed between Q1 and Q3 (p=0.05) (Table 112).

Overall, the difference in the share of OOPs in household income between the 1st and 5th quintile (for instance, in 2018 the difference is 0.070-0.031 = 0.039) is more important than the difference in the share of OOPs in total household expense (in 2018 = -0.009).

The OOPs as a share of household income follow a more or less constant trend over the years whilst for OOPs as a share of total household expenses, there is an upward trend, except between 2016 and 2018 where a stable trend is observed (Figure 122). However, the results for the first quintile are different. The OOPs as a share of household income increased for Q1 between 2012 and 2018 (+0.8 percentage points), while this is not the case for OOPs as share of total household expenses for which there was a constant trend for the 2012-2018 period.

Table 112 – Out-of-pocket spending as a proportion of total net household income, by income quintile, by OOP definition, 2012-2018

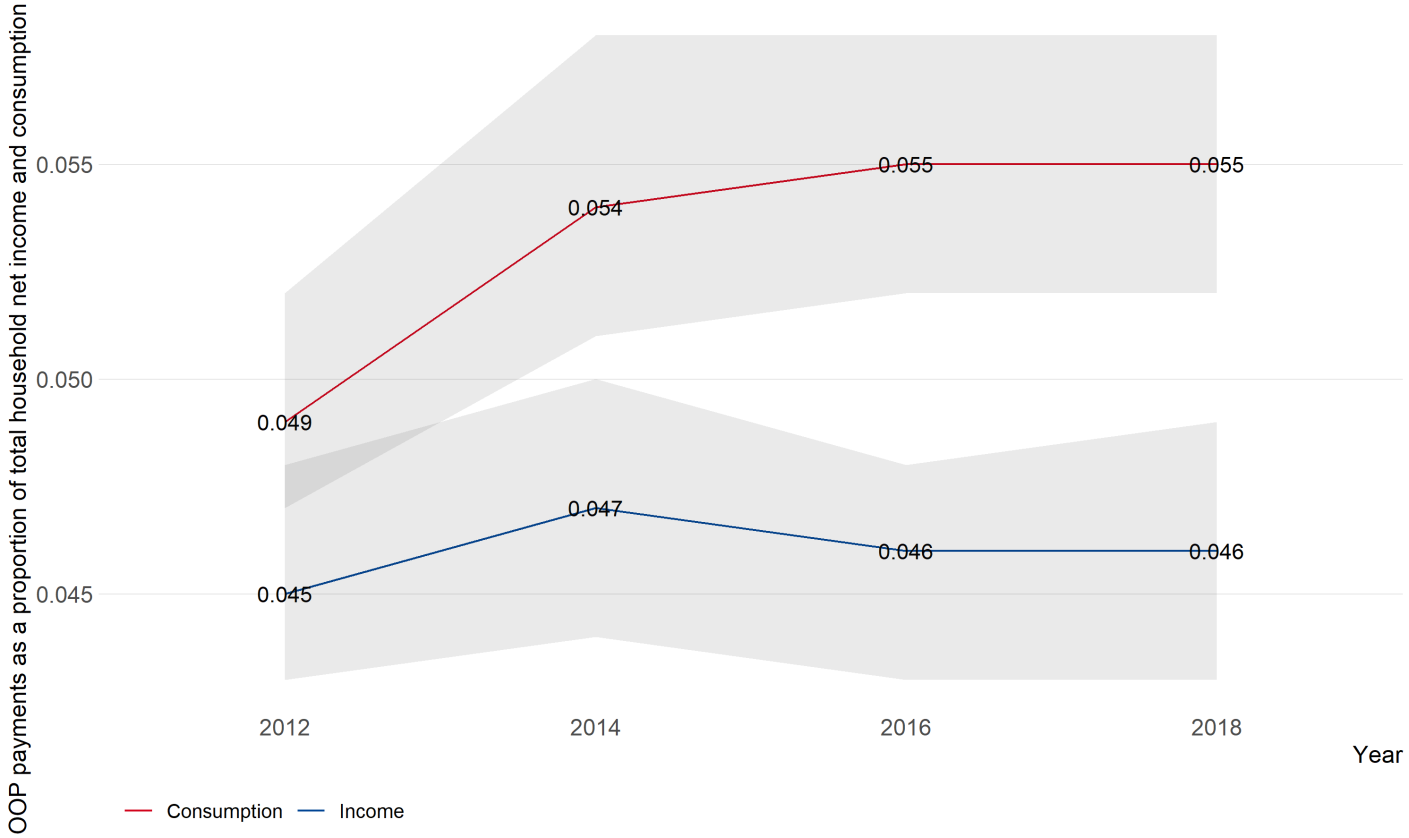
	2012	2014	2016	2018
Weighted Mean Income				
1st	19 047	20 704	19 747	20 699
2nd	25 327	26 265	25 636	26 998
3rd	31 516	33 393	33 603	33 128
4th	37 165	39 627	39 236	40 591
5th	52 408	56 687	53 974	56 898
Total	33 089	35 322	34 424	35 644
Weighted Mean OOP				
1st	1 177	1 257	1 064	1 444
2nd	1 469	1 584	1 753	1 519

3rd	1 488	1 621	1 648	1 782
4th	1 598	1 786	1 716	1 691
5th	1 754	2 030	1 674	1 760
Total	1 497	1 655	1 571	1 639
Weighted Mean OOP**				
1st	NA	1 118	915	1 011
2nd	NA	1 412	1 520	973
3rd	NA	1 437	1 349	1 173
4th	NA	1 581	1 454	1 064
5th	NA	1 831	1 421	1 191
Total	NA	1 476	1 332	1 082
Weighted Mean OOP***				
1st	NA	1 014	870	936
2nd	NA	1 288	1 427	895
3rd	NA	1 311	1 220	1 025
4th	NA	1 356	1 376	1 001
5th	NA	1 674	1 325	1 121
Total	NA	1 329	1 244	995
Proportion OOP/total household income (value [95% confidence interval])				
1st	0.062 [0.053-0.070]	0.061 [0.053-0.068]	0.054 [0.045-0.063]	0.070 [0.059-0.080] [4,5]
2nd	0.058 [0.051-0.065]	0.060 [0.054-0.067]	0.068 [0.059-0.078]	0.056 [0.050-0.063] [4,5]
3rd	0.047 [0.043-0.052]	0.049 [0.044-0.053]	0.049 [0.044-0.054]	0.054 [0.046-0.061] [4,5]
4th	0.043 [0.039-0.047]	0.045 [0.038-0.052]	0.044 [0.038-0.050]	0.042 [0.037-0.046] [1,2,3,5]
5th	0.033 [0.028-0.039]	0.036 [0.031-0.041]	0.031 [0.028-0.034]	0.031 [0.027-0.035] [1,2,3,4]
Total	0.045 [0.043-0.048]	0.047 [0.044-0.050]	0.046 [0.043-0.048]	0.046 [0.043-0.049]
Proportion OOP/total household income (value [95% confidence interval])**				
1st	NA	0.054 [0.047-0.061]	0.046 [0.038-0.055]	0.049 [0.04-0.055] [4,5]

2nd	NA	0.054 [0.047-0.060]	0.059 [0.050-0.069]	0.036 [0.031-0.069] [4,5]
3rd	NA	0.043 [0.038-0.048]	0.040 [0.035-0.045]	0.035 [0.029-0.045] [4,5]
4th	NA	0.040 [0.033-0.047]	0.037 [0.031-0.043]	0.026 [0.022-0.043] [1,2,3]
5th	NA	0.032 [0.027-0.037]	0.026 [0.023-0.03]	0.021 [0.017-0.03] [1,2,3]
Total	NA	0.042 [0.039-0.045]	0.039 [0.036-0.041]	0.035 [0.028-0.041]
Proportion OOP*/total household income (value [95% confidence interval])**				
1st	NA	0.049 [0.043-0.055]	0.044 [0.036-0.052]	0.045 [0.037-0.053] [3,4,5]
2nd	NA	0.049 [0.043-0.055]	0.056 [0.047-0.064]	0.033 [0.028-0.038] [4,5]
3rd	NA	0.039 [0.036-0.043]	0.036 [0.032-0.041]	0.031 [0.026-0.036] [1,4,5]
4th	NA	0.034 [0.028-0.04]	0.035 [0.029-0.041]	0.025 [0.021-0.028] [1,2,3]
5th	NA	0.03 [0.025-0.034]	0.025 [0.022-0.027]	0.02 [0.016-0.023] [1,2,3]
Total	NA	0.038 [0.035-0.04]	0.036 [0.034-0.039]	0.028 [0.026-0.030]

*Data source: HBS 2012, 2014, 2016, 2018, Significant differences (p<0.05): [1] – significantly different from quintile 1; [2] – significantly different from quintile 2; [3] – significantly different from quintile 3; [4] – significantly different from quintile 4; [5] – significantly different from quintile 5; NA=Not available, OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0.*

Figure 122 – Out-of-pocket payments as a proportion of household income and total expenses, 2012-2018



Data source: HBS 2012-2018

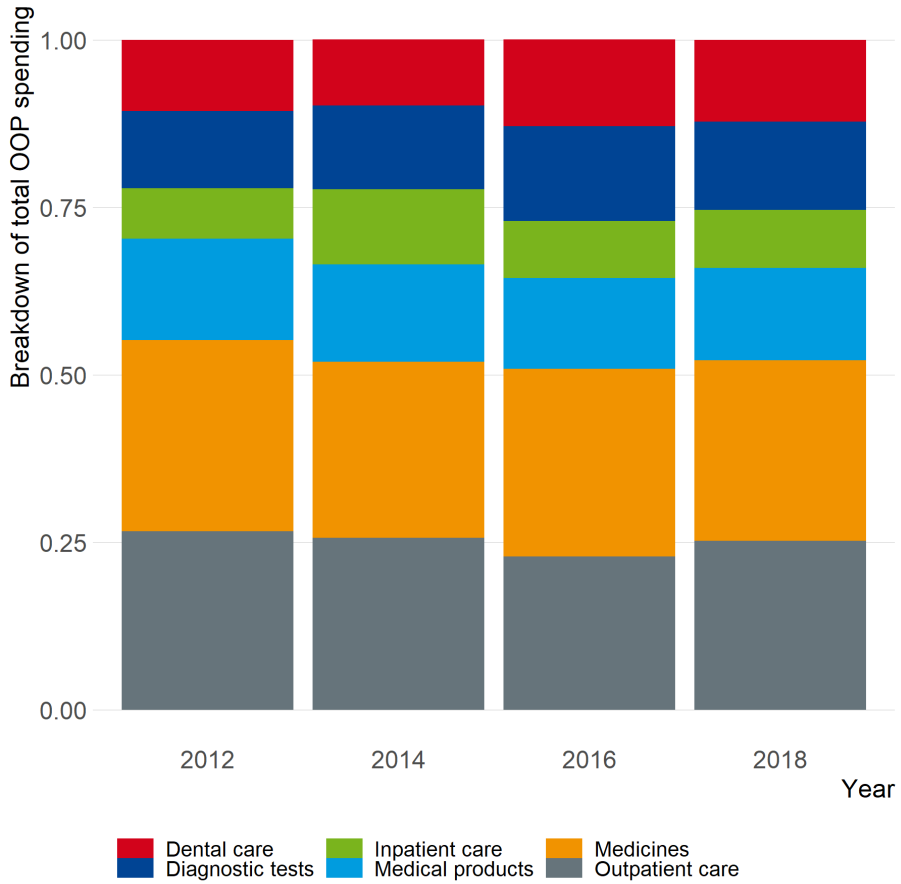
Out-of-pocket payments by type of healthcare

In 2018, the majority of OOPs were related to expenses for medicines (27.0%), outpatient care (25.2%) and medical products and equipment (13.8%). Also in 2012, expenses for medicines (28.5%), outpatient care (26.7%) and medical products and equipment (15.1%) were the top 3 categories of OOPs. The share of OOPs by type of healthcare did not vary much between 2012 and 2018 (Table 113, Figure 123).

The top three categories of OOPs vary across quintiles of total household expenses. Patients in the 1st and 2nd quintile (Q1 and Q2) spend relatively less on medical products and equipment (2018: 6.3% and 7.3% for Q1 and Q2, respectively), dental care (2018: 8.0% and 10.0% for Q1 and Q2, respectively) and inpatient care (2018: 4.8% and 6.1% for Q1 and Q2, respectively) and more on medicines (2018: 37.4% and 33.8% for Q1 and Q2, respectively) and outpatient care (2018: 29.0% and 29.0% for Q1 and Q2, respectively) compared to the 5th quintile (2018: 18.2% for medical products and equipment, 13.4% for dental care, 13.7% for inpatient care, 22.0% for medicines and 21.8% for outpatient care). This observation applies for all four years (Table 113).

In 2018, there was a significant difference of OOPs for medicines between Q1 and Q4 (Q1: 37.4%; Q4: 26.2%; p=0.006), for medical products and equipment between Q1 and Q3 (Q1: 6.3%; Q3: 12.5%; p<0.001), Q1 and Q4 (Q1: 6.3%; Q4:14.9%; p<0.001), Q1 and Q5 (Q1: 6.3%; Q5: 18.2%; p<0.001), Q2 and Q5 (Q2: 7.3%; Q5: 18.2%; p<0.001) and Q3 and Q5 (Q3: 12.5%; Q5: 18.2%; p=0.027), for outpatient care between Q1 and all other quintiles of total household expenses (p≤0.011), for dental care between Q1 and Q3, Q4, Q5 (p≤0.001) and Q2 and Q4 (Q2: 10.2%; Q4: 13.0%; p=0.017) and for diagnostic tests and other paramedical services between Q1 and Q4 (Q1: 14.5%; Q4: 16.0%; p=0.027), Q2 and Q3, Q4 and Q5 (p≤ 0.018) (Table 113).

Figure 123 – Breakdown of total out-of-pocket payments by type of healthcare, 2012-2018



Data source: HBS 2012, 2014, 2016, 2018; see Table 113 for the definitions of the health expenses categories.

Table 113 – Breakdown of total out-of-pocket spending by type of healthcare, by quintile of total household expenses, 2012-2018

	2012	2014	2016	2018
Medicines°				
1st	36.2%	37.4%	38.9%	37.4%[4]
2nd	36.9%	30.9%	36.8%	33.8%
3rd	29.5%	28.7%	30.0%	27.3%
4th	29.0%	28.7%	25.7%	26.2%[1]
5th	21.9%	18.6%	22.3%	22.0%
Total	28.5%	26.3%	28.0%	27.0%
Medical products and equipment[$]				
1st	6.4%	7.1%	6.8%	6.3%[3,4,5]
2nd	5.6%	8.3%	6.7%	7.3%[5]
3rd	8.5%	9.4%	10.8%	12.5%[1,5]
4th	14.9%	13.5%	13.3%	14.9%[1]
5th	25.8%	22.2%	19.6%	18.2%[1,2,3]
Total	15.1%	14.5%	13.6%	13.8%
Outpatient care[£]				
1st	33.2%	29.6%	26.1%	29.0%[2,3,4,5]
2nd	33.0%	30.1%	26.5%	29.0%[1]
3rd	30.2%	28.9%	27.0%	26.3%[1]
4th	26.8%	25.2%	22.3%	25.8%[1]
5th	20.0%	21.4%	18.9%	21.8%[1]
Total	26.7%	25.7%	22.9%	25.2%

Dental care				
1st	7.1%	10.2%	13.0%	8.0%[3,4,5]
2nd	9.2%	7.5%	10.7%	10.2%[4]
3rd	11.6%	10.5%	10.4%	12.2%[1]
4th	10.8%	9.3%	14.8%	13.0%[1,2]
5th	11.4%	11.0%	13.9%	13.4%[1]
Total	10.6%	9.9%	13.0%	12.2%
Diagnostic tests and paramedical services^				
1st	9.0%	8.8%	10.7%	14.5%[4]
2nd	10.4%	14.8%	13.4%	13.6%[3,4,5]
3rd	13.6%	12.3%	13.6%	12.7%[2]
4th	12.7%	15.3%	17.8%	16.0%[1,2]
5th	10.6%	10.8%	13.0%	10.8%[2]
Total	11.5%	12.5%	14.1%	13.2%
Inpatient care+				
1st	8.1%	6.9%	4.6%	4.8%[5]
2nd	4.8%	8.4%	6.0%	6.1%
3rd	6.7%	10.2%	8.3%	9.0%
4th	5.8%	7.9%	6.1%	4.0%[5]
5th	10.3%	16.0%	12.2%	13.7%[1,4]
Total	7.6%	11.2%	8.5%	8.6%

Data source: HBS 2012, 2014, 2016, 2018, ° Medicines include: medicines (06110A), magistral preparation except homeopathic ones (06110B), disinfectants (06110C), serums and vaccines (06110D), vitamins (C, D, etc.) and minerals (magnesium, calcium, iron, zinc, chromium, etc.), cod liver oil, fish oil capsules, omega 3, dietary supplements (06110E), oral contraception (pill) (06110F) and other medicines (homeopathic, etc.) (06110G) and unspecified purchases at the pharmacy (06129D). $ Medical products and equipment category include: pregnancy test, contraceptives, intrauterine device (06121A), fever thermometers (06129A), special hosiery and rubber stockings, support stockings (06129B) and medical wadding, bandages, plasters, bandages, first aid kit, syringes, heating or cooling device (e.g. cushion) (for medical use) (06129C), glasses (06131A), hearing aids (06132A), repair of therapeutic equipment (eyeglasses, prostheses, dentures, wheelchairs, etc.) (06133A), therapeutic Lamps (06139A), wheelchairs and invalid carriages, medical beds, commode chair, crutches, walker, etc. (06139B), orthopaedic shoes and insoles (06139C), prostheses, dentures etc. (06139D) and other therapeutic equipment (aerosol, blood pressure monitor, inhaler, baby scales, neck brace, support belt, etc.) (06139E). ^ Diagnostic tests and paramedical services include: checks and analyses (of blood, urine, etc.) carried out in laboratories and X-rays (MRI, ultrasound, scanner, etc.) (06231A), thermal cure, sanatorium, rental of

therapeutic equipment (06232A), ambulance service (06232B), physiotherapists, remedial gymnastics, medical massages (06232C) and other paramedical services (dietician, psychologist, speech therapist, acupuncturist, chiropractor, osteopath, etc.) (06239A), £Outpatient care include: fees paid to general practitioners (06211A) and fees paid to medical specialists (including plastic surgeons and orthodontists) (06212A), +Hospital inpatient care include: medical fees billed during hospitalization (including cosmetic surgery) (06300A) and payments for inpatient admission, maternity care (private room or not), day treatment, in hospital palliative care, in hospital revalidation (06300B). Significant differences (p<0.05): [1] – significantly different from quintile 1; [2] – significantly different from quintile 2; [3] – significantly different from quintile 3; [4] – significantly different from quintile 4; [5] – significantly different from quintile 5.

