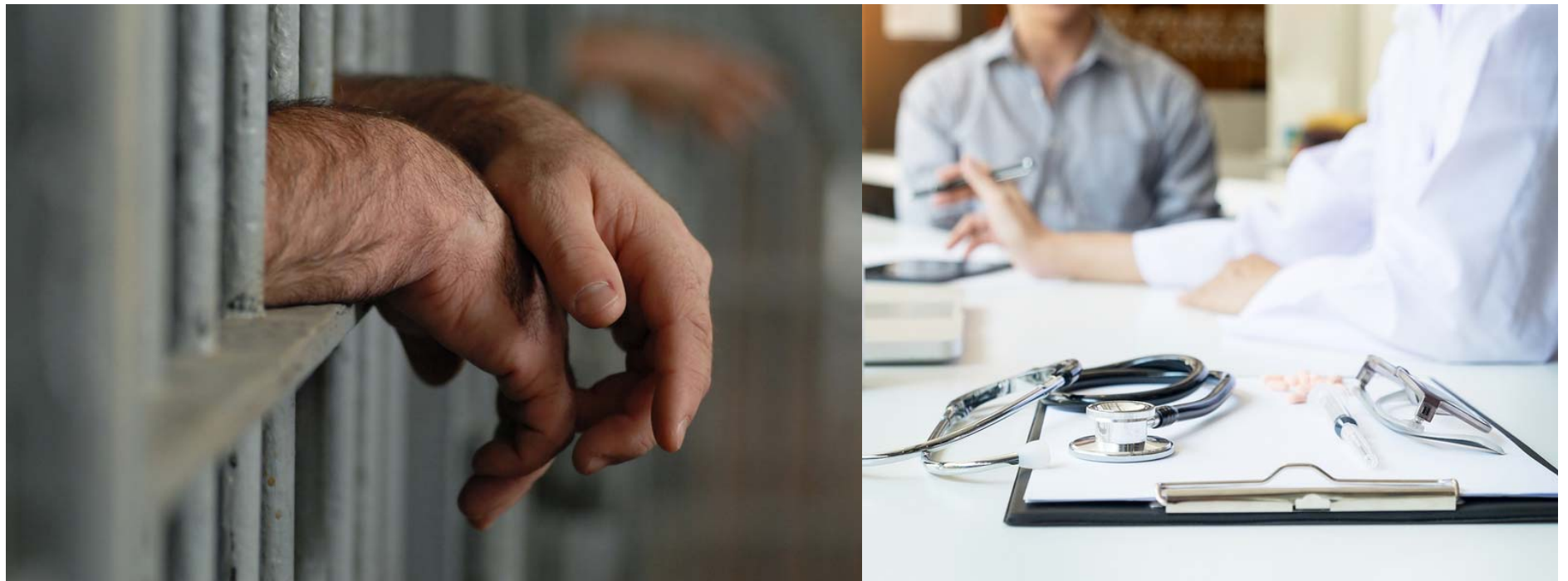


HEALTH PROBLEMS AND HEALTH CARE UTILISATION IN BELGIAN PRISONS



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LIST OF ABBREVIATIONS

ABBREVIATION	DEFINITION
ATC	Anatomical Therapeutic Chemical
CBIP – BCFI	Centre Belge d'Information Pharmacothérapeutique – Belgisch Centrum voor Farmacotherapeutische Informatie
CI	Confidence Interval
CNK	Code National – Nationale Code
EU	European
FPS	Federal Public Service
GP	Generalist practitioner
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
HR	Hazard Ratio
PY	Person-Year
WHOCC	World Health Organization Collaborating Centre for Drug Statistics Methodology



■ SCIENTIFIC REPORT

1 INTRODUCTION

In 2005, Feron et al. published a study on the annual use of primary health care in Belgian prisons and reported high rates of GP consultations¹. Their analysis was based on the medical records of 513 prisoners released between 1 September and 30 November 2002. Although being informative, that study presented a number of shortcomings to understand the current situation of health services in prisons: it was based on data from 2002 and 15 years later the situation might differ substantially; it considered only GP consultations; and the factors associated with the high individual variability of attendance rate² were not explored.

In Belgium, as in Canada, health data in prisons are routinely collected through a systematic, standardized and computerized system³. Therefore, we aimed at describing health problems and health care utilization in all Belgian prisons during one year (April 2015-April 2016) and at identifying associated factors, on the basis of these routine data. However, from the onset of the project, it appeared that medical diagnoses were not readily available (mostly written in free text and not uniformly coded^a). Therefore, assessing the frequency of diseases with accuracy was impossible. In contrast to medical observations written in free text and not readily usable for statistical analysis, the degree of completeness and accuracy of medication prescription data is deemed high as the coding in Epicure is a necessary step for ordering and distributing medications to prisoners. Subsequently, we assessed what were the most frequently treated health problems on the basis of specific medical prescriptions, i.e. our data analysis is based on health care utilization only: medical consultations and medications.

^a Moreover, the diagnosis may appear somewhere in one of the many record lines for a given prisoner and cannot be retrieved easily. Given these elements, identifying individual diagnosis would have required a tremendous resource investment in manual recoding. This was not possible in the frame of this project.



2 METHODS

2.1 Data sources

Sidis Suite is an administrative database managed by the SPF Justice for the daily organization of the prison population. It includes all incarcerated persons (accused, convicted or interned) present in Belgian prisons (and the centre of social defence in Paifve) on a given day^b. In our analysis, a prisoner was defined as a person who spent at least one night^c in prison between the 4th April 2015 (regardless of the entry date, i.e. including those whose initial registration had been made before April 2015) and the 4th April 2016, the latter being the date of data extraction. The FPS Justice anonymised the dataset by replacing the Sidis unique individual code by a random number, and by grouping in broad categories variables which combination could have allowed individual identification (i.e. age recoded in 10 year-categories, nationality recoded in two categories: Belgian vs. other nationality). The final dataset contained the following variables: anonymous ID code, age category, sex, nationality, residency permit, main language spoken, prison name, number of days in prison between the 4th April 2015 and the 4th April 2016, legal status (accused, convicted, or interned). There could be several record lines for a given person in case of prison transfer(s) and/or change of legal status during the year of observation.

Epicure is a dataset containing the electronic medical files of the persons in prison (i.e. the health care of persons under electronic surveillance is not included).

However, clinical information relating to medical consultations done outside the prison and external hospitalisations are not entered in Epicure^d. Every staff member linked to health care service in prisons (i.e. medical doctors, nurses, but also for example physiotherapists, psychologists, podiatrists, and secretaries) can enter information in Epicure. Data was anonymised in the same way as described above. The final dataset included the following variables per individual and per visit: anonymous ID, type of medical staff consulted, clinical observations (mostly in free text), prison name, date of the consultation, medication prescribed (in national codes, CNK), duration of treatment.

Sidis Suite and **Epicure** were merged using the unique random ID code and the prison name.

^b A person registered in Sidis Suite is not necessarily jailed during all the time of his/her registration in Sidis Suite but can also be under electronic surveillance outside the prison or expecting the application of his/her sentence

^c A person appears in the data base if she fulfils the criteria "Present at the 6:00 AM call" or/and "Has spent the night in jail". If the person has not stayed overnight, the day is not counted (mail J Derlet 6 June 2016)

^d A nurse or a secretary can enter in Epicure information of the medical report of the outside consultation/hospitalisation, or simply mentions that the report was archived.



2.2 Data management

First, as several record lines can be entered in Epicure by the same health care provider for a given consultation, we counted as one single contact the different entry lines made by a given provider concerning a given prisoner on a given date. Exploratory analysis revealed that it was extremely rare that a medical doctor visits twice the same patient on the same day, and a resulting downward bias in medical contacts was thus unlikely.

Second, we translated the national CNK codes into Anatomical Therapeutic Chemical (ATC) codes^e. To proxy the frequency of a number of health problems, we used a set of ATC codes with high specificity^{4,5} (Table 1). As the health problems selected were serious long-lasting conditions, one single medication prescription was deemed sufficient to ascertain the disease, independently of treatment duration⁴.

Third, the legal status of incarcerated people (accused, convicted, internee, other) may change during incarceration (e.g. from accused to convicted) within a given prison. For confidentiality reason, the dates of such changes were not available, but the number of days for a given legal status in a given prison was available. Therefore, for a person in a specific prison, the legal status retained was the one counting for the most days during the observation year. If an individual was classified as internee at some point, this legal status was applied to the whole period under consideration as the presence of psychiatric problems before the court decision acknowledging the problems can be reasonably assumed.

The final dataset contained multiple lines per prisoner, i.e. a given prisoner can contribute to the data of multiple prisons, as in case of transfers from prison to prison, consult the medical services several times over the observation year, and receive various medical prescriptions. Person with no medical consultations or no medical prescriptions were kept in the dataset as they contributed to the person-time of observation.

^e The Anatomical Therapeutic Chemical (ATC) Classification System is used for the classification of active ingredients of drugs according to the organ or system on which they act and their therapeutic, pharmacological and chemical properties. Several different brands share the same code if they

Table 1 – Specific ATC codes for identifying treated health conditions

Health conditions	ATC codes
Hypertension	ATC2=="C02" (antihypertensive) or ATC2=="C03" (diuretics) or ATC2=="C04" (peripheral vasodilators) or ATC2=="C07" (beta-blocking agents) or ATC2=="C08" (calcium channel blockers) or ATC2=="C09" (agents acting on the renin-angiotensin system)
Opioid dependence	ATC4=="N07BC" (drugs used in opioid dependence)
Tuberculosis	ATC3=="J04A" (drugs for treatment of tuberculosis)
HIV	ATC4=="J05AE" (protease inhibitors) or ATC4=="J05AF" or ATC4=="J05AG (reverse transcriptase inhibitor) or ATC4=="J05AH" (neuraminidase inhibitors) or ATC4=="J05AR" (combinations)
Hepatitis C	ATC6=="J05AB04" or ATC6=="J05AE11" or ATC6=="J05AE12" or ATC6=="J05AE14" or ATC6=="J05AR10" or ATC6=="J05AX14" or ATC6=="J05AX15" or ATC6=="J05AX16" or ATC6=="J05AX65" or ATC6=="J05AX66" or ATC6=="J05AX67" or ATC6=="J05AX68"
Psychological depression	ATC3=="N06A" (antidepressants)
Psychosis	ATC3=="N05A" (antipsychotics)
Anxiety/sleep disorders	ATC3=="N05B" (anxiolytics) ATC3=="N05C" (hypnotics & sedatives)
Obstructive airway diseases	ATC2=="R03" (drugs for obstructive airways diseases)
Diabetes	ATC2=="A10" (drugs used in diabetes)

have the same active substance and indications. The ATC classification is controlled by the World Health Organization Collaborating Centre for Drug Statistics Methodology (WHOC). https://www.whocc.no/atc_ddd_index/



The selection of ATC codes was done on the basis of what is described in the scientific literature^{4, 5}. The ATC codes for Hepatitis C is based on treatment currently available in Belgium (CBIP/BCFI)

2.3 Data analysis

First, we computed descriptive statistics on the general characteristics of the prison population and on the overall volume of medical consultations and prescriptions. Second, because the number of consultations is highly time-dependent and multiple consultations can occur per prisoner, we applied a multiple failure survival analysis⁶. Consultation rates are expressed in number of consultations per person-year. In bivariate analysis, rates are displayed per categories of the independent variables and statistical significance of observed differences were tested with a Cox proportional hazards model with only one independent variables. Third, for medical consultations, we ran multivariate Cox proportional hazards models. The clustering of data at individual level was accounted for by the “cluster” command in Stata. The covariates were: time in prison during the observation year (categorical), age (categorical), sex, nationality (Belgian vs. other), residency status (allowed, undocumented migrants, unregistered Europeans), prisoner status (convicted, accused, internees, other), new prisoner (prisoner entered during the observation year vs. already in prison before 4 April 2015), and prison. The dependent variables were the medical consultation rate. For medical prescriptions, we ran multilevel multivariate linear regression models. In such models, the regression coefficients corresponds to the absolute % increase in the dependent variable from one category of the independent variable to the others⁷. Random effect was individual id and fixed effects were the covariates as described in the Cox model above. The independent variable was, for each medication class, dichotomous (received at least one prescription vs. no).

Consultation rates can mask the high variability of user patterns, e.g. a high number of consultations may be due to a small number of individuals. It is therefore interesting to assess the characteristics of high and low health care users. Therefore, we generated a variable of individual consultation intensity ((number of consultations/number of days of incarceration)*100). We used the percentile 75 of that variable (approximately 15 consultations per 100 incarceration days) to define a variable “high” coding for individuals with a higher utilization of medical services. For “low” users, we were particularly interested by prisoners who received 0 medical consultations. We ran multilevel multivariate linear regression models, as explained above for medical prescriptions.

All statistical analyses were performed with STATA 12.0 (Statacorp 2011. Stata Statistical Software: Release 12. College Station, TX: StataCorp LP.). All significance tests were set at 5%.



3 RESULTS

3.1 General description of the population

32 240 persons were registered in Sidis Suite during the observation year (4th April 2015 to 4th April 2016^f), among whom 5 729 spent 0 night in jail. The majority of the latter (71.1%) were under electronic surveillance (4 076 persons accounting for 1 040 person-years). In total 26 511 prisoners spent at least one night in prison, accounting for a total of 11 060 person-years in prison^g. During that year, 14 435 new prisoners entered prison and 13 458 prisoners exited prison. A new prisoner is defined as a person entering prison between 4th April 2015 and 4th April 2016. On 4th April 2016, there were 12 663 persons in Belgian prisons.

The characteristics of prisoners are presented in Table 2. In the vast majority they were young males. Nearly half of the population was not a Belgian citizen. Seventeen percent had no entitlement to stay on the Belgian territory (undocumented migrants) and 12.5% were unregistered EU citizen. Roughly 30 % were accused and 60% convicted, whereas around 6% were interned. The incarceration duration was short for a substantial percentage of individuals, particularly in new prisoners: 14.5 % (9 508/14 439) of new prisoners (=who entered prison during the observation year) stayed less than 7 days in prison, and 55.6% less than 3 months (6 047/10 869 who entered prison between 04 April 2015 and 04 January 2016).

Table 2 – Characteristics of overall prisoners (N=26 511)

Characteristics	Mean (±SD) or %	
Sex (n=26 511)	Male	93.4%
Age (n=26 320)	<20 years	2.5%
	20-<30 years	32.7%
	30-<40 years	32.4%
	40-<50 years	19.9%
	50-<60 years	9.0%
	>=60 years	3.3%
Nationality (n=24 199)	Belgian	55.4%
Language (n=25 453)	German	0.7%
	English	2.7%
	Spanish	0.6%
	French	48.7%
	Dutch	37.9%
	Unknown ^h	9.4%
Residence status (n=26 511)	No legal entitlement	16.7%
	EU citizen not registered	12.5%
Time in prison during the observation year (n=26 511)	Days, mean	152 (±137)
	<1 week	9.6% ⁱ
	<3 months	47.5% ^j

^f The observation year (4th April 2015 to 4th April 2016) is also referred to year 2015 in the text, to ease the reading

^g Among those, some continued their sentence under electronic surveillance outside the prison, accounting for 871 additional person-years.

^h language which is not French, Dutch, German, Spanish or English

ⁱ 14.5% for new prisoners

^j 55.6% for new prisoners entered between 04 April 2015 and 04 January 2016 (this period of 9 months is used to allow computation of the % of <3 months incarceration)



	3 months-<6 months	17.05%
	6 months-<9 months	8.40%
	≥9 months	27.03%
	12 months	18.2%
Prisoner status^k (n=12 663)	Accused	29.4%
	Convicted	62.9%
	Internees	6.3%
	Other	1.4%

The characteristics of the population per prison are presented in Table 3. Note that a same prisoner can have been incarcerated in several prisons during the year, hence the total number of records (n=35 377) is bigger than the number of prisoners (n=26 511). During the observation year, 12.3% (3 271/26 511) were incarcerated in 2 different prisons, and 2.3% in three prisons. The turn-over of prisoners (i.e. the proportion of new prisoners) can be very high in some prisons (e.g. Antwerpen, Dendermonde, Dinant, Leuven Hulp or Forest/Vorst). The presence of internees and the proportion of prisoners with a foreign nationality also vary across prisons. These factors may impact the utilization of health care (see further).

Table 3 – Characteristics of prisoners, per prison (N=35 377)

Prison	Nb of prisoners who spent at least one night in 2015	New prisoners in 2015	Total days in 2015	Average number of days per prisoner in 2015	% days convicted	% days accused	% days internees	% Belgian nationality	% Residence permit	Mean age	% female
Andenne	618	27	150 329	243.25	94.93%	2.88%	0.00%	52.52	70.23	36.7	0
Antwerpen	3 243	2 436	207 307	63.92	11.02%	78.91%	7.73%	44.53	63.61	34.6	10.1
Arlon	354	186	43 342	122.44	56.10%	41.12%	0.00%	53.29	68.64	33.3	0
Berkendael	384	261	33 432	87.06	38.05%	49.20%	11.97%	44.16	61.20	36.2	100
Beveren	522	45	106 367	203.77	88.47%	8.86%	0.01%	57.89	73.56	38.0	0
Brugge	2 406	1 192	261 574	108.72	49.88%	41.74%	5.58%	62.98	72.44	37.2	13.6
Dendermonde	865	589	67 224	77.72	28.22%	69.36%	0.07%	57	72.72	34.8	0
Dinant	249	194	17 241	69.24	24.75%	74.80%	0.01%	76.36	83.53	33.4	0
Forest/Vorst	2 763	1 953	170 741	61.80	16.49%	63.25%	18.75%	43.19	63.23	33.9	0.1
Gent	1 482	954	131 789	88.93	29.24%	53.64%	15.15%	60.76	73.28	35.0	16.5
Hasselt	1 728	965	195 873	113.35	59.83%	37.79%	0.16%	55.89	71.82	36.3	9.5
Hoogstraten	349	80	59 855	171.50	97.84%	0.27%	0.00%	84.59	99.43	39.9	0

^k The prisoner status is reported for the 12 663 persons in jail on April 4, 2016. Figures computed on the 4 043 688 person-days in prison between April 2015

and April 2016 yields very similar results: 32.3% accused, 58.2% convicted, 8.0% internees, 1.6% other.