3.3.1.3. How many households experience financial hardship?

Catastrophic OOPs occur when a household's OOPs are equal to or exceed some threshold of a household's capacity to pay. According to the methodology proposed by the WHO European region, households with catastrophic levels of spending are households whose out-of-pocket healthcare payments represent more than 40% of their capacity to pay, i.e. total household expenses corrected for expenses related to basic needs (see section 3.2.5). This includes households who are impoverished after OOPs (households which are above the poverty line, but fall below the poverty line when subtracting out-of-pocket expenses from their total expenses) and further impoverished (all households which are below the poverty line and have positive healthcare expenses).

Households with (further) impoverishing OOPs

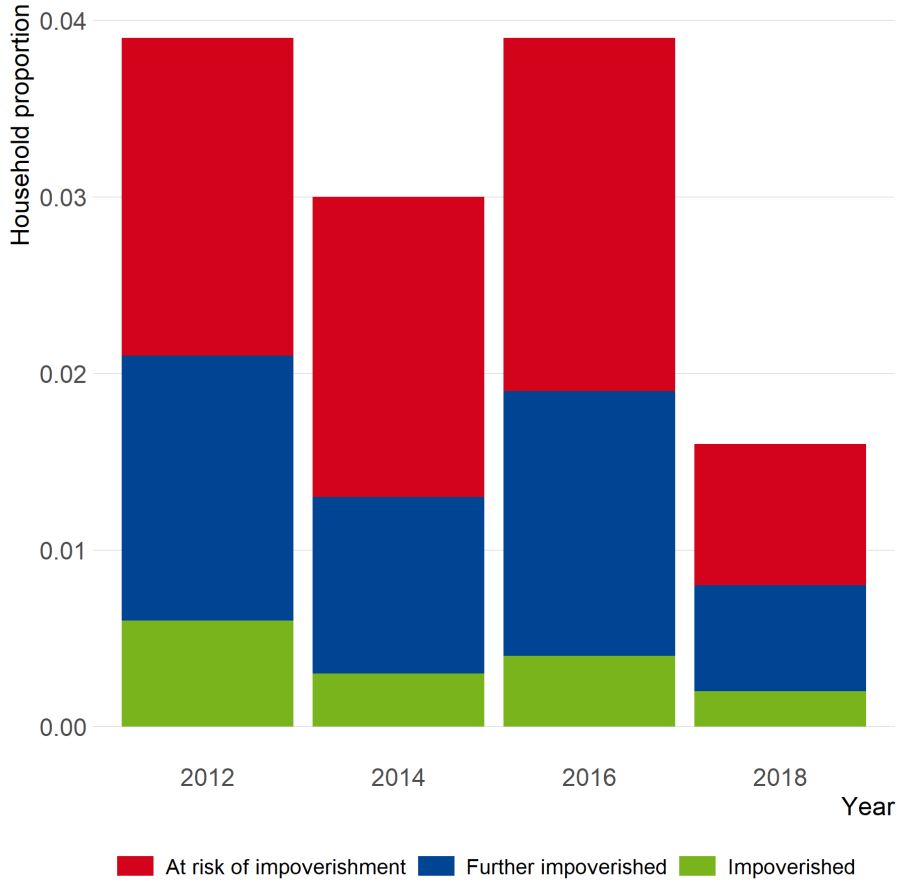
Table 115 and Figure 124 indicate that the share of households that are further impoverished and at risk of impoverishment after OOPs, decreased between 2012 and 2018 (further impoverished: 2012: 1.5%; 2018: 0.6%; impoverished: 2012: 0.6%; 2018: 0.2%). The same conclusion is observed with OOP** and OOP*** adjustments.

In 2018, significantly more households reported no OOPs (32.8%) compared to other years (2016: 19.7%; 2014: 16.4%; 2012: 17.1%). Among poor households, the conclusion is the same, i.e. more households reported no OOPs (62.2%) in 2018 compared to other years (2016: 42.8%; 2014: 44.4%; 2012: 43.4%). This is explained by the fact that in the HBS 2018, consumption data were collected over a 15-day registration period whereas in previous HBSs, data were collected during 1 month.

Table 114 shows that households in the 1st quintile reported more frequently no OOPs than the other quintiles.

The share of households without OOP has an important effect on the incidence of catastrophic and impoverishing OOPs as households without OOPs cannot be (further) impoverished and cannot have catastrophic payments. This does not necessarily reflect a positive results as it might be related to increased postponement of care.

Figure 124 – Proportion of households at risk of impoverishment, further impoverished and impoverished, 2012-2018



*Data source: HBS 2012, 2014, 2016, 2018. *OOPs are calculated as the sum of the health expenses (COICOP 06).*

Table 114 – Proportion of households without OOPs, by quintile of total household expenses, 2012-2018

	2012	2014	2016	2018
1st	27.3%	28.1%	30.1%	48.8%
2nd	20.4%	17.3%	22.9%	36.0%
3rd	12.3%	14.6%	19.0%	27.9%
4th	13.7%	10.9%	13.6%	24.6%
5th	11.6%	11.0%	12.7%	26.9%
Total	17.1%	16.4%	19.7%	32.8%

Data source: HBS 2012, 2014, 2016, 2018

Table 115 – Share of households by impoverishment group, by OOP definition, 2012-2018

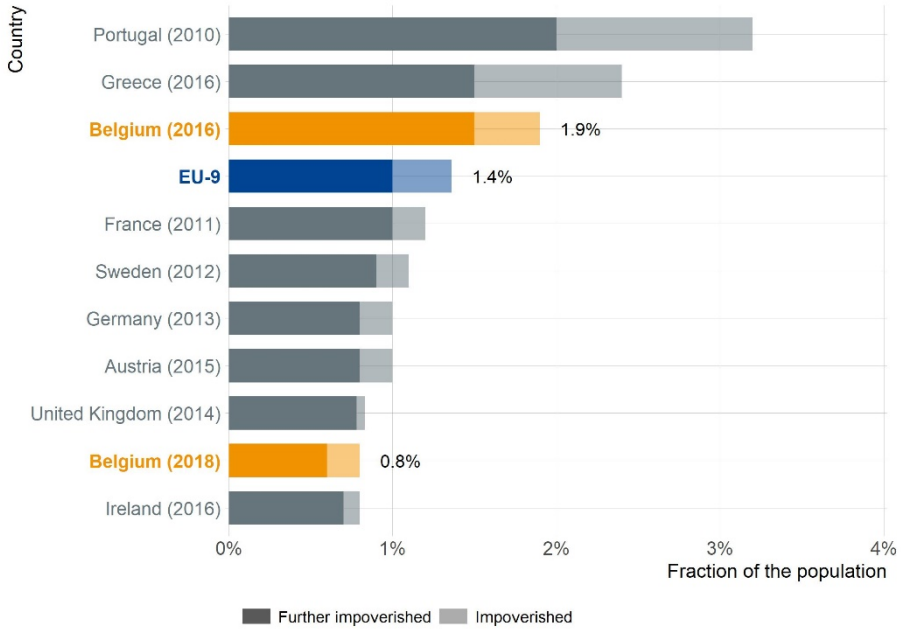
	2012	2014	2016	2018
OOP, share of households				
Further impoverished	0.015 [0.012-0.018]	0.010 [0.008-0.013]	0.015 [0.011-0.02]	0.006 [0.004-0.011]
Impoverished	0.006 [0.004-0.008]	0.003 [0.002-0.005]	0.004 [0.002-0.007]	0.002 [0.001-0.004]
At-risk of impoverishment	0.018 [0.014-0.021]	0.017 [0.014-0.021]	0.020 [0.015-0.025]	0.008 [0.005-0.011]
Not at-risk of impoverishment	0.791 [0.779-0.803]	0.805 [0.794-0.817]	0.765 [0.749-0.78]	0.655 [0.638-0.672]
No OOPs	0.171 [0.160-0.182]	0.164 [0.154-0.175]	0.197 [0.182-0.212]	0.328 [0.312-0.345]
OOP, share of households**				
Further impoverished	NA	0.008 [0.007-0.011]	0.013 [0.01-0.018]	0.004 [0.002-0.007]
Impoverished	NA	0.003 [0.002-0.005]	0.003 [0.002-0.006]	0.002 [0.001-0.004]
At-risk of impoverishment	NA	0.016 [0.013-0.019]	0.018 [0.014-0.023]	0.005 [0.003-0.008]
Not at-risk of impoverishment	NA	0.746 [0.733-0.758]	0.693 [0.676-0.71]	0.469 [0.451-0.486]
No OOPs	NA	0.227 [0.215-0.239]	0.272 [0.256-0.289]	0.520 [0.502-0.538]
OOP*, share of households**				
Further impoverished	NA	0.008 [0.007-0.011]	0.013 [0.01-0.018]	0.004 [0.002-0.007]

Impoverished	NA	0.003 [0.002-0.005]	0.003 [0.002-0.006]	0.002 [0.001-0.004]
At-risk of impoverishment	NA	0.015 [0.012-0.018]	0.017 [0.013-0.023]	0.005 [0.003-0.008]
Not at-risk of impoverishment	NA	0.740 [0.727-0.752]	0.686 [0.669-0.702]	0.460 [0.442-0.478]
No OOPs	NA	0.234 [0.222-0.246]	0.280 [0.264-0.297]	0.529 [0.511-0.547]

*Data source: HBS 2012, 2014, 2016, 2018. NA= Not Available, OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0.*

The incidence of impoverishing out-of-pocket payments in a selection of European countries which applied the WHO methodology ranges from 0.8% to 3.2% (see Figure 125). The share of households impoverished after out-of-pocket payments (shown in red in Figure 125) ranges from less than 0.1% in the United Kingdom to 1.2% in Portugal, while the share of further impoverished households (shown in blue) ranges from 0.6% in Belgium (2018) to 2.0% in Portugal. Using the HBS result for 2018, Belgium has, together with Ireland, the lowest share of households with impoverishing OOP. However, when using the HBS result for 2016, Belgium has one of the higher incidence rates. In cross-country comparisons, not only real differences between countries matter, but also differences in survey design, as illustrated by the difference for Belgium between 2016 and 2018. Most European countries apply a 14-day registration period.[28, 29]

Figure 125 – Share of households with impoverishing health spending, latest year available, EU-9



Source: WHO Regional Office for Europe 2019.[25]

Table 116 – Share of households with catastrophic out-of-pocket payments (thresholds 20%, 25%, 30% and 40%), by OOP definition, 2012-2018

	2012	2014	2016	2018
Share of households (value [95% confidence interval]), OOP				
Thr 20%	0.125 [0.116-0.135]	0.123 [0.114-0.133]	0.137 [0.125-0.150]	0.131 [0.120-0.144]
Thr 25%	0.090 [0.082-0.099]	0.086 [0.078-0.094]	0.101 [0.091-0.113]	0.095 [0.085-0.106]
Thr 30%	0.070 [0.063-0.078]	0.069 [0.062-0.077]	0.082 [0.073-0.093]	0.067 [0.059-0.076]
Thr 40%	0.047 [0.042-0.054][14,18]	0.039 [0.034-0.045][12,16]	0.053 [0.046-0.063][14,18]	0.038 [0.032-0.045][12,16]
Share of households (value [95% confidence interval]), OOP**				
Thr 20%	NA	0.108 [0.099-0.117]	0.111 [0.100-0.123]	0.091 [0.081-0.102]
Thr 25%	NA	0.076 [0.068-0.084]	0.083 [0.073-0.094]	0.064 [0.057-0.073]
Thr 30%	NA	0.058 [0.052-0.066]	0.066 [0.057-0.076]	0.044 [0.038-0.051]
Thr 40%	NA	0.035 [0.030-0.041]	0.044 [0.037-0.053]	0.027 [0.022-0.033]
Share of households (value [95% confidence interval]), OOP***				
Thr 20%	NA	0.097 [0.089-0.106]	0.104 [0.093-0.116]	0.084 [0.075-0.095]
Thr 25%	NA	0.065 [0.058-0.072]	0.077 [0.068-0.088]	0.059 [0.052-0.068]
Thr 30%	NA	0.051 [0.045-0.057]	0.062 [0.053-0.072]	0.040 [0.034-0.046]
Thr 40%	NA	0.030 [0.026-0.035]	0.041 [0.034-0.050]	0.024 [0.019-0.030]

*Data source: HBS 2012, 2014, 2016, 2018, OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0; Significant differences (p<0.05): [12] – significantly different from results in 2012; [14] – significantly different from results in 2014; [16] – significantly different from results in 2016; [18] – significantly different from results in 2018.*

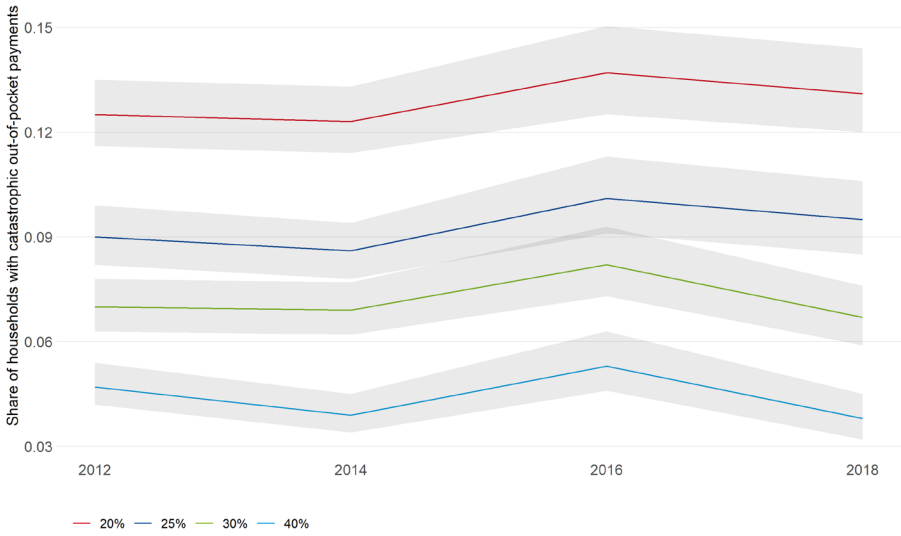
Households with catastrophic out-of-pocket payments

Table 116 and Figure 126 indicate that 4.7%, 3.9%, 5.3% and 3.8% of the households experienced catastrophic OOPs in 2012, 2014, 2016 and 2018, respectively. The share of households with catastrophic OOPs was stable over time when using the 30% threshold and decreased slightly between 2012 and 2018 when using the 40% threshold. With the 20% or the 25% threshold, there is a small increase in the share of households with catastrophic OOPs between 2012 and 2018.

Using the 40% threshold, there was a significant difference in the proportion of households with catastrophic OOPs between 2012 and 2014 (p=0.05), 2012 and 2018 (p=0.045), 2014 and 2016 (p=0.005) and 2016 and 2018 (p=0.005). Using the 20, 25 or 30% threshold, no significant difference in the proportion of households with catastrophic OOPs was observed between years (Table 116).

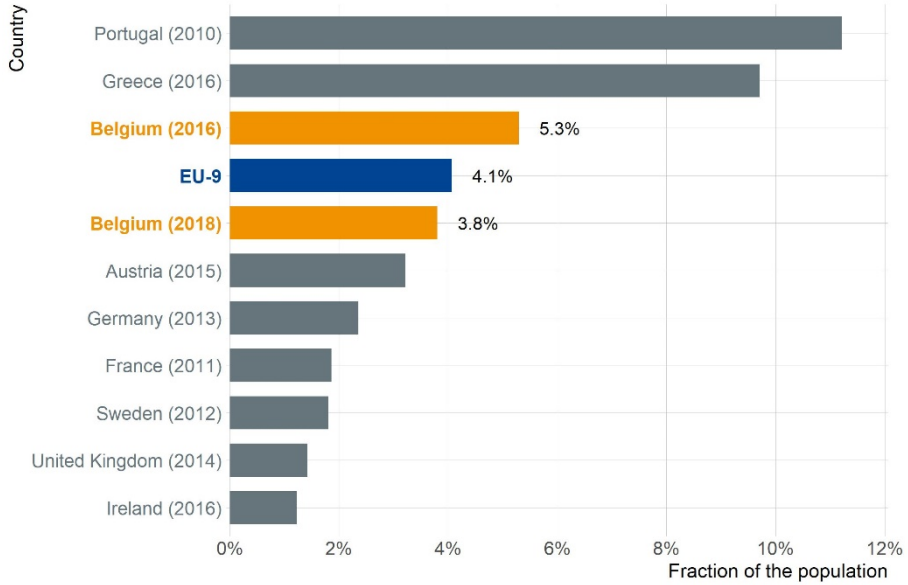
Figure 127 demonstrates that the share of households with catastrophic OOPs in Belgium for 2016 (5.3%) and 2018 (3.8%) is situated around the average of the selected European countries which applied the WHO methodology. The Belgian rate is higher relative to neighbouring countries such as Germany (2013: 2.4%) or France (2011: 1.9%).

Figure 126 – Share of households with catastrophic out-of-pocket payments (thresholds 20%, 25%, 30% and 40%), 2012-2018



Data source: HBS 2012, 2014, 2016, 2018, OOPs are calculated as the sum of all health expenses (COICOP 06).