Prison	Nb of prisoners who spent at least one night in 2015	New prisoners in 2015	Total days in 2015	Average number of days per prisoner in 2015	% days convicted	% days accused	% days internees	% Belgian nationality	% Residence permit	Mean age	% female
Huy	263	154	29 865	113.56	53.88%	45.84%	0.00%	77.92	89.35	36.3	0
Ieper	456	296	26 814	58.80	20.57%	77.93%	0.16%	67.51	78.07	35.5	0
Ittre	675	42	151 311	224.16	98.78%	0.73%	0.00%	51.49	74.96	36.1	0
Jamioulx	1 179	776	116 214	98.57	40.00%	51.13%	7.67%	57.22	73.28	34.1	0
Lantin	3 070	1 723	336 763	109.69	53.02%	42.19%	4.01%	59.57	75.02	35.4	9.6
Leuven Centraal	721	190	125 028	173.41	91.99%	1.55%	0.05%	42.96	50.49	39.5	0
Leuven Hulp	1 117	579	65 137	58.31	35.55%	50.78%	12.86%	32.26	41.45	34.8	0
Leuze	416	39	78 022	187.55	97.38%	2.58%	0.00%	52.77	69.71	34.7	0
Marche	586	166	111 161	189.69	84.05%	13.97%	0.00%	66.91	80.20	37.3	6.3
Marneffe	262	19	47 071	179.66	97.98%	0.22%	0.00%	80.46	99.62	38.1	0
Mechelen	585	401	41 258	70.53	20.70%	77.54%	0.28%	48.81	65.81	33.8	0
Merksplas	1 369	443	198 300	144.85	51.56%	4.92%	42.14%	53.94	67.93	38.8	0
Mons	1 164	609	147 575	126.78	61.59%	31.91%	5.32%	68.85	80.93	34.6	15.6
Namur	581	337	69 732	120.02	39.47%	48.91%	10.37%	73.95	86.06	33.3	0
Nivelles	631	254	89 666	142.10	72.99%	26.14%	0.00%	67.57	84.47	34.5	0
Oudenaarde	438	201	52 351	119.52	62.94%	34.55%	0.27%	73.5	84.70	35.5	0
Paifve	227	8	72 846	320.91	0.71%	0.57%	98.61%	68.75	90.31	43.4	0
Ruiselede	121	11	20 662	170.76	97.81%	0.00%	0.00%	96.69	100.00	38.5	0
Saint-Gilles/Sint-Gillis	2 962	1 456	272 240	91.91	44.54%	54.57%	0.35%	36.8	55.91	34.0	0.4
Saint-Hubert	468	87	78 763	168.30	98.81%	0.04%	0.00%	73.43	87.18	40.0	0
Tongeren	181	98	7 762	42.88	99.81%	0.19%	0.00%	0	3.31	33.0	0
Tournai	580	288	72 466	124.94	70.10%	28.88%	0.00%	56.61	68.28	33.9	0
Turnhout	941	533	94 291	100.20	21.57%	42.27%	35.56%	57.89	70.14	36.0	0
Wortel	1 421	202	286 769	201.81	97.64%	1.18%	0.00%	33.07	44.97	36.1	0

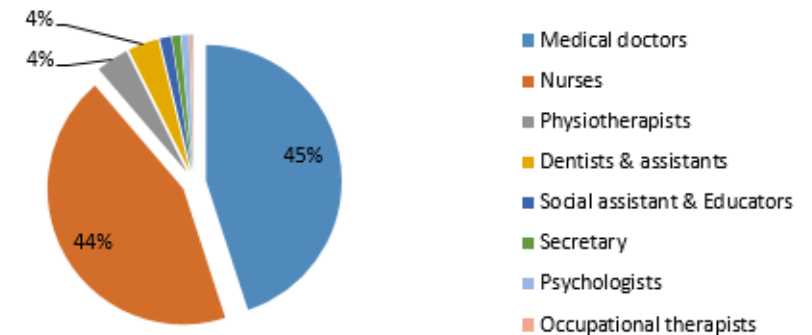


3.2 Medical consultations

In total, 554 412 contacts were registered in Epicure during the observation year (Figure 1) with the staff of the medical services, among which 249 436 medical consultations. 77.7% (193 941/249 436) of medical consultations were performed by a GP (including the obligatory medical consultation at entry) (Figure 2 & Table 4). The proportion of the GP obligatory consultation at entry was estimated at 10.8% (20 865/ 193 941) of all GP consultations, and amounted to 22.2% (16 761/75 617) in new prisoners^l. The other medical specialties most involved were the psychiatrists (11.9% of consultations), the surgeons (2.6%), the radiologists (2.4%) and the orthopaedists (1.2%). Besides medical consultations, there were also 20 143 contacts done by dentists, 21 468 contacts by physiotherapists, 1 851 contacts by occupational therapists, and 5 262 contacts by psychologists^m. There were also 7 529 contacts done by social assistants and educators. It is important to note that some of these professionals are mainly allocated to the care of internees: 74% of contacts by psychologists, 70% by social assistants and educators, 64% by occupational therapists and 29% by psychiatrists are delivered to internees whereas this group is less than 8% of the prison population.

Figure 1 – Overall contacts with health services in 2015, spread by type of staff

Contacts with health services in 2015 (n=554 412)



^l As the specific code for entry consultation was used inconsistently (only 6 022 occurrences), we approximated the proportion of entry consultations by considering every first GP consultation for a given prisoner entering a given prison (i.e. also when a prisoner is transferred from one prison to another) as an entry consultation.

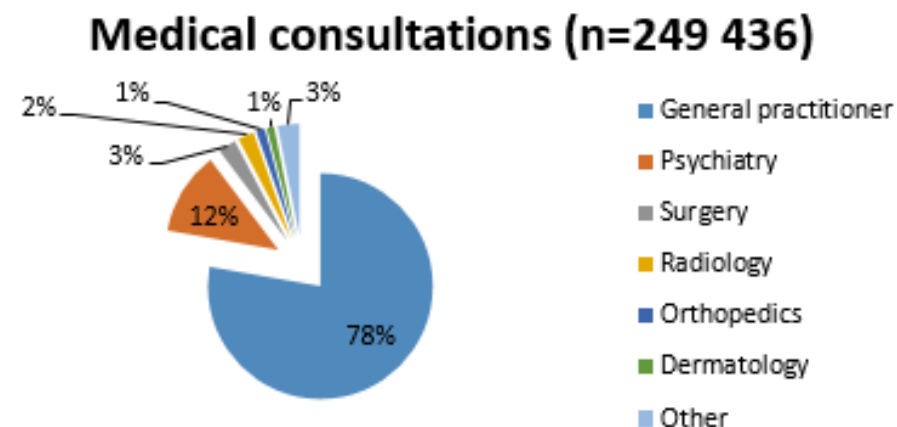
^m There were also 242 617 contacts by nurses, but it seems that not all contacts are registered. Moreover, keeping only 1 line per health provider per prisoner per day is an analysis strategy which might result in more underestimation than for MD as a same nurse may visit several times a day the same prisoner.



Table 4 – Number of overall medical consultations per medical specialty

Medical specialty (consultation)	N	%
General practitioner	193 941	77.75
Psychiatry	29 789	11.94
Surgery	6 419	2.57
Radiology	5 725	2.30
Orthopaedics	3 111	1.25
Dermatology	2 643	1.06
Gastro-enterology	1 370	0.55
Cardiology	1 048	0.42
Ophthalmology	954	0.38
Otorhinolaryngology	924	0.37
Pneumology	665	0.27
Urology	648	0.26
Neurology	607	0.24
Gynaecology	565	0.23
Reference doctor for opioid substitution	355	0.14
Oro maxilla facial surgery	256	0.10
Internal medicine	182	0.07
Infectiology	133	0.05
Anaesthetics	53	0.02
Reference doctor for hepatitis	42	0.02
Paediatrics	6	0.00
Total	249 436	100.00

Figure 2 – Overall medical consultations in 2015, spread by medical specialties



We removed the prison of Wortel from further analysis on individual utilization of health care because many of its prisoners were in reality jailed in the prison of Tilburg (Netherlands) until December 2016, and their medical consultations were not registered in Epicure. Therefore, the following analyses concern 26 064 prisoners (10 275 person-years) and 243 232 medical consultations.