Figure 127 – Share of households with catastrophic out-of-pocket payments, by EU-9 country, last available year



Source: WHO Regional Office for Europe 2019 and health at a glance 2018.[25, 30]

3.3.1.4. Who experiences financial hardship?

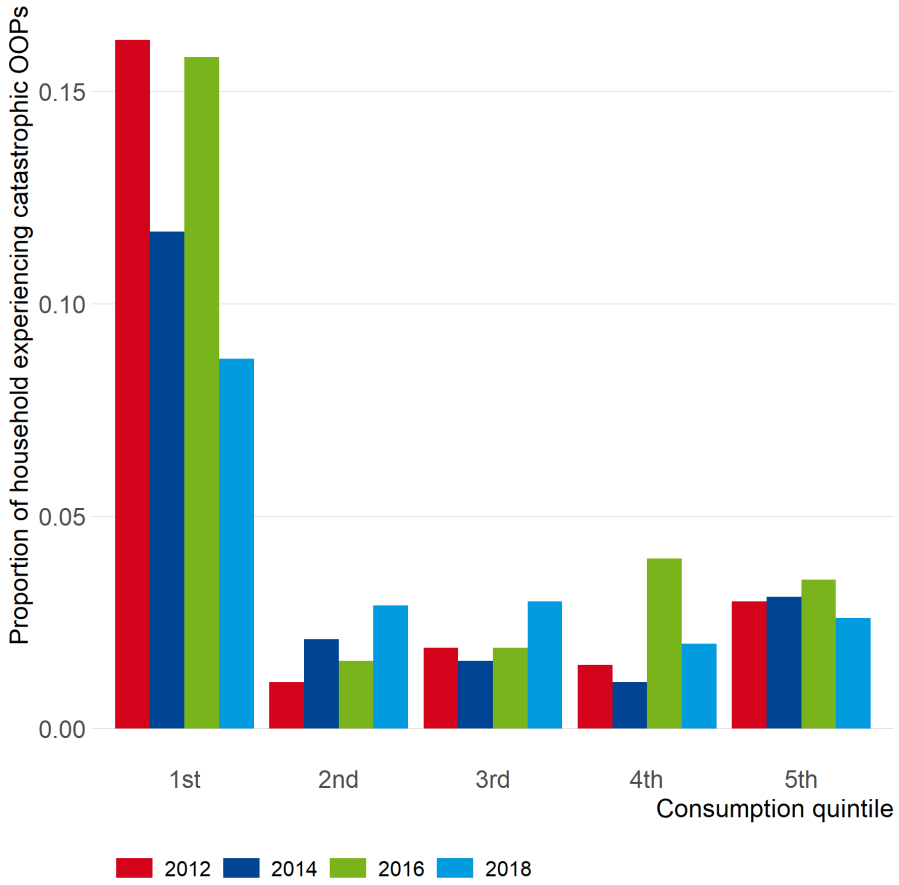
Households by quintile of total household expenses

In 2012, 2014, 2016 and 2018, the proportion of households experiencing catastrophic health expenditures was higher among households in the 1st quintile compared to all other quintiles of total household expenses. In 2018, on average 3.8% of the households experienced catastrophic out-of-pocket payments (Table 116). In the 1st quintile, the incidence was almost 8.7% (Table 117), whereas the incidence in all other quintiles was below the average.

The proportion of households experiencing catastrophic health spending increased in the 5th quintile between 2012 and 2016 and decreased between 2016 and 2018. The incidence of catastrophic spending was higher in the 5th quintile relative to the 2nd, 3rd and 4th quintile in 2012 and 2014, while in 2016 the 4th quintile had an even higher share. These findings are robust to the alternative definitions of OOPs (Figure 128).

There are multiple explanations why catastrophic healthcare payments increase again in quintile (4 and) 5. One explanation is the type of healthcare that is consumed by the more affluent households, such as expenses on glasses and hearing aids where price variation exists which is not necessarily related to medical needs. Another explanation is that households with a hospital or other complementary health insurance might be financially unaffected by important out-of-pocket payments on inpatient or dental care, which are included in the computation of catastrophic out-of-pocket payments, but hence do not necessarily lead to financial hardship. The coverage and depth of private insurance vary in the different quintiles (see Table 107).[31, 32] The OOP*** adjustment tried to alleviate this issue (Table 117).

Figure 128 – Proportion of households experiencing catastrophic (threshold 40%) out-of-pocket payments, by quintile of total household expenses, 2012-2018



Data source: HBS 2012, 2014, 2016, 2018, OOPs are calculated as the sum of the health expenses (COICOP 06).

Households by income quintile

Table 118 shows the proportion of households with catastrophic out-of-pocket payments subdivided by income quintile when using household income corrected for basic needs expenses as capacity to pay. In correspondence with the analysis using total household expenses (Table 117), the proportion of households facing catastrophic out-of-pocket payments in the 1st income quintile is substantially higher than the proportion in all other quintiles. Moreover, when income is used as proxy for the household financial resources, the proportion of catastrophic expenditures is generally decreasing when moving from the 1st to the 5th income quintile.

Table 117 – Share of households experiencing catastrophic (threshold 40%) OOPs, by OOP definition, by quintile of total household expenses, 2012-2018

	2012	2014	2016	2018
Share of households, catastrophic OOP (value [95% confidence interval])				
1st	0.162 [0.140-0.184]	0.117 [0.098-0.135]	0.158 [0.128-0.187]	0.087 [0.065-0.110][2,3,4,5]
2nd	0.011 [0.005-0.017]	0.021 [0.012-0.030]	0.016 [0.007-0.025]	0.029 [0.016-0.042][1]
3rd	0.019 [0.008-0.029]	0.016 [0.007-0.025]	0.019 [0.008-0.03]	0.030 [0.017-0.042][1]
4th	0.015 [0.007-0.023]	0.011 [0.005-0.018]	0.040 [0.020-0.061]	0.020 [0.010-0.029][1]
5th	0.030 [0.017-0.042]	0.031 [0.018-0.043]	0.035 [0.021-0.048]	0.026 [0.014-0.037][1]
Total	0.047 [0.042-0.054][14,18]	0.039 [0.034-0.045][12,16]	0.053 [0.046-0.063][14,18]	0.038 [0.032-0.045][12,16]
Share of households, catastrophic OOP (value [95% confidence interval])**				
1st	NA	0.101 [0.083-0.119]	0.135 [0.107-0.163]	0.062 [0.043-0.080][2,3,4,5]
2nd	NA	0.020 [0.011-0.028]	0.012 [0.004-0.021]	0.020 [0.009-0.031][1]
3rd	NA	0.014 [0.006-0.023]	0.012 [0.003-0.022]	0.016 [0.007-0.025][1]
4th	NA	0.010 [0.004-0.017]	0.031 [0.011-0.050]	0.014 [0.006-0.022][1]
5th	NA	0.030 [0.018-0.043]	0.030 [0.017-0.043]	0.022 [0.010-0.033][1]
Total	NA	0.035 [0.030-0.041]	0.044 [0.037-0.053]	0.027 [0.022-0.033]
Share of households, catastrophic OOP* (value [95% confidence interval])**				
1st	NA	0.096 [0.079-0.114]	0.132 [0.104-0.160]	0.059 [0.041-0.078][2,3,4,5]
2nd	NA	0.015 [0.008-0.023]	0.011 [0.003-0.019]	0.016 [0.006-0.025][1,3,4,5]
3rd	NA	0.009 [0.003-0.015]	0.011 [0.002-0.019]	0.014 [0.005-0.022][1,2,5]
4th	NA	0.008 [0.002-0.014]	0.030 [0.010-0.050]	0.014 [0.005-0.022][1,2]
5th	NA	0.022 [0.011-0.033]	0.023 [0.012-0.034]	0.017 [0.007-0.026][1,2,3]
Total	NA	0.030 [0.026-0.035]	0.041 [0.034-0.050]	0.024 [0.019-0.030]

*Data source: HBS 2012, 2014, 2016, 2018, NA= Not Available, OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0, Significant differences (p<0.05): 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5; [12] – significantly different from results in 2012; [14] – significantly different from results in 2014; [16] – significantly different from results in 2016; [18] – significantly different from results in 2018*

Table 118 – Share of households experiencing catastrophic (threshold 40%) OOPs, by income quintile, by OOP definition, 2012-2018

	2012	2014	2016	2018
Share of households experiencing catastrophic OOP (value [95% confidence interval])				
1st	0.173 [0.148-0.197]	0.119 [0.099-0.139]	0.143 [0.111-0.176]	0.114 [0.089-0.139]
2nd	0.048 [0.032-0.064]	0.038 [0.025-0.051]	0.054 [0.035-0.073]	0.046 [0.028-0.064]
3rd	0.018 [0.008-0.029]	0.020 [0.010-0.031]	0.016 [0.007-0.025]	0.033 [0.021-0.046]
4th	0.013 [0.006-0.020]	0.013 [0.005-0.020]	0.013 [0.005-0.021]	0.010 [0.004-0.016]
5th	0.011 [0.004-0.019]	0.010 [0.003-0.017]	0.004 [0.000-0.008]	0.008 [0.002-0.013]
Total	0.053 [0.046-0.059]	0.040 [0.034-0.046]	0.046 [0.038-0.055]	0.042 [0.035-0.049]
Share of households experiencing catastrophic OOP (value [95% confidence interval])**				
1st	NA	0.104 [0.085-0.123]	0.121 [0.092-0.150]	0.082 [0.060-0.103]
2nd	NA	0.035 [0.022-0.047]	0.050 [0.032-0.069]	0.035 [0.019-0.052]
3rd	NA	0.019 [0.009-0.030]	0.014 [0.006-0.023]	0.025 [0.013-0.036]
4th	NA	0.013 [0.005-0.020]	0.012 [0.004-0.020]	0.007 [0.002-0.011]
5th	NA	0.010 [0.003-0.017]	0.002 [0.000-0.004]	0.007 [0.001-0.013]
Total	NA	0.036 [0.031-0.042]	0.040 [0.032-0.048]	0.031 [0.025-0.037]
Share of households experiencing catastrophic OOP* (value [95% confidence interval])**				
1st	NA	0.097 [0.078-0.115]	0.117 [0.087-0.146]	0.078 [0.057-0.100]
2nd	NA	0.029 [0.018-0.041]	0.046 [0.028-0.064]	0.030 [0.014-0.046]
3rd	NA	0.015 [0.006-0.024]	0.011 [0.003-0.019]	0.017 [0.008-0.026]
4th	NA	0.006 [0.000-0.012]	0.012 [0.004-0.020]	0.007 [0.002-0.011]
5th	NA	0.009 [0.002-0.016]	0.002 [-0.001-0.004]	0.007 [0.001-0.012]
Total	NA	0.031 [0.026-0.036]	0.038 [0.030-0.045]	0.028 [0.022-0.034]

*Data source: HBS 2012, 2014, 2016, 2018; OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0.*

Table 119 – Breakdown of out-of-pocket spending by type of healthcare among households that experience catastrophic OOPs (threshold: 40%), by quintile of total household expenses, 2012-2018

	2012		2014		2016		2018	
	%	N	%	N	%	N	%	N
Medicines°								
1st	31.9%	221	29.4%	140	37.3%	112	25.8%[3,4,5]	60
2nd	20.4%	14	18.3%	20	15.2%	13	18.2%[5]	17
3rd	7.0%	15	8.9%	16	11.8%	14	9.5%[1]	16
4th	11.5%	21	15.5%	13	13.9%	19	5.1%[1]	17
5th	5.2%	22	3.4%	24	9.1%	28	2.4%[1,2]	25
Total	11.5%	293	9.9%	213	15.6%	186	9.5%	135
Medical products and equipment$								
1st	9.6%	40	15.1%	35	7.4%	21	9.0%[3,4,5]	14
2nd	4.3%	3	21.5%	7	14.0%	5	6.3%[3,4,5]	4
3rd	18.8%	7	17.7%	4	37.1%	9	23.2%[1,2]	14
4th	54.7%	16	25.9%	10	31.9%	13	35.8%[1,2]	14
5th	55.8%	20	37.0%	15	30.8%	21	25.6%[1,2]	21
Total	40.3%	86	29.6%	71	26.7%	69	22.5%	67
Outpatient care£								
1st	30.7%	120	22.5%	71	20.1%	62	19.4%[5]	45
2nd	17.7%	14	13.6%	18	9.5%	7	26.6%[5]	16
3rd	21.8%	14	14.8%	13	14.6%	11	17.0%	20
4th	8.5%	18	13.6%	12	8.7%	13	23.3%	17
5th	7.1%	20	14.8%	21	2.9%	24	8.8%[1,2]	19
Total	14.0%	186	15.6%	135	8.5%	117	16.5%	117
Dental care								
1st	7.5%	24	11.4%	19	17.7%	18	10.8%	10

2nd	20.7%	6	9.8%	7	9.1%	5	6.4%	4
3rd	18.3%	4	5.2%	2	10.6%	4	16.4%	9
4th	9.3%	8	12.0%	3	15.6%	8	10.9%	8
5th	13.0%	5	5.9%	5	24.0%	11	21.8%	9
Total	12.6%	47	7.5%	36	19.2%	46	15.5%	40
Diagnostic tests and paramedical services^								
1st	11.8%	30	10.2%	24	11.3%	22	28.8%	23
2nd	18.6%	9	20.3%	9	34.2%	6	29.3%	10
3rd	29.4%	7	17.0%	9	11.4%	7	9.9%	11
4th	6.7%	7	17.4%	7	25.4%	11	22.2%[5]	14
5th	1.7%	10	1.3%	12	8.5%	10	8.8%[4]	12
Total	7.6%	63	7.5%	61	14.0%	56	16.6%	70
Inpatient care+								
1st	8.5%	40	11.3%	47	6.2%	22	6.3%	14
2nd	7.4%	4	16.5%	8	18.0%	3	13.1%	6
3rd	15.5%	7	36.3%	7	14.4%	4	24.0%	6
4th	9.3%	4	15.6%	3	4.5%	8	2.6%	7
5th	17.2%	12	37.6%	15	24.7%	15	32.6%	15
Total	14.1%	67	29.9%	80	16.0%	52	19.5%	48

Data source: HBS 2012, 2014, 2016 & 2018, ° Medicines include: medicines (06110A), magistral preparation except homeopathic ones (06110B), disinfectants (06110C), serums and vaccines (06110D), vitamins (C, D, etc.) and minerals (magnesium, calcium, iron, zinc, chromium, etc.), cod liver oil, fish oil capsules, omega 3, dietary supplements (06110E), oral contraception (pill) (06110F) and other medicines (homeopathic, etc.) (06110G) and unspecified purchases at the pharmacy (06129D). $ Medical products and equipment category include: pregnancy test, contraceptives, intrauterine device (06121A), fever thermometers (06129A), special hosiery and rubber stockings, support stockings (06129B) and medical wadding, bandages, plasters, bandages, first aid kit, syringes, heating or cooling device (e.g. cushion) (for medical use) (06129C), glasses (06131A), hearing aids (06132A), repair of therapeutic equipment (eyeglasses, prostheses, dentures, wheelchairs, etc.) (06133A), therapeutic Lamps (06139A), wheelchairs and invalid carriages, medical beds, commode chair, crutches, walker, etc. (06139B), orthopaedic shoes and insoles (06139C), prostheses, dentures etc. (06139D) and other therapeutic equipment (aerosol, blood pressure monitor, inhaler, baby scales, neck brace, support belt, etc.) (06139E). ^ Diagnostic tests and paramedical services include: checks and analyses (of blood, urine, etc.) carried out in laboratories and X-rays (MRI, ultrasound, scanner, etc.) (06231A), thermal cure, sanatorium, rental of therapeutic equipment (06232A), ambulance service (06232B), physiotherapists, remedial gymnastics, medical massages (06232C) and other paramedical services (dietician, psychologist, speech therapist, acupuncturist, chiropractor, osteopath, etc.) (06239A), £Outpatient care include: fees paid to general practitioners (06211A) and fees paid to medical specialists (including plastic surgeons and orthodontists) (06212A), +Hospital inpatient care include: medical fees billed during hospitalization (including cosmetic

surgery) (06300A) and payments for inpatient admission, maternity care (private room or not), day treatment, in hospital palliative care, in hospital revalidation (06300B). Significant differences (p<0.05): 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5.

Table 120 – Top 10 highest healthcare expenses among households experiencing catastrophic expenses, by COICOP health code, by quintile of total household expenses, 2018

Code COICOP	Label	Category	1st	2nd	3rd	4th	5th	Total
06131A	Glasses	Medical products and equipment	9	8	2	1	1	1
06220A	Fees paid to dentists	Dental care	4	7	3	4	3	2
06300B	Costs of hospital or maternity hospital stay (private room or not), day hospital, palliative care in hospital, revalidation stay	Hospital inpatient care	10	5	1	6	2	3
06212A	Fees paid to medical specialists (including plastic surgeons and orthodontists)	Outpatient care	3	1	4	2	5	4
06232C	Physiotherapists, remedial gymnastics, medical massages	Diagnostic tests and paramedical services	5	3	5	3	6	5
06110A	Medicines	Medicines	1	2	6	5	8	6
06300A	Medical fees billed during hospitalization (including cosmetic surgery)	Hospital inpatient	8	9	7	8	4	7
06239A	Other paramedical services (dietician, psychologist, speech therapist, acupuncturist, chiropractor, osteopath, etc.)	Diagnostic tests and paramedical services	2	4	11	13	11	8
06211A	Prostheses, dentures etc.	Medical products and equipment	6	6	10	9	10	9
06231A	Checks and analyses (of blood, urine, etc.) carried out in laboratories and X-rays (MRI, ultrasound, scanner, etc.)	Diagnostic tests and paramedical services	12	13	13	15	7	10

Data source: HBS 2018

3.3.1.5. *Which health services are responsible for financial hardship?*

Table 119 provides a breakdown of healthcare expenses for the subgroup experiencing catastrophic OOPs subdivided by quintiles of total household expenses. Remark that the subgroup with catastrophic OOPs is a small subsample and hence the results show important variation between years partly because of the small sample size (see Table 119).

In 2018, most of the OOPs among households with catastrophic OOPs are related to medical products and equipment (22.5%), especially to glasses, inpatient costs (19.5%) and paramedical services, especially physiotherapists, remedial gymnastics, and medical massages (16.6%). Expenses related to diagnostic tests and paramedical services and medicines are the most important category of healthcare consumption among households in the 1st quintile, whereas the category inpatient care has the highest share of OOPs in the 5th quintile (Table 119 and Table 120).

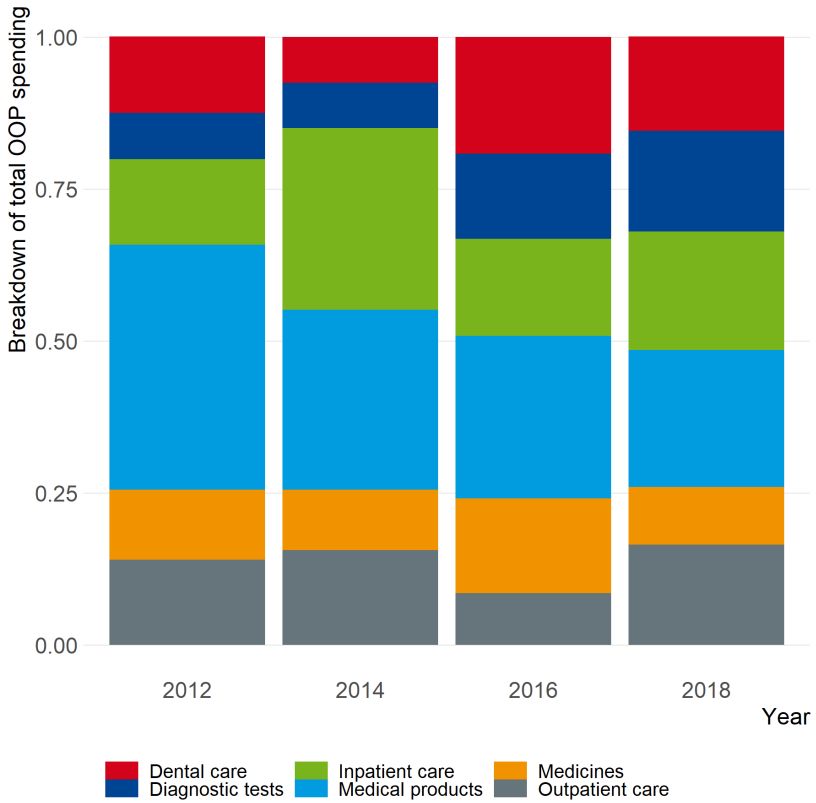
Over time, medical products and equipment have accounted for a smaller proportion of spending among households that experience catastrophic OOPs. In 2018, the share of expenses by type of healthcare became more balanced (except for medicines). However, as already mentioned above, these changes have to be interpreted with caution because they can be partly explained by an update of the COICOP classification between 2014 and 2016 (Figure 129) and also because of the small sample size.

In 2018, for medicines the OOPs as a proportion of total household expenses were significantly different between Q1 and Q3, Q4 and Q5 ($p \leq 0.011$) and between Q2 and Q5 ($p=0.020$), for medical products and equipment there was a significant difference of proportion between Q1 and Q3, Q4 and Q5 ($p \leq 0.021$) and Q2 and Q3, Q4, Q5 ($p \leq 0.010$), for outpatient care between Q1 and Q5 ($p=0.002$) and between Q2 and Q5 ($p=0.005$) and for inpatient care between Q4 and Q5 ($p=0.029$). There was no significant difference of proportion between quintiles of total household expenses for dental care and diagnostic tests and paramedical services (Table 119).

3.3.1.6. *How much financial hardship?*

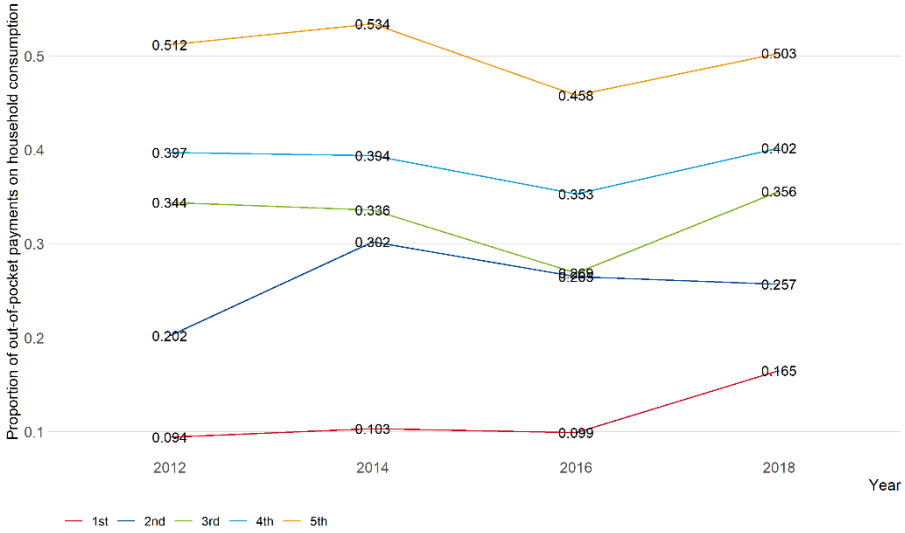
Among the households with catastrophic health spending, the 5th quintile has the largest share of total household expenses going to health (OOPs). The conclusion is the same for all years and all OOP definitions (Table 121, Figure 130).

Figure 129 – Breakdown of out-of-pocket spending by type of healthcare among households that experience catastrophic OOPs (threshold: 40%), 2012-2018



Data source: HBS 2012-2018; see Table 119 for the definitions of the health expenses categories.

Figure 130 – OOPs as a proportion of total household spending among households with catastrophic spending (threshold: 40%) by quintile of total household expenses, 2012-2018



Data source: HBS 2012-2018

Table 121 – OOPs as a share of total household expenses among households with catastrophic health spending (threshold: 40%) by quintile of total household expenses, 2012-2018

	2012	2014	2016	2018
OOP share of total expenses (value [95% confidence interval])				
1st	0.094 [0.079-0.108]	0.103 [0.084-0.123]	0.099 [0.080-0.118]	0.165 [0.131-0.199]
2nd	0.202 [0.175-0.229]	0.302 [0.262-0.342]	0.265 [0.199-0.33]	0.257 [0.213-0.301]
3rd	0.344 [0.316-0.373]	0.336 [0.292-0.380]	0.269 [0.242-0.296]	0.356 [0.299-0.412]
4th	0.397 [0.358-0.436]	0.394 [0.351-0.436]	0.353 [0.285-0.422]	0.402 [0.330-0.475]
5th	0.512 [0.420-0.603]	0.534 [0.476-0.592]	0.458 [0.407-0.509]	0.503 [0.457-0.548]
OOP share of total expenses (value [95% confidence interval])**				
1st	NA	0.103 [0.082-0.124]	0.094 [0.073-0.115]	0.150 [0.110-0.190]
2nd	NA	0.292 [0.251-0.333]	0.271 [0.192-0.349]	0.231 [0.190-0.272]
3rd	NA	0.341 [0.297-0.386]	0.275 [0.252-0.299]	0.365 [0.307-0.422]
4th	NA	0.392 [0.349-0.435]	0.372 [0.275-0.470]	0.424 [0.326-0.522]
5th	NA	0.534 [0.476-0.593]	0.470 [0.415-0.524]	0.488 [0.435-0.541]
OOP* share of total expenses (value [95% confidence interval])**				
1st	NA	0.100 [0.078-0.122]	0.093 [0.072-0.114]	0.149 [0.109-0.190]
2nd	NA	0.286 [0.236-0.337]	0.234 [0.171-0.298]	0.222 [0.184-0.259]
3rd	NA	0.341 [0.271-0.411]	0.282 [0.256-0.308]	0.342 [0.278-0.407]
4th	NA	0.395 [0.344-0.447]	0.375 [0.275-0.474]	0.418 [0.320-0.517]
5th	NA	0.542 [0.460-0.623]	0.460 [0.402-0.518]	0.449 [0.402-0.497]

*Data source: HBS 2012, 2014, 2016 & 2018; NA= Not Available; OOP**: OOPs minus sickness fund reimbursements, OOP***: OOP** and IF Hospital insurance contributions >0 THEN inpatient expenses = 0.*

The main results for the HBS are:

- **There is an increase over time in OOPs, in OOPs as a share of total household expenses (+0.6 percentage points between 2012 and 2018) and in OOPs as a share of net income (+0.1 percentage points over time).**
- **A subdivision by quintile of total household expenses shows that about 4.4% to 5.5% of total expenses is devoted to healthcare, with important variation in the categories of spending by quintile. Patients in the 1st and 2nd quintile (Q1 and Q2) spend relatively less on medical products and equipment (e.g. mainly glasses and hearing aids; 2018: 6.3% and 7.3% for Q1 and Q2, respectively) and more on medicines (2018: 37.4% and 33.8% for Q1 and Q2, respectively) and outpatient care (2018: 29.0% for both Q1 and Q2, respectively) compared to the 5th quintile (2018: 18.2% for medical products and equipment, 22.0% for medicines and 21.8% for outpatient care).**
- **Using the default WHO methodology, 4.7%, 3.9%, 5.3% and 3.8% of the households experienced catastrophic OOPs in 2012, 2014, 2016 and 2018, respectively. About 60% of households with catastrophic payments are concentrated in the 1st quintile of total household expenses, where the incidence equalled 16.2%, 11.7%, 15.8% and 8.7% in 2012, 2014, 2016 and 2018, respectively. The incidence in other quintiles was below the average.**
- **The proportion of households with catastrophic OOPs is significantly higher in the (4th and) 5th quintile compared to the 2nd and 3rd quintile. This is due to large expenses for medical products and equipment, dental care and hospital inpatient care. This is partly counterbalanced by the OOP definition that corrects for a hospital insurance.**

3.3.2. EU-SILC/IMA-AIM database

3.3.2.1. Description of the population

6 277, 5 801 and 5 902 households were included in the EU-SILC/IMA-AIM coupled database for the years 2008, 2012 and 2016. The results that are presented here use data from the EU-SILC and IMA-AIM of the corresponding years (i.e. SILC wave 2016 with IMA-AIM year 2016, etc.). As the income in EU-SILC refers to the previous year, one could alternatively have combined EU-SILC wave 2016 with IMA-AIM data from 2015 (and similarly for other waves). We have chosen to present the corresponding year, to ensure time consistency between the variables (e.g. household composition and healthcare use), to use the more recent data on healthcare use and because one could argue that income/expenses in a previous period are equally relevant for household consumption decisions as current income/expenses. Nonetheless, we checked the sensitivity of the main results on catastrophic and impoverishing OOPs to this choice (because for some households the income can change substantially over the years) and found no substantial difference in incidence rates (results available upon request).

The observed OOPs are less than half the amount in the HBS data. As with the HBS, we find an increase in average monthly out-of-pocket payments (co-payments and supplements) per household over time from € 41 in 2008 to € 45 in 2012 (annual growth rate 2008-2012 of 2.4%) and to € 56 in 2016 (annual growth rate 2012-2016 of 6.1%).

When excluding inpatient supplements (see section 3.2.2 for the definition of inpatient expenses category), OOPs increased from € 33 in 2008 to € 35 in 2012 (annual growth rate 2008-2012 of 1.5%) and to € 42 in 2016 (annual growth rate 2012-2016 of 5.0%). Inpatient supplements make up about one fifth to one quarter of out-of-pocket payments registered in the IMA-AIM database (difference between OOP^^ and OOP, see section 3.2.4 for the different OOP-definitions).

When MAB reimbursements are excluded (definition OOP^^^), OOPs increased from € 45 in 2008 to € 50 in 2012 (annual growth rate 2008-2012 of 2.8%) and to € 61 in 2016 (annual growth rate 2012-2016 of 5.5%) (Table

122). MAB reimbursements reduce OOPs on average by about € 4 to € 5, but this is of course concentrated in a small subpart of the population and in particular among lower income households (Table 125).

Despite a lower inflation in the period 2012-2016 than in 2008-2012, the growth in OOPs was more pronounced.[33] Moreover, growth rates are higher when accounting for inpatient supplements, implying a faster growth in supplements than in co-payments.

Table 122 further indicates that average expenses and income increased from 2008 onwards. Monthly income increased from € 2 681 in 2008 to € 2 952 in 2012 (annual growth rate 2008-2012 of 2.5%) and to € 3 236 in 2016 (annual growth rate 2012-2016 of 2.4%); it is higher than the household income recorded in the HBS survey (see Table 109). Total expenses imputed to the EU-SILC/IMA-AIM dataset are higher in 2016 than total expenses recorded in the HBS, and of similar magnitude in 2012 (see Table 109).

Table 122 – Main variables extracted from the EU-SILC/IMA-AIM database to calculate catastrophic and impoverishing health expenses, 2008, 2012, 2016

	2008 (N=6 277)		2012 (N=5 801)		2016 (N=5 902)	
	Weighted mean [95% confidence interval] +	N>0	Weighted mean [95% confidence interval] +	N>0	Weighted mean [95% confidence interval] +	N>0
Total expenses, monthly (in €)	2 276 [2 230-2 322]	6 277	2 483 [2 435-2 532]	5 803	2 646 [2 582-2 710]	5 902
Basic needs expenditures						
Food	354 [349-359]	6 277	387 [381-392]	5 803	415 [409-420]	5 902
Utilities	197 [195-200]	6 272	219 [216-221]	5 801	234 [231-237]	5 901
Rent	141 [131-152]	1 942	148 [136-160]	1 767	142 [126-159]	1 766
Healthcare expenditures, monthly (in €)						
OOP	41 [39-43]	6 025	45 [43-48]	5 569	56 [53-59]	5 681
OOP^^	33 [32-34]	6 025	35 [34-37]	5 569	42 [40-44]	5 681
OOP^^^	45 [43-47]	6 025	50 [48-53]	5 569	61 [57-64]	5 681
Medicines	10 [10-10]	5 739	9 [8-9]	5 329	8 [7-8]	5 443
General practitioner	4 [4-4]	5 584	4 [4-4]	5 152	3 [3-4]	5 100
Specialist care	9 [9-10]	5 571	10 [10-11]	5 187	13 [13-14]	5299
Dental care	2 [2-3]	3 711	3 [2-3]	3 378	4 [4-4]	3 664
Hospital inpatient care	11 [9-12]	1 462	13 [12-14]	1 404	16 [14-18]	1 523
Hospital day care	2 [2-2]	1 613	2 [2-3]	1 547	4 [3-4]	1 699

Nursing care	0 [0-0]	172	0 [0-0]	177	0 [0-0]	201
Other	3 [3-3]	4 551	5 [4-5]	4 279	8 [7-9]	4 579
Disposable net income, monthly (in €)	2 681 [2 604-2 758]	6 277	2 952 [2 866-3 037]	5 803	3 236 [3 142-3 330]	5 902
Household size (n)	2 [2-2]	6 277	2 [2-2]	5 803	2 [2-2]	5 902

Data source: EU-SILC/IMA-AIM; + weighted average over the population (including zero-expenses).

3.3.2.2. Out-of-pocket payments

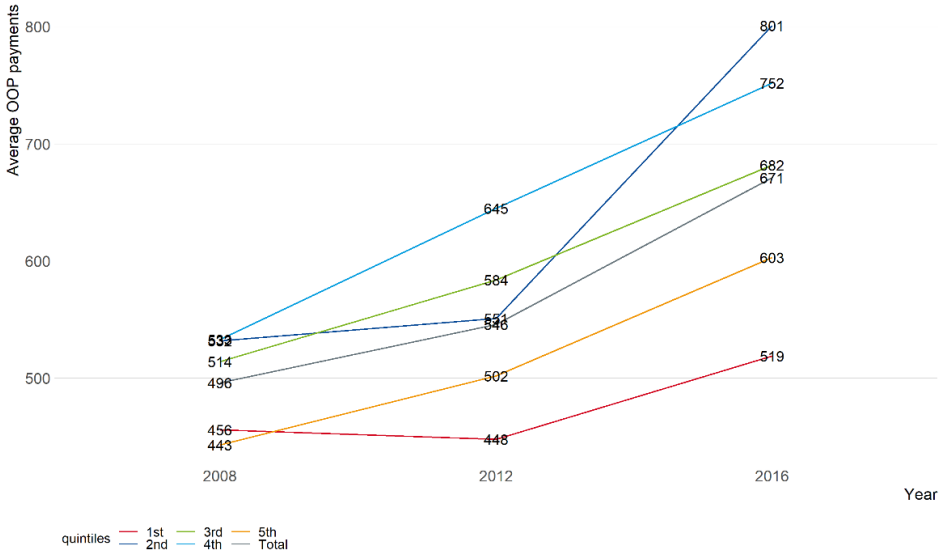
Out-of-pocket payments as a share of total household expenses

The average annual OOPs increased significantly over time from € 496 (95%CI: 472-519) to € 671 (95%CI: 633-710) (Table 123, Figure 131).

In 2016, the 2nd quintile of total household expenses reported the highest average annual OOPs (€ 801), whereas in 2008 and 2012, it was the 4th quintile of total household expenses that reported the highest OOPs. With OOP^^ (i.e. OOPs excluding the inpatient supplements) and OOP^^^ (OOPs before MAB reimbursements) adjustments, in 2016, Q2 was still the quintile that reported the highest level of OOPs. In Table 125 average annual OOPs are presented by income quintile and it shows that Q4 reported the highest annual OOPs in 2012 and 2016, whereas Q3 reported the highest OOPs in 2008.

In 2016, annual OOPs were generally significantly different between the quintiles of total household expenses, with the exception of the Q2 vs Q4, Q2 vs Q5 and Q3 vs Q4 comparisons. With OOP^^, annual OOPs were generally significantly different between the quintiles of total household expenses, with the exception of the Q2 vs Q3 and Q2 vs Q4 comparisons. With OOP^^^, annual OOPs were generally significantly different between the quintiles, with the exception of the Q1 vs Q5, Q2 vs Q4 and Q3 vs Q4 comparisons (Table 123).

Figure 131 – Average out-of-pocket payments, by quintile of total household expenses, 2008-2016



Data source: EU-SILC/IMA-AIM

The share of OOPs in total household expenses has slightly increased since 2008 (+ 0.3 percentage points). The same trend was observed with the HBS data (Figure 133). From 2008 to 2016, an increase in OOPs as a share of total household expenses is also observed by using OOP^^ (i.e. OOPs excluding inpatient supplements) and OOP^^^ (i.e. before MAB reimbursements) (OOP^^: +0.2 and OOP^^^: +0.3 percentage points) (Table 124). We observe that the system of maximum billing reduces the share of OOPs in total household expenses by about 0.2 percentage points (difference between OOP^^^ and OOP) and this reduction is more pronounced in the first and second quintile; inpatient supplements amount to 0.5 percentage point of household expenditures (difference between OOP^^ and OOP).

The OOPs as a share of total household expenses are significantly different over time (p=0.002), more specifically between 2008 and 2016 (p=0.001) and between 2012 and 2016 (p=0.002) (Table 124).

In 2016, the share of OOPs in total household expenses in the 2nd quintile amounts to 2.8% and is higher than the share in other quintiles. The share of OOPs is lowest in the 5th quintile (1.6% in 2016)). The same conclusion (but with other budget shares) is reached irrespective of the definition of OOP. In 2016, the share of OOPs in total household expenses is significantly different between the 2nd quintile (p=0.028) and all the other quintiles of total household expenses (p≤0.007) and between the 5th quintile (p=0.016) and all the other quintiles of total household expenses (p≤0.004). With OOP^^ and OOP^^^, the same significant differences are observed (Table 124).