The overall mean rate of medical consultation was 23.7 per person-year (95%CI: 23.6; 23.8). The corresponding rate for GP consultations was 18.3 per person-year (95%CI: 18.2; 18.4)ⁿ, and 16.3 per person-year (95%CI: 16.2; 16.4) when the obligatory entry consultation was excluded. The rate for psychiatric consultations was 2.9 per person-year (95%CI: 2.8; 2.9)^o. For 6.9% of prisoners (1 807/26 064), no medical consultation was registered. Mean rates hide great individual variations. For example, when looking at prisoners who stayed in prison during the full year (n=4 386), the mean

ⁿ 188 083 consultations over 10 275 person-years

^o 29 443 consultations over 10 275 person-years



number of all medical consultations was 19.6 (± 18.8), the median was 14 (IQR: 7; 27), with a percentile-5 at 2 consultations and a percentile-95 at 56 consultations.

It was reported that everyday 10% of the prison population visit a GP¹. Based on Epicure data, the current health care utilization is substantially lower. When overall GP consultations are considered ($n=193\,941$), we found that every working day 7.5% of the prison population on average visits a GP ($193\,241/(253*10\,275)$). When the obligatory entry consultations are excluded, this proportion amounts to 6.7% ($173\,076/(253*10\,275)$).

3.3 Determinants of medical consultations

3.3.1 Bivariate analysis

In Table 5 and 6, we present crude rates of medical consultations, stratified per categories of covariates.

The consultation rate was higher in prisoners having stayed less than 3 months in prison during the observation year. This might partly be due to the compulsory medical consultation at entry in new prisoners, a substantial proportion of whom stayed during a very short time in prison. To check that hypothesis, we also computed the consultation rates after removal of the first medical consultations in new prisoners. The corresponding rates, per categories of time in prison during the observation year, were 31.0 (95%CI: 30.8; 31.3), 23.6 (95%CI: 23.4; 23.8), 22.5 (95%CI: 22.3; 22.7), and 18.6 (95%CI: 18.4; 18.7) per person-year, respectively for the <3 months, 3 months-<6 months, 6 months-<9 months, and ≥ 9 months periods. Part of the excess rate in the <3 months category was indeed due to the high number of new prisoners receiving systematically the entry consultation and staying a very short time (the rates in the other categories barely changed).

The consultation rate was higher in the age categories 40-<50 years and ≥ 60 years than in other categories, and higher in females than in males. It was also higher in new prisoners. The rate was also higher in Belgian citizens than in foreigners, higher in French- or Dutch speaking individuals than persons speaking another language, higher in persons holding a residence permit than in those without one, and higher in accused and interneers than in convicted prisoners. Finally, high variability of consultations rates was observed across prisons (Figure 3). Such variations were also observed for GP (Figure 4 & Table 7) and psychiatric consultations (Figure 5 & Table 8). It was for example striking that the rate of psychiatric consultations in interneers was 5 times lower in Merksplas than in Forest/Vorst (Table 8). Also for non-interneers, great variations in psychiatric consultation rate were observed (Figure 5). Table 8 also revealed that there were no psychiatric consultations in 5 prisons (Arlon, Huy, Marneffe, Saint-Hubert and Tongeren).

As regards the absence of medical consultations, the main associated factors were a short stay in prison, not being a new prisoner, and the prison itself. A short stay was the prominent factor. Nearly 30% (599/1807) of prisoners with no medical consultations stayed less than 1 week in prison. When looking specifically at new prisoners, 72% (371/513) of those with no medical consultation stayed less than 1 week. Still, even after restriction on new prisoners with a stay >7 days, the % with no medical visit was substantial in some prisons.



Figure 3 – Crude rates of medical consultations per person-year, per prison, in 2015

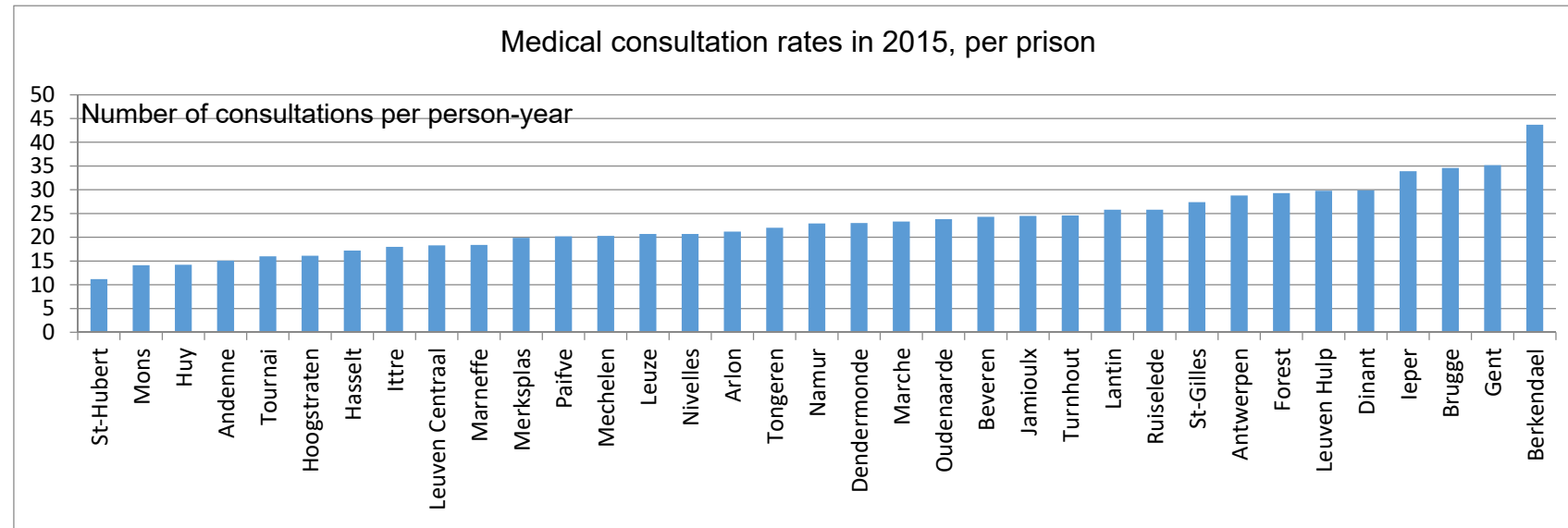


Table 5 – Crude rates of overall medical consultations

Variables	Categories	N consultation	PY	Rate	95% CI
Time in prison during observation year	<3 months	63 435	1 722	36.8	36.5
	3 months-<6 months	52 549	2 122	24.9	24.7
	6 months-<9 months	38 065	1 655	23.0	22.8
	>=9 months	89 183	4 785	18.6	18.5
Age	<20y	3 399	145	23.4	22.6
	20-<30y	66 184	2 959	22.4	22.2
	30-<40y	79 819	3 345	23.9	23.7
	40-<50y	56 397	2 189	25.8	25.5



Variables	Categories	N consultation	PY	Rate	95% CI	
	50-<60y	24 360	1 111	21.9	21.7	22.2
	>=60y	11 136	4 295	25.9	25.4	26.4
Sex	Female	19 344	500	38.7	38.1	39.2
	Male	223 888	9 775	22.9	22.8	23.0
Nationality	Belgian	137 706	5 691	24.2	24.1	24.3
	Foreigner	90 858	4 093	22.2	22.1	22.3
Residence status	Legal	183 408	7 465	24.6	24.5	24.7
	Not allowed	38 505	1 836	21.0	20.8	21.2
	Unregistered EU citizens	21 319	974	21.9	21.6	22.2
Language	French	120 293	5 352	22.5	22.3	22.6
	Dutch	91 336	3 506	26.0	25.9	26.2
	Other	24 141	1 151	21.0	20.7	21.2
Prisoner status	Condemned	143 395	6 627	21.6	21.5	21.7
	Accused	72 621	2 682	27.1	26.9	27.3
	Internees	23 265	839	27.7	27.4	28.1
	Other	3 951	127	31.0	30.1	32.0
New prisoner	Yes	97 613	3 172	30.8	30.6	31.0
	No	145 619	7 103	20.5	20.4	20.6


Table 6 – Crude rates of overall medical consultations per prison

Variables	Categories	N consultation	PY	Rate	95% CI		% new prisoners with a stay >7 days and no consult
Prison	Andenne	6 208	412	15.1	14.7	15.4	4.0
	Antwerpen	16 375	568	28.8	28.4	29.3	0.8
	Arlon	2 517	119	21.2	20.4	22.0	0.6
	Berkendael	4 005	92	43.7	42.4	45.1	0.5
	Beveren	7 073	291	24.3	23.7	24.8	0.0
	Brugge	24 768	717	34.6	34.1	35.0	0.8
	Dendermonde	4 235	184	23.0	22.3	23.7	2.6
	Dinant	1 412	47	29.9	28.4	31.5	0.0
	Forest/Vorst	13 722	468	29.3	28.8	29.8	1.5
	Gent	12 726	361	35.2	34.6	35.9	0.3
	Hasselt	9 254	537	17.2	16.9	17.6	3.1
	Hoogstraten	2 636	164	16.1	15.5	16.7	1.3
	Huy	1 163	82	14.2	13.4	15.0	11.3
	Ieper	2 490	73	33.9	32.6	35.2	0.9
	Ittre	7 484	415	18.0	17.6	18.5	0.0
	Jamioulx	7 819	318	24.5	24.0	25.1	0.8
	Lantin	23 830	923	25.8	25.5	26.6	0.7
	Leuven Centraal	6 276	342	18.3	17.9	18.8	2.5
	Leuven Hulp	5 322	178	29.8	29.0	30.6	0.3
	Leuze	4 421	214	20.7	20.1	21.3	0.0
	Marche	7 094	304	23.3	22.7	23.8	2.1
	Marneffe	2 370	127	18.4	17.6	19.1	0.0
	Mechelen	2 295	113	20.3	19.5	21.1	3.4



Variables	Categories	N consultation	PY	Rate	95% CI		% new prisoners with a stay >7 days and no consult
	Merkspas	10 793	543	19.9	19.5	20.2	1.2
	Mons	5 706	404	14.1	13.7	14.5	1.6
	Namur	4 367	191	22.9	22.2	23.5	0.0
	Nivelles	5 88	246	20.7	20.1	21.3	0.5
	Oudenaarde	3 412	143	23.8	23.0	24.6	2.5
	Paifve	4 040	200	20.2	19.6	20.9	0.0
	Ruiselede	1 460	57	25.8	24.5	27.1	0.0
	St-Gilles/St-Gillis	20 448	746	27.4	27.0	27.8	2.1
	Saint-Hubert	2 417	216	11.2	10.8	11.6	1.2
	Tongeren	468	21	22.0	20.1	24.1	0.0
	Tournai	3 170	198	16.0	15.4	16.5	0.8
	Turnhout	6 368	258	24.6	24.0	25.3	0.0

PY: person-year

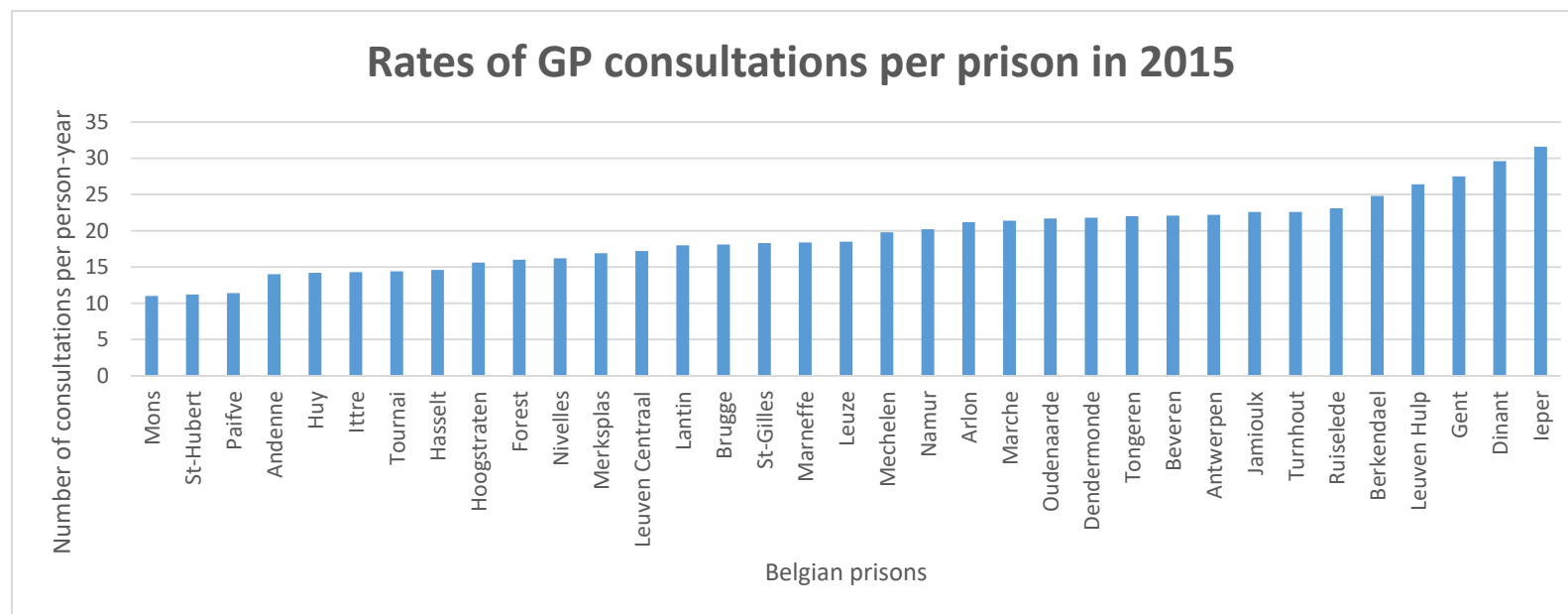
**Figure 4 – Crude rates of GP consultations per person-year, per prison, in 2015**



Table 7 – Crude rates of GP consultation, per prison

Prisons	PY	Nb consultations GP	Rate GP	95% CI	
Andenne	412	5 754	14.0	13.6	14.3
Antwerpen	568	12 626	22.2	21.8	22.6
Arlon	119	2 517	21.2	20.4	22.0
Berkendael	92	2 274	24.8	23.8	25.9
Beveren	291	6 444	22.1	21.6	22.7
Brugge	717	12 947	18.1	17.8	18.4
Dendermonde	184	4 016	21.8	21.1	22.5
Dinant	47	1 397	29.6	28.1	31.2
Forest/Vorst	468	7 499	16.0	15.7	16.4
Gent	361	9 939	27.5	27.0	28.1
Hasselt	537	7 856	14.6	14.3	15.0
Hoogstraten	164	2 554	15.6	15.0	16.2
Huy	82	1 163	14.2	13.4	15.1
Ieper	73	2 323	31.6	30.4	32.9
Ittre	415	5 923	14.3	13.9	14.7
Jamioulx	318	7 203	22.6	22.1	23.2
Lantin	923	16 606	18.0	17.7	18.3
Leuven Centraal	342	5 891	17.2	16.8	17.6
Leuven Hulp	178	4 708	26.4	25.6	27.1
Leuze	214	3 962	18.5	18.0	19.1
Marche	304	6 524	21.4	20.9	21.9
Marneffe	127	2 368	18.4	17.6	19.1
Mechelen	113	2 236	19.8	19.0	20.6
Merksplas	543	9 183	16.9	16.6	17.3
Mons	404	4 432	11.0	10.6	11.3



Prisons	PY	Nb consultations GP	Rate GP	95% CI	
Namur	191	3 854	20.2	19.5	20.8
Nivelles	246	3 981	16.2	15.7	16.7
Oudenaarde	143	3 109	21.7	20.9	22.5
Paifve	200	2 274	11.4	10.9	11.9
Ruiselede	57	1 306	23.1	21.9	24.4
Saint-Gilles/Sint-Gillis	746	13 644	18.3	18.0	18.6
Saint-Hubert	216	2 416	11.2	10.8	11.7
Tongeren	21	468	22.0	20.1	24.1
Tournai	198	2 855	14.4	13.9	14.9
Turnhout	258	5 831	22.6	22.0	23.2

PY: person-year



Figure 5 – Crude rates of psychiatric consultations per person-year (overall), per prison, in 2015