Table 123 – Average annual out-of-pocket payments by quintile of total household expenses, by OOP definition, 2008-2016

	2008	2012	2016
Average OOP (value in € [95% confidence interval])			
1st	456 [425-487]	448 [403-493]	519 [472-565][2,3,4,5]
2nd	532 [455-609]	551 [500-602]	801 [695-907][1,3,5]
3rd	515 [473-557]	584 [535-632]	682 [622-741][1,2]
4th	533 [492-574]	645 [586-704]	752 [675-830][1,5]
5th	443 [401-484]	502 [446-558]	603 [544-663][1,2,4]
Total	496 [472-519][12,16]	546 [521-571][08,16]	671 [633-710][08,12]
Average OOP^^ (value in € [95% confidence interval])			
1st	386 [362-410]	362 [335-389]	409 [379-439][2,3,4,5]
2nd	417 [391-442]	447 [404-489]	580 [512-648][1,5]
3rd	422 [397-447]	461 [434-487]	516 [484-547][1,5]
4th	409 [386-433]	463 [433-493]	560 [516-604][1,5]
5th	343 [318-368]	378 [347-409]	453 [416-490][1,2,3,4]

Total	395 [382-409]	422 [406-439]	503 [479-528]
Average OOP^^^ (value in € [95% confidence interval])			
1st	524 [485-563]	520 [466-574]	594 [538-651][2,3,4]
2nd	590 [509-671]	616 [559-674]	884 [771-998][1,3,5]
3rd	570 [521-620]	663 [604-721]	739 [675-804][1,2,5]
4th	576 [531-622]	689 [624-754]	800 [715-885][1,5]
5th	458 [413-503]	529 [467-591]	623 [561-685][2,3,4]
Total	544 [518-569]	603 [575-632]	728 [686-770]

Data source: EU-SILC/IMA-AIM; OOP^^ excluding the inpatient supplements; OOP^^^ before MAB reimbursements. Significant differences (p<0.05): [08] – significantly different from results in 2008; [12] – significantly different from results in 2012; [16] – significantly different from results in 2016; 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5.

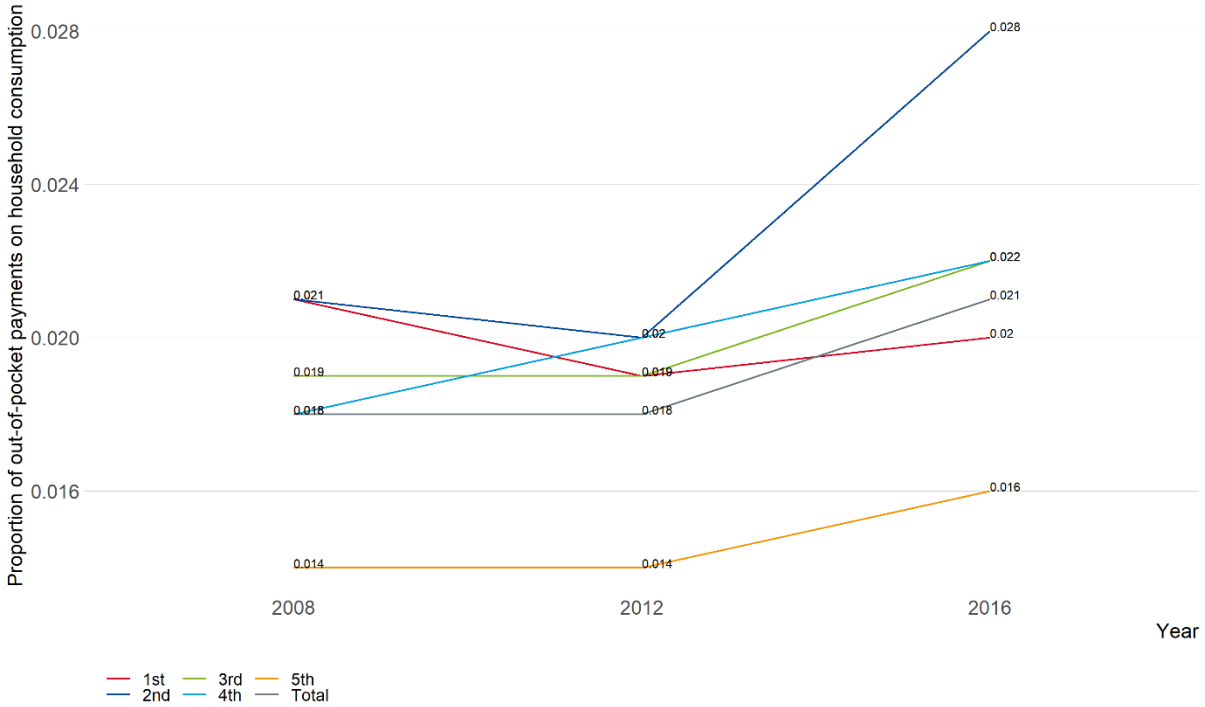
Table 124 – Out-of-pocket spending as a share of total household expenses by quintile of total household expenses, by OOP definition, 2008, 2012, 2016

	2008	2012	2016
Proportion OOP/total expenses (value [95% confidence interval])			
1st	0.021 [0.020-0.023]	0.019 [0.017-0.021]	0.020 [0.018-0.022][2,5]
2nd	0.021 [0.018-0.024]	0.020 [0.018-0.022]	0.028 [0.024-0.031][1,3,4,5]
3rd	0.019 [0.017-0.020]	0.019 [0.018-0.021]	0.022 [0.020-0.023][2,5]
4th	0.018 [0.016-0.019]	0.020 [0.018-0.021]	0.022 [0.020-0.025][2,5]
5th	0.014 [0.012-0.015]	0.014 [0.013-0.016]	0.016 [0.014-0.017][1,2,3,4]
Total	0.018 [0.017-0.019][16]	0.018 [0.018-0.019][16]	0.021 [0.020-0.022][08,12]
Proportion OOP^^/total expenses (value [95% confidence interval])			
1st	0.018 [0.017-0.019]	0.015 [0.014-0.016]	0.016 [0.015-0.017] [2,5]
2nd	0.016 [0.016-0.017]	0.016 [0.015-0.018]	0.020 [0.018-0.022] [1,3,4,5]
3rd	0.015 [0.015-0.016]	0.015 [0.014-0.016]	0.016 [0.015-0.017] [2,5]
4th	0.014 [0.013-0.014]	0.014 [0.013-0.015]	0.017 [0.015-0.018] [2,5]
5th	0.010 [0.010-0.011]	0.011 [0.010-0.012]	0.012 [0.011-0.013] [1,2,3,4]

Total	0.014 [0.014-0.015]	0.014 [0.014-0.015]	0.016 [0.015-0.017]
Proportion OOP^^^/total expenses (value [95% confidence interval])			
1st	0.025 [0.023-0.026]	0.022 [0.020-0.024]	0.023 [0.021-0.025] [2,5]
2nd	0.023 [0.020-0.026]	0.022 [0.020-0.024]	0.031 [0.027-0.034] [1,3,4,5]
3rd	0.021 [0.019-0.023]	0.022 [0.020-0.024]	0.023 [0.021-0.025] [2,5]
4th	0.019 [0.018-0.021]	0.021 [0.019-0.023]	0.024 [0.021-0.026] [2,5]
5th	0.014 [0.013-0.015]	0.015 [0.013-0.017]	0.016 [0.014-0.018] [1,2,3,4]
Total	0.020 [0.019-0.021]	0.020 [0.019-0.021]	0.023 [0.022-0.024]

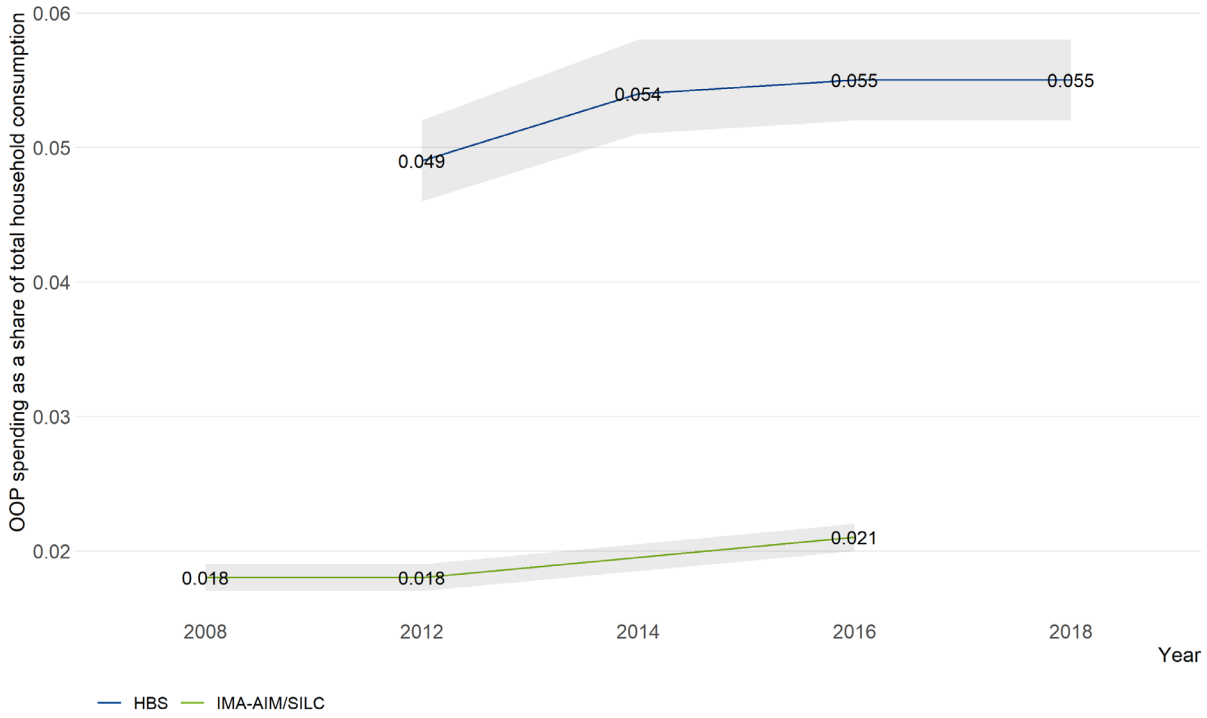
Data source: EU-SILC/IMA-AIM; OOP^^ excluding the inpatient supplements; OOP^^^ before MAB reimbursements. Significant differences (p<0.05): [08] – significantly different from results in 2008; [12] – significantly different from results in 2012; [16] – significantly different from results in 2016; 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5.

Figure 132 – Proportion of out-of-pocket payments in total household expenses, by quintile of total household expenses, 2008-2016



Data source: EU-SILC/IMA-AIM

Figure 133 – Out-of-pocket spending as a proportion of total household expenses by data source and by year



Data source: EU-SILC/IMA-AIM and HBS

Out-of-pocket payments as a share of net income

In Table 125, out-of-pocket payments are related to total household income. There was a stable evolution of OOPs as share of household income between 2008 and 2016 (+ 0.2 percentage points) without significant effect over time (p=0.692), as was the case for the HBS results. The proportion of OOPs in total income slightly decreased for the 1st income quintile (-0.4 percentage points) between 2008 and 2016, related to a faster growth in income than OOP. It remained constant or increased for the other income quintiles. A similar trend is observed when applying the OOP adjustments (OOP^^ and OOP^^^).

Moreover, Table 125 indicates that inpatient supplements (difference between OOP^^ and OOP) are concentrated in income quintiles 2 to 5, but inpatient supplements in Q1 (on average about € 110 per year in 2016) are not small and likely not covered through hospital insurance. They may constitute a financial barrier for households at risk of poverty.

In 2016, the proportion of OOPs in total income was significantly different between the income quintiles ($p<0.001$). The differences of proportion of OOPs in total household income were significant for all pairwise income quintile comparisons, except for the Q1 vs Q2 and Q1 vs Q3 comparisons. With OOP^^ and OOP^^^, the same conclusions hold (Table 125).

Figure 134 shows that the share of OOPs in total household net income and in total household expenses follow the same stable trend over time.

Table 125 – OOPs as a proportion of total net household income, by income quintile, by OOP definition, 2008-2016

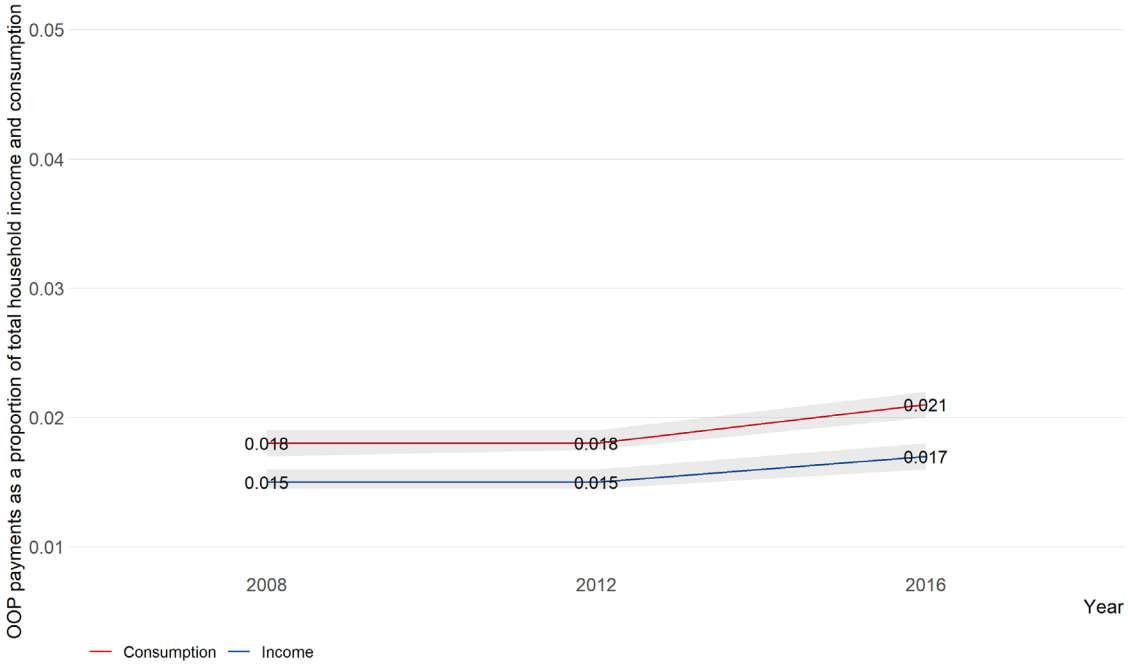
	2008	2012	2016
Weighted Mean Income			
1st	16 269	18 058	19 954
2nd	21 917	23 407	25 084
3rd	30 229	33 224	35 669
4th	38 029	42 555	47 142
5th	54 434	59 868	66 323
Total	32 174	35 419	38 831
Weighted Mean OOP			
1st	435	407	449
2nd	485	492	647
3rd	563	648	733
4th	546	658	857
5th	449	526	672
Total	496	546	671
Weighted Mean OOP^^			
1st	346	326	362
2nd	400	396	491
3rd	451	502	564
4th	429	488	597
5th	350	398	503

Total	395	422	503
Weighted Mean OOP^^^			
1st	494	481	522
2nd	566	588	746
3rd	626	720	789
4th	574	693	897
5th	458	534	688
Total	544	603	728
Proportion OOP/total households income (value [95% confidence interval])			
1st	0.027 [0.023-0.031]	0.023 [0.020-0.025]	0.023 [0.020-0.025][4,5]
2nd	0.022 [0.020-0.024]	0.021 [0.019-0.023]	0.026 [0.023-0.029][3,4,5]
3rd	0.019 [0.017-0.020]	0.019 [0.018-0.021]	0.021 [0.019-0.023][2,4,5]
4th	0.014 [0.013-0.016]	0.015 [0.014-0.017]	0.018 [0.016-0.020][1,2,3,5]
5th	0.008 [0.007-0.009]	0.009 [0.008-0.010]	0.010 [0.009-0.011][1,2,3,4]
Total	0.015 [0.015-0.016]	0.015 [0.015-0.016]	0.017 [0.016-0.018]
Proportion OOP^^/total households income (value [95% confidence interval])			
1st	0.021 [0.020-0.023]	0.018 [0.017-0.019]	0.018 [0.016-0.020][4,5]
2nd	0.018 [0.017-0.019]	0.017 [0.016-0.018]	0.020 [0.017-0.022][3,4,5]
3rd	0.015 [0.014-0.016]	0.015 [0.014-0.016]	0.016 [0.015-0.017][2,4,5]
4th	0.011 [0.011-0.012]	0.011 [0.011-0.012]	0.013 [0.012-0.013][1,2,3,5]
5th	0.006 [0.006-0.007]	0.007 [0.006-0.007]	0.008 [0.007-0.008][1,2,3,4]
Total	0.012 [0.012-0.013]	0.012 [0.011-0.012]	0.013 [0.012-0.014]
Proportion OOP^^^/total households income (value [95% confidence interval])			
1st	0.03 [0.026-0.035]	0.027 [0.024-0.029]	0.026 [0.023-0.029][4,5]
2nd	0.026 [0.024-0.028]	0.025 [0.023-0.027]	0.030 [0.026-0.033][3,4,5]
3rd	0.021 [0.019-0.022]	0.022 [0.02-0.024]	0.022 [0.020-0.024][2,4,5]

4th	0.015 [0.014-0.016]	0.016 [0.015-0.018]	0.019 [0.017-0.021][1,2,3,5]
5th	0.008 [0.008-0.009]	0.009 [0.008-0.01]	0.010 [0.009-0.011][1,2,3,4]
Total	0.017 [0.017-0.018]	0.017 [0.017-0.018]	0.019 [0.018-0.020]

Data source: EU-SILC/IMA-AIM; OOP^^ excluding the inpatient supplements; OOP^^^ before MAB reimbursements, Significant differences (p<0.05): 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5.

Figure 134 – Out-of-pocket payments as a proportion of total household income and total household expenses, 2008-2016



Data source: EU-SILC/IMA-AIM

Out-of-pocket payments by type of healthcare

In 2016, the majority of OOPs were related to hospital inpatient care (29.1%), specialist care (24.1%) and medicines (13.5%). In 2008, the top 3 categories were the same. Between 2016 and 2008, the proportion of OOPs related to dental care, specialist care, hospital care, nursing care and other healthcare increased, whereas the proportion of OOPs related to the general practitioner (GP) and medicines decreased (Table 126, Figure 135). The share of OOPs related to GP care decreased more importantly in the lower quintiles (Q1 and Q2). The decreasing evolution in the share of OOPs for medication (nearly a 50% reduction between 2008 and 2016 in all quintiles) is opposite to the results from the HBS indicating a stable trend over time. This suggests that while expenses for medication reimbursed by the public health insurance might have relatively reduced over time, expenses related to over-the-counter drugs have increased.

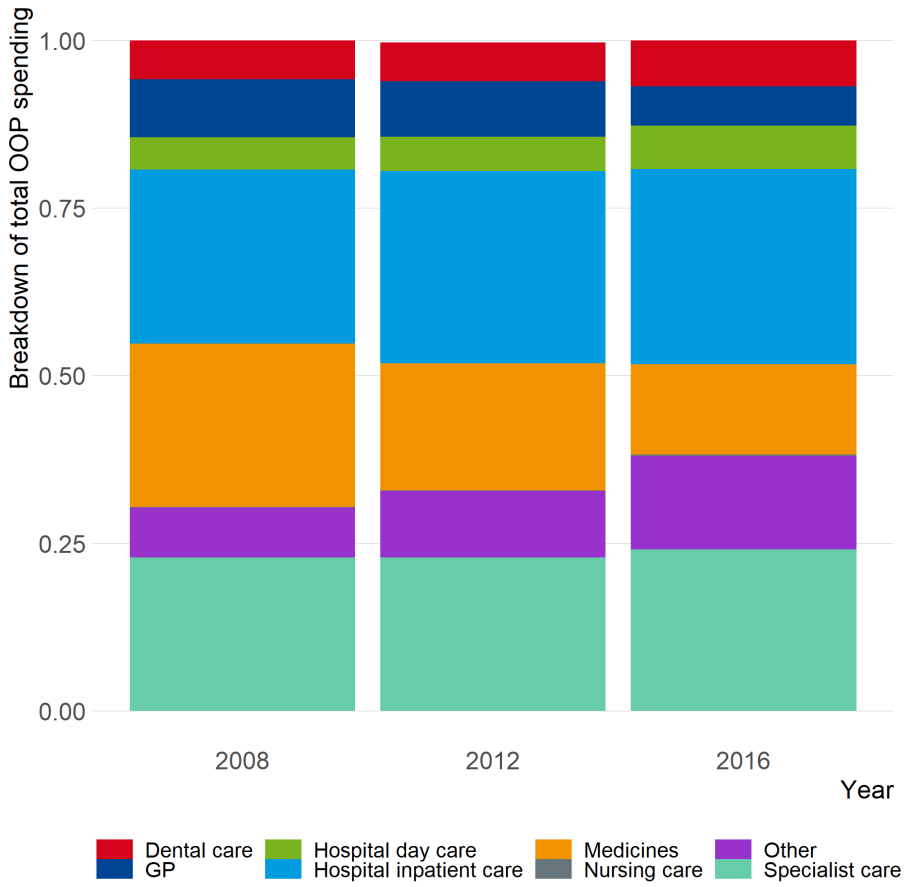
In contrast with the HBS results, the top three categories of OOPs do not vary across quintiles of total household expenses. Overall, the lowest quintiles (Q1 and Q2) reported fewer dental care and day hospitalisation expenses than the highest quintiles (Q4 and Q5). The lowest quintiles also reported more expenses for medicines compared to the highest quintiles (Table 126).

Table 126 – Breakdown of total out-of-pocket spending by type of healthcare, by quintile of total household expenses, 2008-2016

	1st			2nd			3rd			4th			5th			Total		
	2008	2012	2016	2008	2012	2016	2008	2012	2016	2008	2012	2016	2008	2012	2016	2008	2012	2016
Medicines	27.1%	21.4%	15.8%[4,5]	24.9%	20.8%	12.5%[4,5]	24.8%	18.6%	14.3%[4,5]	22.8%	17.3%	12.7%[1,2,3]	22.2%	17.3%	13.0%[1,2,3]	24.4%	18.9%	13.5%
General practitioner	9.7%	8.5%	5.9%[3,4]	8.4%	9.0%	5.5%	9.4%	8.8%	6.2%[1]	8.3%	7.8%	5.9%[1,5]	7.6%	7.6%	5.4%[5]	8.7%	8.3%	5.8%
Specialist care	22.1%	21.7%	24.9%	20.6%	21.6%	20.1%[4,5]	24.1%	24.4%	24.5%[4,5]	23.0%	22.6%	25.7%[2,3]	24.9%	24.2%	26.1%[2,3]	22.9%	22.9%	24.1%
Dental care	5.1%	5.0%	5.5%[2,3,4,5]	5.5%	5.8%	5.6%[1,3,4,5]	6.3%	5.8%	7.8%[1,2,5]	6.0%	6.5%	7.5%[1,2,5]	6.2%	5.8%	8.2%[1,2,3,4]	5.8%	5.8%	6.9%
Hospital inpatient care	22.7%	26.3%	27.9%[4,5]	27.2%	24.6%	33.4%[3,4,5]	22.9%	27.1%	25.8%[2,5]	29.0%	33.7%	29.1%[1,2]	27.6%	30.7%	28.1%[1,2,3]	25.9%	28.7%	29.1%
Hospital day care	4.4%	5.6%	5.0%	4.4%	5.7%	4.8%	4.9%	5.1%	9.9%	4.6%	4.5%	5.8%	5.7%	4.9%	7.2%	4.8%	5.1%	6.5%
Nursing care	0.2%	0.2%	0.1%	0.1%	0.1%	0.3%	0.2%	0.1%	0.2%	0.1%	0.1%	0.1%	0.0%	0.2%	0.3%	0.1%	0.1%	0.2%
Other	8.7%	11.0%	14.8%	8.9%	12.4%	17.8%	7.3%	10.0%	11.2%	6.2%	7.5%	13.3%	5.7%	9.3%	11.7%	7.4%	9.9%	13.9%

Data source: EU-SILC/IMA-AIM; Significant differences (p<0.05): 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5.

Figure 135 – Breakdown of total out-of-pocket payments by type of healthcare spending, 2008-2016



Data source: EU-SILC/IMA-AIM

In 2016, there is a significant difference of OOPs for dental care between all quintiles of total household expenses (p≤ 0.035), except between Q3 and Q4; for general practitioner care between Q1 vs Q3 (p=0.005), Q1 vs Q4 (p=0.001) and Q4 vs Q5 (p=0.044); for specialist care between Q2 vs Q4 (p<0.001), Q2 vs Q5 (p=0.015), Q3 vs Q4 (p=0.002) and Q3 vs Q5 (p=0.049), for hospital inpatient care between Q1 vs Q4 (p=0.026), Q1 vs Q5 (p<0.001), Q2 vs Q3 (p=0.010), Q2 vs Q4 (p=0.001), Q2 vs Q5 (p<0.001) and Q3 vs Q5 (p=0.028) and for medicines between Q1 vs Q4 (0.002), Q1 vs Q5 (p<0.001), Q2 vs Q4 (p<0.001), Q2 vs Q5 (p<0.001), Q3 vs Q4 (p=0.028), Q3 vs Q5 (p<0.001) (Table 126).

3.3.2.3. How many households experience financial hardship?

Households with (further) impoverishing OOPs

Table 127 and Figure 136 indicate that the share of households that are further impoverished and at risk of impoverishment after OOPs remained stable between 2008 and 2016 (further impoverished: 2008: 1.2%; 2016: 1.1%; impoverished: 2012: 0.02%; 2016: 0.02%). The same conclusion holds for OOP^^ and OOP^^^ adjustments. In 2016, the proportion of households that are further impoverished, impoverished and at risk of impoverishment reported in the HBS results (3.9% of the households, Figure 124) is slightly higher than what we observed in the EU-SILC/IMA-AIM results (3.2% of the households, Figure 136).

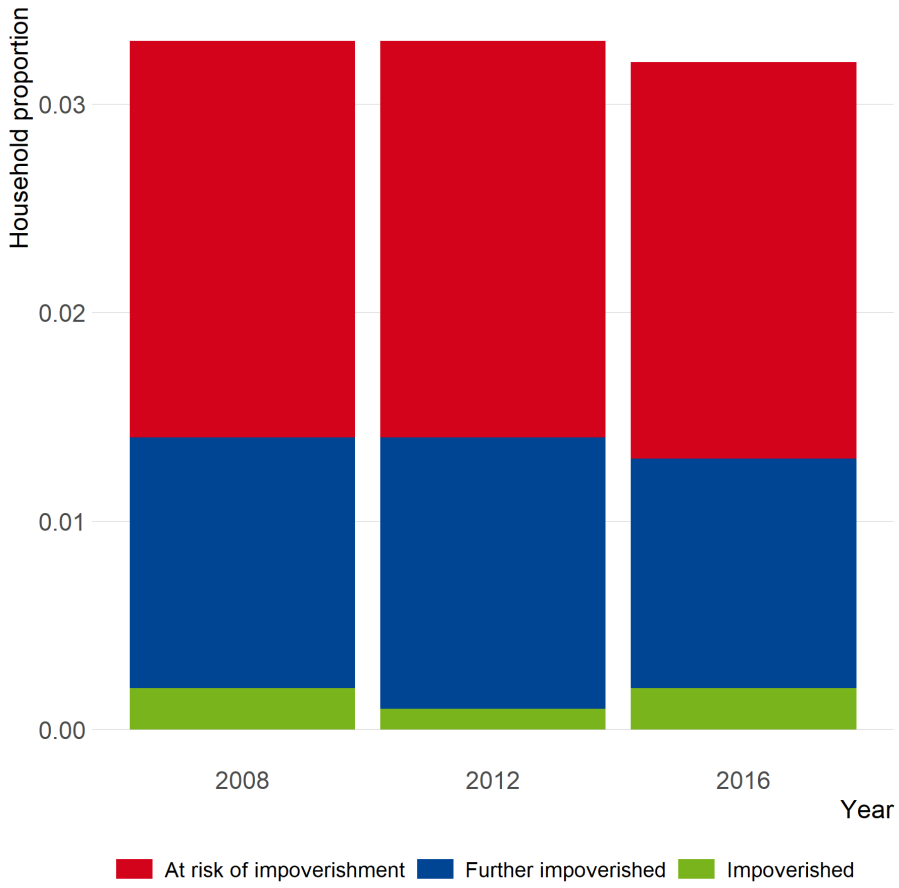
Moreover, when using the annual data from EU-SILC/IMA-AIM, the fraction of individuals without OOPs is much smaller, about 4% of the population, compared to the 17% (in 2016) to 32% (in 2018) observed in the HBS database (Table 115).

Table 127 – Share of households by impoverishment group, by OOP definition, 2008-2016

	2008	2012	2016
OOP, share of households			
Further impoverished	0.012 [0.009-0.016]	0.013 [0.009-0.017]	0.011 [0.008-0.016]
Impoverished	0.002 [0.001-0.004]	0.001 [0.000-0.002]	0.002 [0.001-0.003]
At-risk of impoverishment	0.019 [0.016-0.024]	0.019 [0.015-0.024]	0.019 [0.014-0.024]
Not at-risk of impoverishment	0.924 [0.913-0.934]	0.924 [0.912-0.935]	0.931 [0.918-0.943]
No OOPs	0.042 [0.035-0.05]	0.044 [0.036-0.053]	0.037 [0.029-0.046]
OOP^^, share of households			
Further impoverished	0.012 [0.009-0.016]	0.013 [0.009-0.017]	0.011 [0.008-0.016]
Impoverished	0.002 [0.001-0.003]	0.001 [0.000-0.002]	0.002 [0.001-0.003]
At-risk of impoverishment	0.019 [0.015-0.024]	0.018 [0.014-0.023]	0.018 [0.014-0.024]
Not at-risk of impoverishment	0.925 [0.914-0.935]	0.925 [0.913-0.936]	0.932 [0.918-0.944]
No OOPs	0.042 [0.035-0.050]	0.044 [0.036-0.053]	0.037 [0.029-0.046]
OOP^^^, share of households			
Further impoverished	0.012 [0.009-0.016]	0.013 [0.009-0.017]	0.011 [0.008-0.016]
Impoverished	0.003 [0.002-0.004]	0.002 [0.001-0.004]	0.002 [0.001-0.004]
At-risk of impoverishment	0.020 [0.016-0.025]	0.019 [0.015-0.024]	0.020 [0.015-0.025]
Not at-risk of impoverishment	0.923 [0.912-0.933]	0.923 [0.911-0.934]	0.930 [0.916-0.942]
No OOPs	0.042 [0.035-0.050]	0.044 [0.036-0.053]	0.037 [0.029-0.046]

Data source: EU-SILC/IMA-AIM; OOP^^ excluding the inpatient supplements; OOP^^^ before MAB reimbursements

Figure 136 – Proportion of households at risk of impoverishment, further impoverished and impoverished after out-of-pocket payments, 2008-2016



Data source: EU-SILC/IMA-AIM

Households with catastrophic out-of-pocket payments

Table 128 indicates that the proportion of households with catastrophic out-of-pocket payments is stable over time at about 2.0% when applying the 40% threshold and about double as high when applying the 20% threshold. There is a small upward trend between 2012 and 2016 when using a 20%, 25%, and 30% threshold (Figure 137). This trend differs from the one that was observed with the HBS data (Figure 138). The incidence of catastrophic OOPs is lower when inpatient supplements are excluded (OOP^^), in particular when applying the 20% and 25% threshold (Table 128).

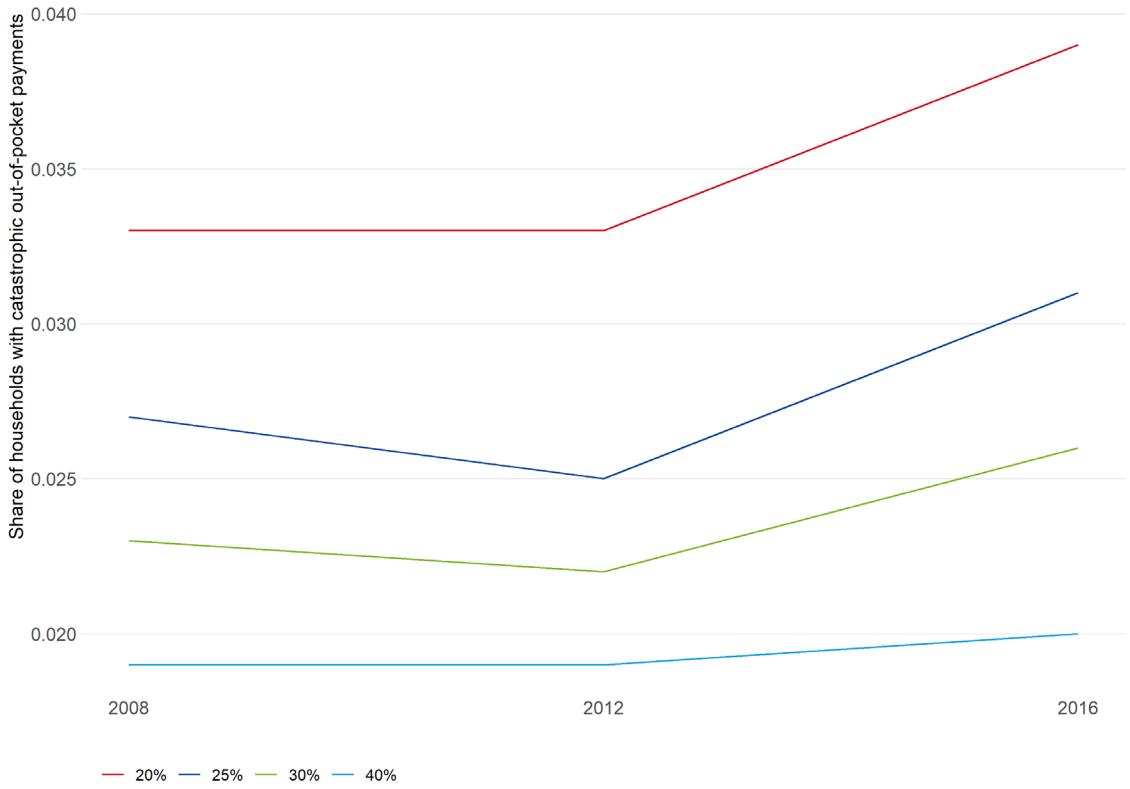


Table 128 – Proportion of households with catastrophic out-of-pocket payments (thresholds 20%, 25%, 30% and 40%), by OOP definition, 2008-2016

	2008	2012	2016
OOP, share of households (value [95% confidence interval])			
Thr 20%	0.033 [0.028-0.040]	0.033 [0.028-0.040]	0.039 [0.033-0.046]
Thr 25%	0.027 [0.022-0.033]	0.025 [0.021-0.031]	0.031 [0.026-0.037]
Thr 30%	0.023 [0.019-0.028]	0.022 [0.018-0.028]	0.026 [0.021-0.032]
Thr 40%	0.019 [0.016-0.024]	0.019 [0.015-0.024]	0.020 [0.016-0.026]
OOP^^, share of households (value [95% confidence interval])			
Thr 20%	0.024 [0.020-0.030]	0.021 [0.016-0.027]	0.023 [0.018-0.029]
Thr 25%	0.021 [0.017-0.026]	0.018 [0.014-0.023]	0.021 [0.016-0.026]
Thr 30%	0.019 [0.016-0.024]	0.016 [0.012-0.021]	0.019 [0.014-0.024]
Thr 40%	0.018 [0.014-0.022]	0.015 [0.011-0.020]	0.017 [0.013-0.022]
OOP^^^, share of households (value [95% confidence interval])			
Thr 20%	0.044 [0.038-0.051]	0.042 [0.036-0.05]	0.047 [0.041-0.054]
Thr 25%	0.033 [0.028-0.040]	0.031 [0.027-0.037]	0.036 [0.030-0.043]
Thr 30%	0.028 [0.023-0.034]	0.026 [0.021-0.031]	0.030 [0.025-0.036]
Thr 40%	0.022 [0.018-0.027]	0.021 [0.017-0.027]	0.023 [0.018-0.029]

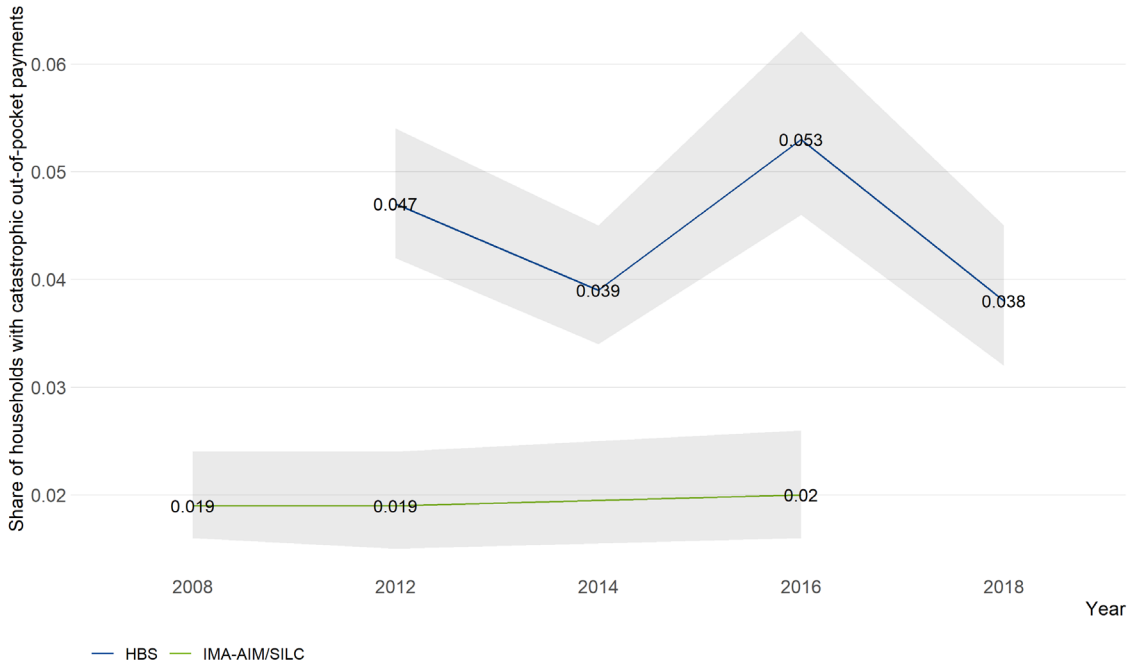
Data source: EU-SILC/IMA-AIM; OOP^^ excluding the inpatient supplements; OOP^^^ before MAB reimbursements

Figure 137 – Share of households with catastrophic out-of-pocket payments (thresholds 20%, 25%, 30% and 40%), 2008-2016



Data source: EU-SILC/IMA-AIM

Figure 138 – Share of households with catastrophic out-of-pocket payments (thresholds 40%), by data source



Data source: EU-SILC/IMA-AIM and HBS

3.3.2.4. Who experiences financial hardship?

Households by quintile of total household expenses

Table 129 shows the proportion of households with catastrophic OOPs (threshold 40%). In 2008, 2012 and 2016, this proportion is overall much lower than in the HBS data. It is higher in the 1st quintile than in the 5th quintile. In the 5th quintile, hardly any household experienced catastrophic OOPs. In 2008 and 2012 nearly all households with catastrophic payments are concentrated in the bottom quintile, whereas in 2016 catastrophic spending occurs also in other quintiles, albeit to a limited extent. The same is true for OOP^^, i.e. OOPs excluding inpatient supplements and for OOP^^^, i.e. OOPs before MAB reimbursements.