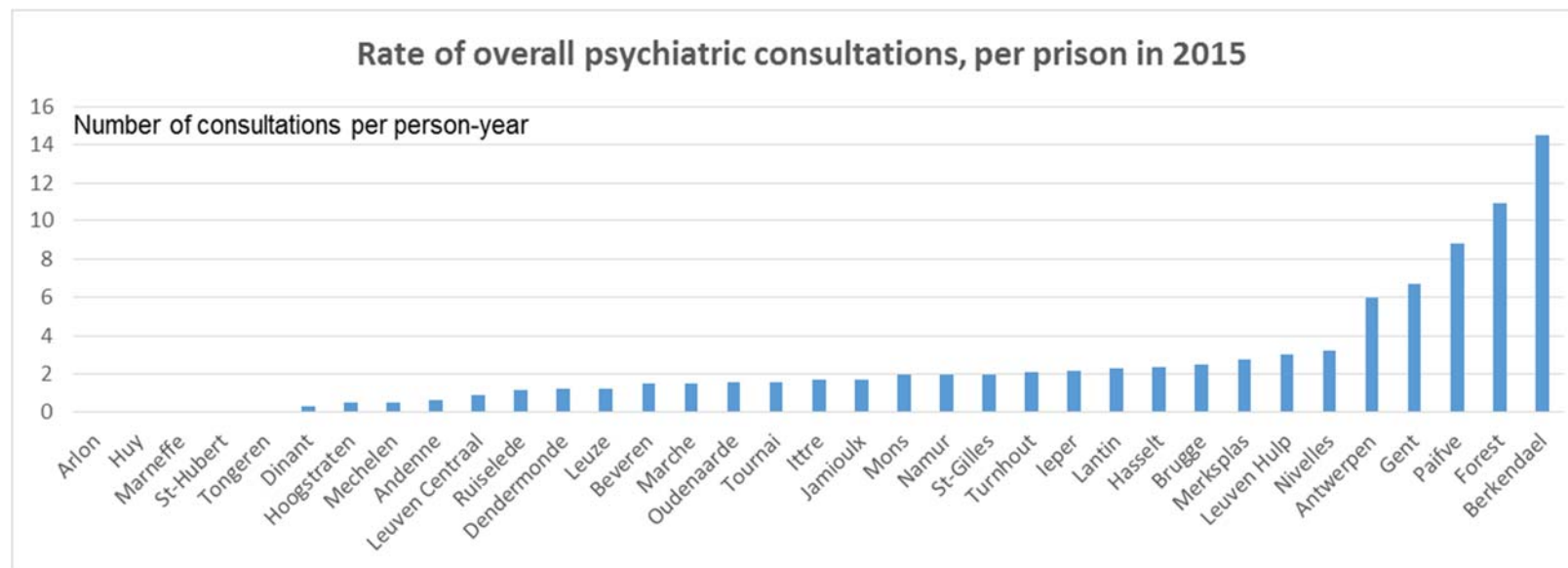




Figure 6 – Crude rates of psychiatric consultations per person-year in non-internees, per prison, in 2015

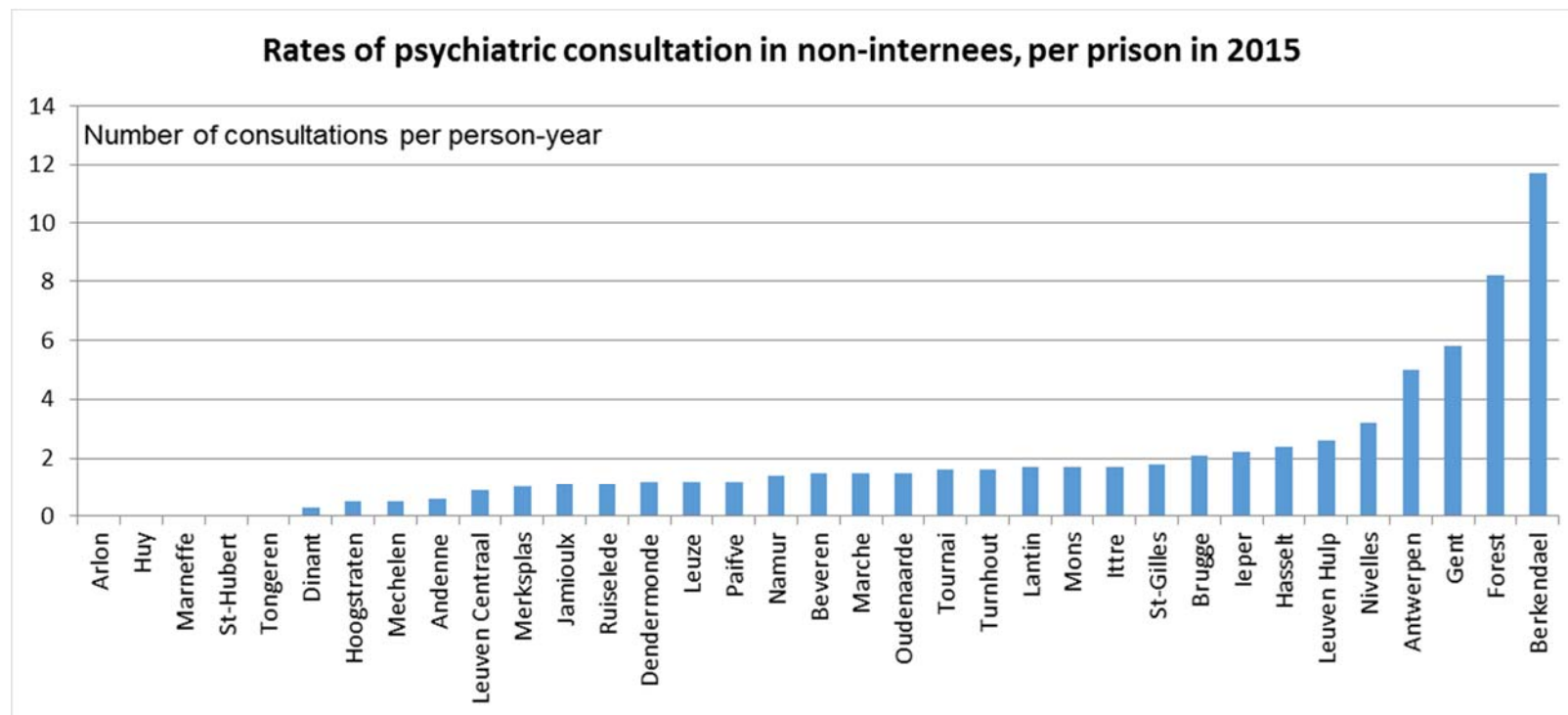




Table 8 – Crude rates of psychiatric consultations, per prison

Internees						Non-internees					All				
Prisons	N consult	PY	Rate	95% CI		N consult	PY	Rate	95% CI		N consult	PY	Rate	95% CI	
Andenne	0	0	-	-	-	229	412	0.6	0.5	0.7	229	412	0.6	0.5	0.6
Antwerpen	809	39	20.7	19.3	22.2	2625	529	5.0	4.8	5.1	3 434	568	6.0	5.8	6.2
Arlon	0	0	-	-	-	0	119	0	-	-	0	119	0	-	-
Berkendael	375	10	38.4	34.7	42.5	962	82	11.7	11.0	12.5	1 337	92	14.5	14.4	14.6
Beveren	0	0	-	-	-	439	291	1.5	1.4	1.6	439	291	1.5	1.4	1.6
Brugge	386	38	10.1	9.1	11.1	1424	678	2.1	2.0	2.2	1 810	717	2.5	2.4	2.6
Dendermonde	1	0.1	10.4	14.6	74.0	218	184	1.2	1.0	1.3	219	184	1.2	1.0	1.3
Dinant	0	0	-	-	-	15	47	0.3	0.2	0.5	15	47	0.3	0.2	0.5
Forest/Vorst	1 830	70	26.0	24.8	27.2	3 262	397	8.2	7.9	8.5	5 092	468	10.9	10.6	11.2
Gent	609	49	12.4	11.5	13.5	1807	312	5.8	5.5	6.1	2 416	361	6.7	6.4	7.0
Hasselt	6	1	5.2	2.	11.6	1 292	535	2.4	2.3	2.5	1 298	537	2.4	2.3	2.6
Hoogstraten	0	0	-	-	-	82	164	0.5	0.4	0.6	82	164	0.5	0.4	0.6
Huy	0	0	-	-	-	0	82	0	-	-	0	82	0	-	-
Ieper	1	0.1	9.1	1.3	64.8	159	73	2.2	1.8	2.5	160	73	2.2	1.9	2.5
Ittre	0	0	-	-	-	714	414	1.7	1.6	1.8	714	415	1.7	1.6	1.8
Jamioulx	192	18	10.5	9.1	12.1	340	300	1.1	1.0	1.3	532	318	1.7	1.5	1.8
Lantin	606	36	16.7	15.4	18.1	1 533	886	1.7	1.6	1.8	2 139	923	2.3	2.2	2.4
Leuven Centraal	0	0.2	0			296	342	0.9	0.8	1.0	296	342	0.9	0.8	1.0
Leuven Hulp	127	20	6.4	5.4	7.7	417	159	2.6	2.4	2.9	544	178	3.0	2.8	3.3
Leuze	0	0	-	-	-	260	214	1.2	1.1	1.4	260	214	1.2	1.1	1.4
Marche	0	0	-	-	-	468	305	1.5	1.4	1.7	468	304	1.5	1.4	1.7
Marneffe	0	0	-	-	-	0	127	0	-	-	0	127	0	-	-
Mechelen	3	1	2.6	0.8	8.10	56	112	0.5	0.4	0.6	59	113	0.5	0.4	0.7
Merksplas	1211	229	5.3	5.0	5.6	325	314	1.0	0.9	1.1	1 536	543	2.8	2.7	3.0