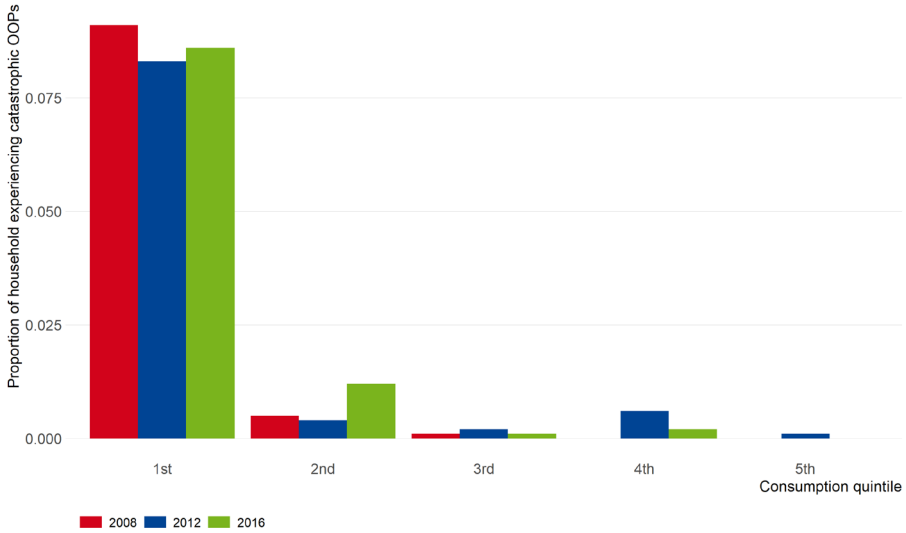
The results from the EU-SILC/IMA-AIM data suggest that the catastrophic OOPs in the higher quintiles of total household expenses (Q3 to Q5) that are found in the HBS (see Table 117) are not solely the result of healthcare expenses covered by the public health insurance, but of non-covered expenses (on top of the covered expenses).

Table 129 – Share of households experiencing catastrophic (threshold 40%) OOPs, by OOP definition, by quintile of total household expenses, 2008-2016

	2008	2012	2016
OOP, share of households (value [95% confidence interval])			
1st	0.091 [0.072-0.110]	0.083 [0.064-0.102]	0.086 [0.065-0.107][2,3,4,5]
2nd	0.005 [0.001-0.010]	0.004 [0.000-0.008]	0.012 [0.005-0.019][1,3,4,5]
3rd	0.001 [0.000-0.002]	0.002 [-0.001-0.005]	0.001 [-0.001-0.003][1,2]
4th	0.000 [0.000-0.001]	0.006 [0.001-0.010]	0.002 [-0.001-0.004][1,2]
5th	0.000 [0.000-0.000]	0.001 [-0.001-0.002]	0.000 [0.000-0.000][1,2]
Total	0.019 [0.016-0.024]	0.019 [0.015-0.024]	0.020 [0.016-0.026]
OOP^^, share of households (value [95% confidence interval])			
1st	0.085 [0.067-0.103]	0.073 [0.055-0.091]	0.081 [0.060-0.101]
2nd	0.003 [-0.001-0.007]	0.002 [-0.002-0.006]	0.004 [0.000-0.007]
3rd	0.000 [0.000-0.000]	0.000 [0.000-0.000]	0.000 [0.000-0.000]
4th	0.000 [0.000-0.000]	0.000 [0.000-0.000]	0.000 [0.000-0.000]
5th	0.000 [0.000-0.000]	0.000 [0.000-0.000]	0.000 [0.000-0.000]
Total	0.018 [0.014-0.022]	0.015 [0.011-0.020]	0.017 [0.013-0.022]
OOP^^^, share of households (value [95% confidence interval])			
1st	0.096 [0.077-0.115]	0.090 [0.071-0.110]	0.091 [0.070-0.112][2,3,4,5]
2nd	0.009 [0.003-0.015]	0.005 [0.000-0.010]	0.019 [0.009-0.028][1,3,4,5]
3rd	0.003 [0.000-0.005]	0.004 [0.000-0.008]	0.002 [0.000-0.004][1,2]
4th	0.001 [-0.001-0.003]	0.007 [0.002-0.012]	0.002 [0.000-0.005][1,2]
5th	0.000 [0.000-0.000]	0.001 [-0.001-0.002]	0.001 [-0.001-0.003][1,2]
Total	0.022 [0.018-0.027]	0.021 [0.017-0.027]	0.023 [0.018-0.029]

Data source: EU-SILC/IMA-AIM; Significant differences (p<0.05): 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5.

Figure 139 – Proportion of households experiencing catastrophic (threshold 40%) OOPs, by quintile of total household expenses, 2008-2016



Data source: EU-SILC/IMA-AIM

Households by income quintile

Table 130 shows the proportion of households with catastrophic out-of-pocket payments subdivided by income quintile when using household income instead of total expenses as metric for the household's financial means. The incidence of catastrophic payments is similar in magnitude as when using household expenses and fluctuates between 2.7% and 3.3% in the period 2008-2016. In correspondence with the analysis using household expenses (Table 129), the proportion of households facing catastrophic out-of-pocket payments in the 1st income quintile is substantially higher than the proportion in all other quintiles.

When income is used as proxy for the household's financial resources, the proportion of households experiencing catastrophic expenditures is generally higher.

Reimbursements through the MAB are not very effective in reducing the incidence of catastrophic payments in the 1st income quintile (incidence catastrophic OOP^^^ in 2016 is 12.6% versus 12.3% for catastrophic OOP). This is at least partly related to the way catastrophic OOPs are calculated, i.e. for individuals with an income below the basic needs line, all positive OOPs are considered catastrophic (individuals defined as further impoverished). Hence a reduction in magnitude from OOP^^^ to OOP does not affect the catastrophic nature of payments for this group of individuals.

Table 130 – Proportion of households experiencing catastrophic (threshold 40%) out-of-pocket payments by income quintile, by OOP definition, 2008-2016

	2008	2012	2016
OOP, share of households (value [95% confidence interval])			
1st	0.158 [0.134-0.134]	0.155 [0.132-0.179]	0.123 [0.099-0.148]
2nd	0.006 [0.002-0.002]	0.004 [0.000-0.008]	0.011 [0.004-0.018]
3rd	0.001 [-0.001--0.001]	0.007 [0.001-0.013]	0.002 [0.000-0.005]
4th	0.000 [0.000-0.000]	0.002 [-0.001-0.004]	0.000 [0.000-0.000]
5th	0.000 [0.000-0.000]	0.000 [0.000-0.000]	0.000 [0.000-0.000]
Total	0.033 [0.027-0.039]	0.034 [0.028-0.040]	0.027 [0.021-0.034]
OOP^^, share of households (value [95% confidence interval])			
1st	0.148 [0.124-0.172]	0.147 [0.124-0.17]	0.114 [0.09-0.138]
2nd	0.001 [-0.001-0.003]	0.000 [0.000-0.000]]	0.003 [-0.001-0.007]
3rd	0.000 [0.000-0.000]	0.002 [-0.002-0.006]	0.000 [0.000-0.000]
4th	0.000 [0.000-0.000]	0.000 [0.000-0.000]	0.000 [0.000-0.000]
5th	0.000 [0.000-0.000]	0.000 [0.000-0.000]	0.000 [0.000-0.000]
Total	0.030 [0.024-0.035]	0.030 [0.024-0.036]	0.024 [0.018-0.030]
OOP^^^, share of households (value [95% confidence interval])			
1st	0.164 [0.139-0.188]	0.159 [0.136-0.183]	0.126 [0.101-0.151]
2nd	0.011 [0.004-0.018]	0.008 [0.003-0.014]	0.015 [0.006-0.024]
3rd	0.004 [0.000-0.008]	0.007 [0.001-0.013]	0.003 [0.000-0.006]
4th	0.000 [0.000-0.001]	0.003 [0.000-0.006]	0.001 [-0.001-0.003]
5th	0.000 [0.000-0.000]	0.000 [0.000-0.000]	0.000 [0.000-0.000]
Total	0.036 [0.030-0.042]	0.036 [0.029-0.042]	0.029 [0.023-0.035]

Data source: EU-SILC/IMA-AIM; OOP^^ excluding the inpatient supplements; OOP^^^ before MAB reimbursements.

3.3.2.5. *Which healthcare services are responsible for financial hardship?*

Table 131 provides a breakdown of healthcare expenses for the subgroup experiencing catastrophic OOPs subdivided by quintile of total household expenses. Remark that this subgroup is limited in number and hence the results show important variation between years partly because of the small sample size. For the interpretation of the results in Q3 to Q5, it is important to note that nearly no households experienced catastrophic OOP^^, i.e. OOPs without accounting for hospital inpatient supplements. In 2016, most of the OOPs among households with catastrophic OOPs are related to hospital inpatient care (53.4%), other healthcare (33.2%) and specialist care (6.3%). The top 3 of most important healthcare categories among households experiencing catastrophic OOPs was the same for 2012 and 2008 (Table 131, Figure 140).

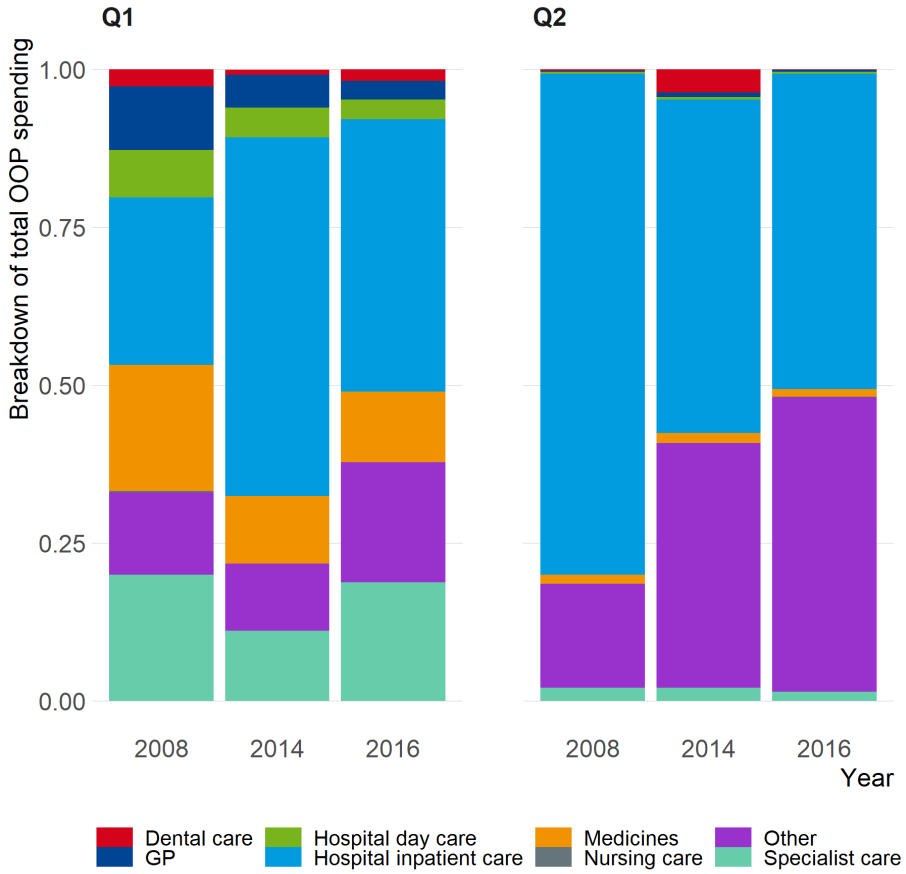
Expenses related to hospital inpatient care were the most important category of healthcare consumption in all quintiles of total household expenses (Table 131). But this should be interpreted with caution, given that this results are mainly driven by inpatient supplements, especially in Q3-Q5. However, as with the HBS data, the 1st quintile of total household expenses reported a higher fraction of expenses related to medication than the other quintiles. The 1st quintile also reported higher expenses related to GP and specialist care (Table 131).

Table 131 – Breakdown of out-of-pocket spending by type of healthcare among households that experience catastrophic OOPs (threshold: 40%), by quintile of total household expenses, 2008-2016

	1st			2nd			3rd			4th			5th			Total		
	2008	2012	2016	2008	2012	2016	2008	2012	2016	2008	2012	2016	2008	2012	2016	2008	2012	2016
Medicines	20.0%	10.7%	11.2%[2,3,4,5]	1.5%	1.6%	1.2%[1,5]	3.8%	0.8%	2.6%[1]	3.2%	1.0%	1.1%[1]	0.0%	2.1%	0.0%[1,5]	9.4%	5.1%	4.0%
General practitioner	10.1%	5.2%	3.0%[2,3,4,5]	0.2%	0.7%	0.3%[1,3,4,5]	0.4%	1.0%	0.3%[1,2]	0.3%	0.4%	0.4%[1,2]	0.0%	0.6%	0.0%[1,2]	4.3%	2.5%	1.1%
Specialist care	20.0%	11.1%	18.8%[2,3,4,5]	2.1%	2.1%	1.4%[1,5]	2.9%	1.7%	4.0%[1]	5.3%	2.3%	1.5%[1]	0.0%	2.3%	0.0%[1,2]	9.8%	5.8%	6.3%
Dental care	2.7%	0.8%	1.8%	0.2%	3.7%	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	1.2%	1.0%	0.6%
Hospital inpatient care	26.5%	56.8%	43.1%[2,3,4,5]	79.3%	52.8%	49.9%[1,3,5]	72.3%	95.5%	88.9%[1,2]	78.6%	95.2%	90.7%[1]	0.0%	95.0%	0.0%[1,2]	56.8%	72.4%	53.4%
Hospital day care	7.5%	4.7%	3.1%[2,3,4,5]	0.3%	0.4%	0.3%[1]	20.0%	0.5%	4.0%[1]	0.0%	0.2%	2.3%[1]	0.0%	0.0%	0.0%[1]	4.4%	2.1%	1.4%
Nursing care	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Other	13.0%	10.6%	19.0%[2,3,4,5]	16.4%	38.7%	46.7%[1,3,4,5]	0.5%	0.4%	0.2%[1,2]	12.6%	0.9%	3.5%[1,2]	0.0%	0.0%	0.0%[1,2]	14.0%	11.2%	33.2%

Data source: EU-SILC/IMA-AIM; Significant differences (p<0.05): 1 – significantly different from quintile 1; 2 – significantly different from quintile 2; 3 – significantly different from quintile 3; 4 – significantly different from quintile 4; 5 – significantly different from quintile 5.

Figure 140 – Breakdown of out-of-pocket spending by type of healthcare among households that experience catastrophic OOPs in 1st and 2nd quintiles of total household expenses (threshold: 40%), 2012-2016



Data source: EU-SILC/IMA-AIM

3.3.2.6. How much financial hardship?

Among the households with catastrophic spending, the 1st quintile has the lowest proportion of OOPs in total expenses (Table 132).

Table 132 indicates that individuals in the 1st quintile of total household expenses with catastrophic OOPs have a share of healthcare OOPs in total household expenses of about 3.1%, clearly below the threshold of 40%. This is because individuals with an income below the basic needs line are considered to have no capacity to pay for healthcare and all positive OOPs, even if they are relatively small, are considered catastrophic. These individuals are defined as further impoverished (see section 3.2.5).

Individuals in the 2nd quintile, on the other hand, who experience catastrophic OOPs spend a high fraction of their consumption on healthcare (46.1% in 2016).

Table 132 – OOPs as a share of total household expenses among households with catastrophic spending in 1st and 2nd quintiles of total household expenses (threshold: 40%), 2008-2016

	2008	2012	2016
OOP share of total expenses (value [95% confidence interval])			
1st	0.029 [0.023-0.035]	0.043 [0.026-0.06]	0.031 [0.022-0.04]
2nd	0.571 [0.085-1.058]	0.286 [0.171-0.402]	0.461 [0.296-0.627]
OOP^^ share of total expenses [95% confidence interval])			
1st	0.022 [0.017-0.027]	0.021 [0.015-0.027]	0.020 [0.014-0.025]
2nd	0.236 [0.195-0.276]	0.447 [NA]	0.682 [0.321-1.043]
OOP^^^ share of total expenses [95% confidence interval])			
1st	0.038 [0.029-0.047]	0.057 [0.037-0.077]	0.040 [0.028-0.052]
2nd	0.434 [0.103-0.765]	0.309 [0.205-0.413]	0.405 [0.279-0.531]

Data source: EU-SILC/IMA-AIM; OOP^^ excluding the inpatient supplements; OOP^^^ before MAB reimbursements; NA=Not available.