Mons	161	16	9.8	8.4	11.4	645	388	1.7	1.5	1.8	806	404	2.0	1.9	2.1
Namur	156	19	8.1	6.9	9.5	234	172	1.4	1.2	1.5	390	191	2.0	1.8	2.2
Nivelles	0	0	-	-	-	793	246	3.2	3.0	3.5	793	246	3.2	3.0	3.5
Oudenaarde	3	1	3.8	12.3	11.8	222	143	1.5	1.4	1.8	225	143	1.6	1.4	1.8
Paifve	1 715	195	8.8	8.4	9.2	51	4	1.2	1.0	1.7	1 766	200	8.8	8.4	9.3
Ruiselede	0	0	-	-	-	65	57	1.1	0.9	1.5	65	57	1.1	0.9	1.5
Saint-Gilles	118	3	39.7	33.2	47.6	1 349	745	1.8	1.7	1.9	1 467	746	2.0		
Saint-Hubert	0	0	-	-	-	0	216	0	-	-	0	216	0	-	-
Tongeren	0	0	-	-	-	0	21	0	-	-	0	21	0	-	-
Tournai	0	0	-	-	-	315	198	1.6	1.4	1.8	315	198	1.6	1.4	1.8
Turnhout	263	92	2.9	2.5	3.2	274	166	1.6	1.5	1.8	537	258	2.1	1.9	2.3

PY: person-year

3.3.2 Multilevel multivariate analysis

We assessed in Cox regression models which covariates were significantly associated with the consultation rate (Table 9).

The consultation rate was significantly higher in prisoners having stayed less than 3 months in prison during the observation year, higher in the age categories 40-<50 years and ≥60 years than in other categories, and higher in females than in males.

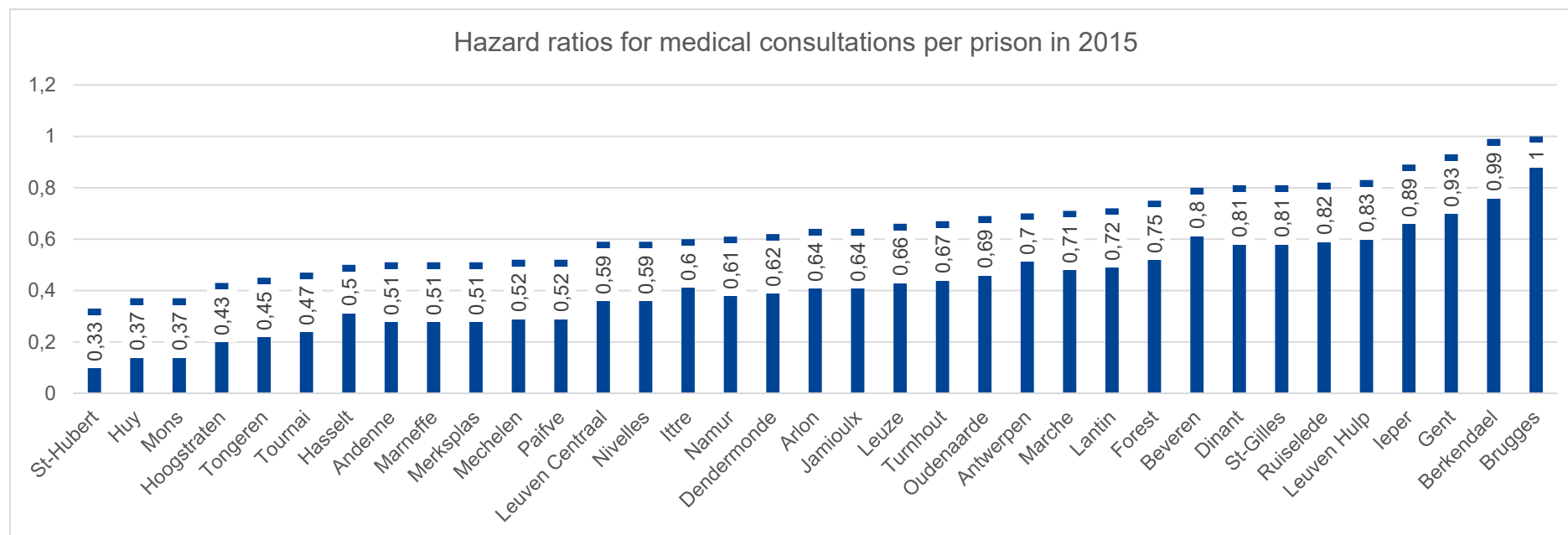
Nationality was not anymore a factor significantly associated with the consultation rate. In contrast, the consultation rate was lower in individuals having no residence permit (by 14%; 95%CI: 9%; 19%) or being an unregistered EU citizen (by 23%; 95%CI: 1%; 28%) in comparison with those with a legal residence status. Not speaking French or Dutch was also a factor associated with a lower consultation rate.

The consultation rate was significantly higher (+30%; 95%CI: +25%; +36%) in new prisoners than in prisoners whose incarceration had started before

the observation year, even after adjustment for the time spent in prison during the observation year.

In contrast to what was observed in bivariate analysis, the consultation rate was lower in accused individuals (-16%; 95%: -13%; -20%) but higher in interneers (+29%; 95%CI: +19%; +40%), than in condemned prisoners.

Finally, high variability of consultations rates was observed across prisons, even after adjustment for the effect of covariates. For example, the consultation rates were not significantly different in Berkendael, Gent, Ieper and Ruiselede than in Brugge prison, although the latter has a medical center resulting expectedly in a high consultation rate. All the other prisons had a significantly lower consultation rate than Brugge, even Saint-Gilles/Sint-Gillis where there is also a medical center. Moreover, there was great variation in how lower the consultation rate was, e.g. by more than 50% in Huy, Mons, and Saint-Hubert. These variations are illustrated in the Figure 7 plotting Hazard Ratio derived from the Cox model (Brugge being the reference prison).

**Figure 7 – Hazard ratios for medical consultations, per prison in 2015**

Hazard ratios are derived from the multilevel multivariate Cox regression model, with adjustment for all other covariates, with Brugge taken as the reference prison


Table 9 – Multivariate analysis of overall consultation rates

Variables	Categories	Hazard ratio	95%CI		p-value
Time in prison during observation year	<3 months	ref	-	-	-
	3 months-<6 months	0.64	0.62	0.67	0.0000
	6 months-<9 months	0.59	0.56	0.62	0.0000
	>=9 months	0.49	0.47	0.51	0.0000
Age	<20y	0.62	0.56	0.69	0.0000
	20-<30y	0.79	0.75	0.82	0.0000
	30-<40y	0.90	0.86	0.94	0.0000
	40-<50y	ref	-	-	-
	50-<60y	0.87	0.82	0.93	0.0000
	>=60y	1.08	0.94	1.23	0.2690
Sex	Female	1.44	1.33	1.57	0.0000
	Male	Ref	-	-	-
Nationality	Belgian	Ref	-	-	-
	Foreigner	0.98	0.94	1.03	0.3720
Residence status	Legal	Ref	-	-	-
	Not allowed	0.86	0.81	0.91	0.0000
	Unregistered EU citizens	0.77	0.72	0.83	0.0000
Language	French	Ref	-	-	-
	Dutch	0.95	0.89	1.01	0.1280
	Other	0.82	0.77	0.88	0.0000
Status	Condemned	Ref	-	-	-
	Accused	0.84	0.80	0.87	0.0000
	Internees	1.29	1.19	1.40	0.0000
	Other	1.25	1.07	1.47	0.0060