The main results for the EU-SILC/IMA-AIM are:

- **Out-of-pockets payments are less than half the amount in the HBS.**
- **There is a small increase over time in OOPs, in OOPs as a share of total household expenses (+0.3 percentage points between 2008 and 2016) and in OOPs as a share of net income (+0.2 percentage points over time).**
- **A subdivision by quintile of total household expenses shows that about 2.0% to 2.8% of household expenses is devoted to healthcare, with important variation in the categories of spending by quintile. This is lower than reported by HBS results (3.1 to 7%). Overall, the lowest quintiles of total household expenses (Q1 and Q2) reported fewer dental care and day hospitalisation expenses than the highest quintiles of total household expenses (Q4 and Q5). The lowest quintiles also reported more expenses for medicines compared than the highest quintiles.**
- **Using the default WHO methodology, there were 1.9%, 1.9% and 2.0% households with catastrophic payments in 2008, 2012 and 2016, respectively. This is substantially lower than the results from the HBS.**
- **There is a socioeconomic gradient with nearly all households with catastrophic payments in 2008 and 2012 concentrated in the 1st quintile of total household expenses. The incidence in the 1st quintile decreased slightly from 9.1% in 2008 to 8.6% in 2016. There is nearly no incidence of catastrophic payments in Q3 to Q5.**
- **Similar results are found for catastrophic spending relative to disposable income with a more or less constant average incidence over time. There is a decrease in incidence over time in the 1st quintile and a small increase in the 2nd quintile.**

4. APPENDIX ON CHANGES IN COICOP DEFINITIONS BETWEEN 2014 AND 2016

Table 133 – Main changes in COICOP definitions between 2014 and 2016 and (unexpected) related expenses

2014 Code COICOP	and definition	Number of households (population)	Average expenditure for households as a whole (per year in euro)	2016 Code COICOP	and definition	Number of households (population)	Average expenditure for households as a whole (per year in euro)
06111A	Medicines	2 365 547	262	**06110A**	Medicines, **except homeopathic remedies**	2 785 726	334
06111B	Magistral preparations excluding homeopathic remedies	8 989	**0**	**06111B**	Magistral preparations excluding homeopathic remedies	293 718	**21**
06113	Vitamins and minerals	213 839	11	**06110E**	Vitamins (C,D, etc.) and **minerals (magnesium, calcium, iron, zinc, chromium, etc.), cod liver oil, fish oil, omega 3, dietary supplements, etc.**	414 195	40
06119	Other medicines	47 483	3	**06110G**	Other medicines (**homeopathic remedies, etc.)**	353 047	34
06300A	Fees paid on the occasion of a stay in hospital	84 792	14	**06300A**	**Medical** fees paid during a stay in hospital **(+ cosmetic surgery)**	288 013	44
06129D	Non-prescribed purchases from the pharmacist	1 376 755	**151**	**06129D**	Non-prescribed purchases from the pharmacist	1 835	**0**
06139D	Prosthetics, braces, etc.	46 560	71	**06139D**	Prosthetics, braces, **dentures,** etc.	10 620	13
06211	General practitioner	164 8621	**177**	**06211**	General practitioner	148 3011	**134**
06231A	Controls and analyses carried out in laboratories	409 357	28	**06231A**	Controls and analyses carried out in laboratories **and radiographs (MRI, ultrasound, scanner, etc.)**	348 836	27

06300B	Accommodation costs in hospital or maternity ward in individual room	519 625	172	**06300B**	Accommodation costs in hospital or maternity ward (in individual or **communal room), in day hospital, palliative ward, rehabilitation centre**	275 005	89

5. APPENDIX ON THE REDISTRIBUTIVE EFFECT OF PAYMENTS FOR PUBLIC HEALTH INSURANCE

5.1. Sample and descriptive statistics

The analysis of the redistributive effect makes use of the EU-SILC/IMA-AIM coupled data (see Scientific report sections, 1.3.1 and 3.2.2).

5.1.1. Sample

The **sample** consists of all households in the EU-SILC waves with two exceptions

1. Households are excluded if no national insurance number could be retrieved for one or more individuals because without such number it is not possible to couple data from EU-SILC and KSZ-BCSS. This leads to a reduction of 229, 88 and 21 households in the EU-SILC waves of 2008, 2012 and 2016, respectively
2. Households are excluded if they have a negative gross household income after subtraction of the pre-payments for the public health insurance. This leads to a reduction of 12, 24 and 14 households in the EU-SILC waves of 2008, 2012 and 2016, respectively

5.1.2. Variable definitions

First of all, a definition of ability to pay is necessary so that redistribution can be assessed. As social contributions, personal income tax, withholding tax on capital income and indirect taxes (VAT and excises) are levied on different income concepts, the definition of an income concept is not clear. Social contributions are levied on gross incomes, personal income tax on gross incomes after social contributions, VAT and excises on consumption expenditures paid for by net incomes. In line with previous research, we opt for gross incomes as proxy for ability to pay.[34-37] We use the gross household income of the EU-SILC (variable hy010 in waves 2012 and 2016, and the sum of py080g and hy010 in 2008 to be consistent with the change in income definition in 2011).[38] The gross household income includes labour income, replacement income, capital income and private transfers.

Second, information on pre-payments for public health insurance is collected from the administrative KSZ-BCSS data and the EUROMOD tax-benefit microsimulation model that runs on EU-SILC data and is able to precisely calculate various taxes and social benefits at the individual and household level using the tax-benefit regulation of a chosen year.[39]

- Information on **social contributions**
  - Social contributions *for employees* are extracted from the administrative KSZ-BCSS data (Source: DWH_BCSS_Revenu, https://www.ksz-bcss.fgov.be/nl/dwh/variables_table/variables_description.html?filter=sources&sources=71122). It is calculated as the difference between the gross income concepts and gross taxable income concepts (gross income minus social contributions). Gross income includes the variables brutoloon_rsz, brutoloon_rszppo, uitkering_FAO, uitkering_RIZIV, uitkering_FBZ; gross taxable income includes the variables loon_BB_rsz, loon_BB_rszppo, uitkering_BB_FAO, uitkering_BB_RIZIV, uitkering_BB_FBZ.
  - Social contributions *for employers* are extracted from the administrative KSZ-BCSS data (Source: DWH_ONSS_StatbaseC, https://www.ksz-bcss.fgov.be/nl/dwh/variables_table/variables_description.html?filter=sources&institution=&sources=70531&themes=; DWH_ONSS_StatbaseF, https://www.ksz-bcss.fgov.be/nl/dwh/variables_table/variables_description.html?filter=sources&institution=&sources=70535&themes=; DWH_ONSSAPL_statbase, https://www.ksz-bcss.fgov.be/nl/dwh/variables_table/variables_description.html?filter=sources&institution=&sources=69144&themes=; DWH_ONSSAPL_statbaseF,

https://www.ksz-bcss.fgov.be/nl/dwh/variables_table/variables_description.html?filter=sources&institution=&sources=69147&themes=).
It is calculated as the sum of contributions (variable ContributionAmount in DWH_ONSS_StatbaseC, limited to the employer contributions; and as the sum of Cot_671_klasse, Cot_672_klasse, Cot_CH_klasse, COT_DPV_klasse, COT_DPV2_klasse, Cot_FMP_klasse, StctrAmt_klasse, cotpat_klasse in DWH_ONSSAPL_statbase) minus the reductions on contributions (variable DeductionAmount in DWH_ONSS_StatbaseF, limited to the employer reductions; and the variable DeductionAmount in DWH_ONSSAPL_statbaseF, limited to the employer reductions)

- Social contributions for *pensioners* are extracted from the administrative KSZ-BCSS data (Source: DWH_BCSS_Revenu, https://www.ksz-bcss.fgov.be/nl/dwh/variables_table/variables_description.html?filter=sources&sources=71122). It is calculated as the difference between the gross income concepts and gross taxable income concepts (gross income minus social contributions). Gross income includes the variable uitkering_RVP; gross taxable income includes the variable uitkering_BB_RVP. Pensioners with a gross pension exceeding a certain threshold not only pay social contributions for healthcare but also a solidarity contribution. We exclude the latter by limiting the social contribution to 3.55% of gross income.
- Social contributions for self-employed individuals are not recorded in the KSZ-BCSS data and are simulated by the EUROMOD tax-benefit microsimulation model (variable tscse_s).
- The *special social security contribution* is simulated by the EUROMOD tax-benefit microsimulation model (variable tsceesp_s) as its precise calculation requires information on the taxable income. In the KSZ-BCSS data only advance payments are recorded, not the actual contribution.

- Information on *consumer taxes* are simulated in the EUROMOD tax-benefit microsimulation model. Consumption expenditures in different categories (e.g. food, utilities, rent etc.) are imputed for each household. For more detail on the imputation procedure, we refer the interested reader to De Agostino et al. (2017)[40] and Decoster et al. (2014)[41]. Next, value added tax and excises on tobacco and packaging (proxied by excises on food and beverages) are simulated.
- The *withholding tax on capital income* is simulated using the EUROMOD microsimulation model (variable tinkt_s). Remark that capital income is likely underreported in the EU-SILC survey, in particular at the top of the distribution.[42]

Third, information on out-of-pocket payments registered in IMA-AIM is used. Out-of-pocket payments are defined as the sum of co-payments (ss00160) registered for healthcare and medicines, and supplements (ss00165) registered for healthcare within one registration year. This sum is corrected for potential double counts and MAB reimbursements (section 3.2.2).

Validity check

As a validity check of the survey data, we control the revenue collected through the various financing sources with information from the national accounts and other sources.[43-45] Table 134 presents the results for the different years. We conclude that there is a relatively good match between population and survey values with respect to social contributions and personal income taxes. Social contributions of employees are overvalued in the survey, the personal income tax in 2011 and the social contributions for the self-employed in 2011 and 2015 are undervalued. The receipts from VAT, excises and the withholding tax on capital income, however, are clearly undervalued in the survey. The survey values represent about 30%, about 55% and about 15% of the revenue for excises on tobacco, value added tax and withholding tax on capital income, respectively. However, this is not necessarily problematic as long as the distribution of the tax in the survey is in line with the distribution in society.

Moreover, we evaluate the amount of out-of-pocket payments registered in the EU-SILC/IMA-AIM against macro information in the System of Health Accounts (SHA), a standardized international database that records financing flows in healthcare (see Table 135). The results in Table 135 show a clear undervaluation of out-of-pocket payments registered in the EU-SILC/IMA-AIM. They represent about a third of the amount indicated in the SHA.

Table 134 – Comparison population and survey value of revenue for the different financing sources

	2007			2011			2015		
	National accounts (1) (million €)	Survey (2) (million €)	Ratio (2) / (1)	National accounts (1) (million €)	Survey (2) (million €)	Ratio (2) / (1)	National accounts (1) (million €)	Survey (2) (million €)	Ratio (2) / (1)
Social contributions									
Employees	12 503	15 268	122%	14 249	17 809	125%	15 640	18 748	120%
Employers	27 157	27 035	100%	31 683	32 406	102%	35 461	36 386	103%
Self-employed	2 846	2 722	96%	3 602	2 583	72%	4 199	3 204	76%
Pensioners	719	793	110%	920	920	100%	1 066	1 230	115%
Special social contribution	923	929	101%	1 063	1 094	103%	1 125	1 213	108%
Alternative financing									
Value added tax	23 864	12 042	50%	25 979	14 166	55%	27 578	15 407	56%
Excises on tobacco	1 821	536	29%	1 696	578	34%	2 262	639	28%
Excises on packaging	296	221	75%	320	267	83%	336	357	106%
Withholding tax on dividends and interest payments	3 037	545	18%	3 082	307	10%	4 570	698	15%
Government subsidies									
Personal income tax	36 880	35 859	97%	42 523	38 599	91%	46 181	47 245	102%

Table 135 – Comparison population and survey value of out-of-pocket payments

	2007			2011			2015		
	System of health accounts (1) (million €)	Survey (2) (million €)	Ratio (2) / (1)	System of health accounts (1) (million €)	Survey (2) (million €)	Ratio (2) / (1)	System of health accounts (1) (million €)	Survey (2) (million €)	Ratio (2) / (1)
Out-of-pocket payments	6 563	2 041	31%	7 732	2 454	32%	8 472	3 079	36%

5.1.3. Descriptive statistics

Table 136 provides descriptive statistics (weighted mean, minimum and maximum) for gross household income and payments made for the public health insurance. Two adjustments have been made to the payments as defined in section 4.1.2.

First, the payments have been rescaled in function of the revenue collected for the public health insurance (see Table 4 of the Scientific report). For example, in 2007 government subsidies contributed 2 180 million euro to the budget of the public health insurance, while total revenue for the personal income tax in the survey amounted to 35 859 million euro. Therefore, we rescale with a fraction of 6.08% (= 2 180/35 859).

Second, the income and payments have been equivalized to account for the household size and composition. The modified OECD equivalence scale is used (1 for the first adult, 0.5 for individuals aged 14 or more, 0.3 for individuals aged 13 or less). This scale is the default choice for the analysis of the EU-SILC by Eurostat.

The results in Table 136 indicate that both gross household income and payment have increased over time, but payments at a faster pace than income, in particular between 2007 and 2011.

Table 136 – Descriptive statistics of gross household income and payments

	2007 (N=6 059)			2011 (N=5 709)			2015 (N=5 870)		
	Mean (€)	Min (€)	Max (€)	Mean (€)	Min (€)	Max (€)	Mean (€)	Min (€)	Max (€)
Household income									
Gross household income	25 926.32	0	848 099	28 283.45	0	411 897	31 077.96	200	1 960 067
Payments for public health insurance									
Social contributions	1 904.99	0	43 353	2 007.56	0	34 599	2 228.62	0	23 952
Employees	555.67	0	14 359	561.67	0	9 361	583.49	0	7 764

	2007 (N=6 059)			2011 (N=5 709)			2015 (N=5 870)		
	Mean (€)	Min (€)	Max (€)	Mean (€)	Min (€)	Max (€)	Mean (€)	Min (€)	Max (€)
Employers	1 083.70	0	28 753	1 100.00	0	25 004	1 260.91	0	15 968
Self-employed	104.68	0	5 188	155.52	0	8 584	175.76	0	7 686
Pensioners	120.00	0	10 846	146.36	0	10 338	164.64	0	7 400
Special social contribution	40.94	0	241	44.02	0	299	43.83	0	277
Alternative financing	756.80	0	13 540	1 270.22	0	7 891	637.50	2	20 122
Value added tax	600.55	0	8 405	1 112.95	0	5 561	476.39	0	6 754
Excises on tobacco	111.75	0	931	115.29	0	888	114.66	0	979
Excises on packaging	18.90	0	177	17.88	0	74	16.90	0	71
Withholding tax on capital income	25.61	0	7 650	24.10	0	6 240	29.56	0	20 000
Personal income tax (government subsidies)	301.13	-88	26 111	360.90	-83	13 460	842.82	-134	127 504
Total payment	2 962.93	0	51 046	3 638.68	0	42 452	3 708.94	23	127 746

5.2. Computation and decomposition redistributive effect

The redistributive effect of a pre-payment for the public health insurance measures the extent to which the payments increase or reduce income inequality. A natural way to assess the redistributive effect of healthcare financing is to compute the difference between the (relative) Gini coefficient of gross household income (before any payment) and the (relative) Gini coefficient of equivalized gross household income after subtracting the equivalized pre-payment for public health insurance (for more information on the Gini coefficient, see section 1.1.5.2).[34, 36, 46, 47] Mathematically, the redistributive effect can be expressed as:

$$RE = G_I - G_{I-P}$$

Where RE is the redistributive effect, G_I is the Gini coefficient of equivalized gross household income and G_{I-P} is the Gini coefficient of equivalized gross household income after subtracting the equivalized pre-payment.

The redistributive effect can be decomposed in two parts.[34] For this decomposition, we follow the methodology proposed in O'Donnell et al. (2008).[48]

1. The **vertical redistribution or income solidarity**. It measures the reduction in income inequality in case there is no horizontal inequity, i.e. if there is no differential tax treatment of households with the same income. Progressive payments lead to a positive vertical redistribution (from rich to poor), while regressive payments lead to a negative vertical redistribution (from poor to rich). The magnitude of vertical redistribution depends on the progressivity or regressivity of the financing source (measured by the Kakwani-index, see above) as well as the proportion of gross household income taken up, on average, by the financing source. It is computed as:

$$V = \left(\frac{g}{1-g}\right) K$$

where g equals the proportion of gross household income taken up by the financing source and K is the Kakwani-index computed in case of horizontal equity (or put differently, in absence of horizontal inequities). The Kakwani-index under the assumption of horizontal equity is calculated in four steps.

a. *Step 1:* Horizontal equity implies equal payments by households with the same ability to pay. Hence, we need to group together households with the same ability to pay or equivalized gross household income. As almost no households have exactly the same income, we create income groups with a range of € 2 000 for incomes between € 0 and € 6 000, with a range of € 500 for incomes between € 6 000 and € 46 000, with a range of € 2 000 for incomes between € 46 000 and € 70 000, with a range of € 5 000 for incomes between € 70 000 and € 110 000, and one group for incomes above € 100 000. The ranges have been fixed depending on the number of households with a particular income level.

b. *Step 2:* For each group of equals, the (weighted) average payment is calculated.

c. *Step 3:* the between-groups concentration index of the (weighted) average payments is calculated.

d. *Step 4:* the Kakwani-index is equal to the difference between the between-groups concentration index of payments and the Gini coefficient of equivalized gross household income G_I.

2. The **horizontal inequity** in pre-payments for public health insurance. Horizontal inequity always decreases the redistributive effects. Horizontal inequity consists of two elements. First, the extent to which households with the same gross household income are treated differently and have different payments. Differential treatment can be the result of tax deductions/reductions for specific groups (e.g. lower employer social contributions for older employees), exemptions from tax for specific types of income (e.g. different treatment of replacement income, labour income, capital income and welfare support in personal income tax), geographic variation in the tax rates (e.g. different target group reductions in social security contributions implemented by the federated governments) etc. Second, the extent of reranking[l] that occurs because of this differential treatment and payments of households with same gross income. Reranking occurs when households have a different relative position (ranking) if they are ranked by gross household income (before any payment) compared to income after subtracting the pre-payment for public health insurance.

Horizontal inequity (HI) is by definition equal to the difference between the vertical redistribution and the redistributive effect: $HI = V - RE$. A further decomposition can be made between the two elements of horizontal inequity, i.e. unequal treatment and reranking. For this decomposition, we refer the interested reader to O'Donnell et al. (2008).[48]

[l] Reranking can also occur in absence of horizontal inequity in case of tax rates in excess of 100%, a possibility that is not considered here.[34]

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