Variables	Categories	Hazard ratio	95%CI		p-value
Entry during year of observation	Yes	1.30	1.25	1.36	0.0000
	No	Ref	-	-	-
Prison	Andenne	0.51	0.45	0.58	0.0000
	Antwerpen	0.70	0.65	0.76	0.0000
	Arlon	0.64	0.55	0.73	0.0000
	Berkendael	0.99	0.83	1.18	0.8880
	Beveren	0.80	0.70	0.90	0.0000
	Brugge	Ref	-	-	-
	Dendermonde	0.62	0.56	0.70	0.0000
	Dinant	0.81	0.68	0.96	0.0170
	Forest/Vorst	0.75	0.67	0.83	0.0000
	Gent	0.93	0.83	1.04	0.1800
	Hasselt	0.50	0.46	0.55	0.0000
	Hoogstraten	0.43	0.39	0.49	0.0000
	Huy	0.37	0.32	0.43	0.0000
	Ieper	0.89	0.75	1.06	0.1850
	Ittre	0.60	0.53	0.67	0.0000
	Jamioulx	0.64	0.57	0.72	0.0000
	Lantin	0.72	0.65	0.80	0.0000
	Leuven Centraal	0.59	0.53	0.67	0.0000
	Leuven Hulp	0.83	0.74	0.93	0.0010
	Leuze	0.66	0.58	0.76	0.0000
	Marche	0.71	0.62	0.81	0.0000
	Marneffe	0.51	0.45	0.58	0.0000
	Mechelen	0.52	0.46	0.59	0.0000



Variables	Categories	Hazard ratio	95%CI		p-value
	Merksplas	0.51	0.47	0.57	0.0000
	Mons	0.37	0.33	0.41	0.0000
	Namur	0.61	0.53	0.69	0.0000
	Nivelles	0.59	0.52	0.67	0.0000
	Oudenaarde	0.69	0.60	0.80	0.0000
	Paifve	0.52	0.43	0.63	0.0000
	Ruiselede	0.82	0.65	1.02	0.0720
	Saint-Gilles/Sint-Gillis	0.81	0.73	0.90	0.0000
	Saint-Hubert	0.33	0.29	0.37	0.0000
	Tongeren	0.45	0.39	0.53	0.0000
	Tournai	0.47	0.41	0.53	0.0000
	Turnhout	0.67	0.60	0.76	0.0000

Results were obtained by a multilevel Cox regression model with adjustment for all covariates, with Brugge as the reference prison

We performed a sensitivity analysis by re-running modified models (restriction to accused and convicted prisoners; restriction to new prisoners). All results were robust (data not shown). After removal of the first entry consultation of new prisoners, the rate remained higher in new prisoners than in long-term prisoners, but the Hazard ratio was somewhat lower (HR=1.15; 95%CI: 1.10; 1.20).

Results were also consistent when only GP consultations were under scrutiny, except that for both accused and internees, the consultation rate was significantly lower (respectively -19% (95%CI: -16%; -22%) and -17% (95%CI: -10%; -20%) than for condemned individuals. The hazard ratio per prison were also quite different from what was observed for all medical consultations (Table 10). First, there were more prisons which had no significant differences with Brugge. Second, some prisons had a higher GP

consultation rate than in Brugge, whereas for all consultation the rates were systematically lower than in Brugge (e.g. Arlon, Dendermonde, Dinant, Beveren). This difference could be substantial (e.g. in Gent, Dinant and leper). Lastly, in prisons which had a low rate ratio of all medical consultations, the rate ratio was closer to 1 when only GP consultations were considered.

As regards psychiatric consultations, there were two differences in comparison with associations observed for overall consultations. First, the consultation rates increased with the time spent in prison during the observation-year. Second, the consultation rate was expectedly much higher in internees than in other prisoners (HR=2.98; 95%CI: 2.66; 3.36). The substantial rate variation among prisons remained after adjustment for the effect of covariates.



Table 10 – Hazard Ratio of GP and psychiatric consultations, per prison in 2015

Variables	Categories	Hazard ratio GP	95%CI		p-value	Hazard ratio Psy	95%CI		p-value
Prison	Andenne	0.98	0.88	1.11	0.804	0.38	0.27	0.53	0.000
	Antwerpen	1.1	1.03	1.18	0.004	2.0	1.70	2.35	0.000
	Arlon	1.38	1.2	1.58	0.000	-	-	-	-
	Berkendael	0.94	0.8	1.1	0.424	3.82	2.98	4.90	0.000
	Beveren	1.52	1.35	1.71	0.000	0.92	0.73	1.15	0.464
	Brugge	Ref	-	-	-	Ref	-	-	-
	Dendermonde	1.24	1.12	1.38	0.000	0.56	0.44	0.72	0.000
	Dinant	1.85	1.55	2.21	0.000	0.15	0.06	0.36	0.000
	Forest/Vorst	0.82	0.76	0.89	0.000	3.32	2.71	4.06	0.000
	Gent	1.55	1.4	1.72	0.000	1.91	1.60	2.29	0.000
	Hasselt	0.86	0.79	0.91	0.000	1.15	0.96	1.37	0.141
	Hoogstraten	0.86	0.77	0.96	0.010	0.29	0.20	0.41	0.000
	Huy	0.79	0.68	0.91	0.001	-	-	-	-
	Ieper	1.83	1.54	2.17	0.000	0.84	0.66	1.08	0.170
	Ittre	0.98	0.88	1.08	0.643	1.02	0.80	1.30	0.896
	Jamioulx	1.32	1.19	1.46	0.000	0.61	0.47	0.78	0.000
	Lantin	1.04	0.96	1.13	0.344	0.95	0.77	1.17	0.616
	Leuven Centraal	1.16	1.04	1.29	0.007	0.59	0.46	0.76	0.000
	Leuven Hulp	1.64	1.48	1.82	0.000	1.10	0.87	1.38	0.420
	Leuze	1.25	1.1	1.42	0.001	0.73	0.56	0.96	0.024
	Marche	1.4	1.24	1.57	0.000	0.81	0.61	1.06	0.129
	Marneffe	1.1	0.97	1.25	0.127	-	-	-	-
	Mechelen	1.07	0.95	1.2	0.252	0.25	0.17	0.35	0.000
	Merksplas	1.1	1.02	1.2	0.020	0.73	0.60	0.87	0.001
	Mons	0.6	0.55	0.66	0.000	0.76	0.59	0.98	0.033



Variables	Categories	Hazard ratio GP	95%CI		p-value	Hazard ratio Psy	95%CI		p-value
	Namur	1.19	1.06	1.34	0.003	0.69	0.52	0.90	0.007
	Nivelles	0.96	0.85	1.08	0.471	1.41	1.11	1.79	0.004
	Oudenaarde	1.32	1.14	1.52	0.000	0.76	0.58	1.00	0.052
	Paifve	0.96	0.82	1.13	0.665	1.18	0.90	1.55	0.226
	Ruiselede	1.52	1.21	1.91	0.000	0.63	0.44	0.90	0.011
	Saint-Gilles/Sint-Gillis	1.08	0.99	1.17	0.068	1.14	0.86	1.49	0.364
	Saint-Hubert	0.67	0.6	0.72	0.000	-	-	-	-
	Tongeren	0.96	0.83	1.12	0.644	-	-	-	-
	Tournai	0.87	0.78	0.96	0.007	0.83	0.63	1.10	0.198
	Turnhout	1.54	1.38	1.72	0.000	0.61	0.51	0.74	0.000

Results were obtained by a multilevel Cox regression model with adjustment for all covariates, with Brugge as the reference prison

Finally, we assessed in multilevel multivariate regression model which covariates were associated with a high medical consultation number per time unit ("high intensity") at individual level. Results are presented in annex 1. They are all consistent with the ones described above. We also assessed the factors associated with having no medical consultation during the observation year. Short duration of incarceration, not being a new prisoner, and prison were the factors with the greatest effect on the probability of not having a medical consultation during the observation year (data not shown).

3.4 Medical prescriptions

In year 2015, there were 203 903 records of medication prescriptions in Epicure (Wortel prison excluded). Their crude distribution by ATC1 is presented in Table 11 (the distribution by ATC2 is presented in annex 2). However, one should be aware that several lines for the same medications can appear for a given person (e.g. prescription renewal), and the treatment

duration for each prescription can vary, and a more accurate figure of the relative weight of each medication can be assessed by summing up the total number of medication days. There were 10 473 550 treatment days, i.e. 1 019 treatment days per person-year. The ATC1 category most prescribed was medications for the nervous system with 43.3% of the prescriptions (53% of treatment days), and 58.8% of prisoners received at least one prescription of that group during the observation year (76.4% for those who stayed 12 months in prison during the observation year). During the observation year, 21.2% of patients received at least one prescription of anti-psychotics, 25.3% anti-depression treatment, 30.6% received anxiolytics, and 7.3% opioid substitution (Table 12). These proportions remain stable when the analysis excluded interneers. The other frequent ATC1 were medications for alimentary tract & metabolism, medications for the musculo-skeletal system and medications for the respiratory system. Overall, 21.5% of prisoners (5 593/26 064) did not receive any medication (5.8% in those who stayed 12 months during the observation year).


Table 11 – Number of prescriptions, days of medication and % of patients with at least one prescription in 2015, per ATC1 level

ATC1 class	Number of prescriptions	%	Number of days of medications	%	% patients (N=26 064) with at least 1 prescription	%patients who stayed 12 months (N=4 386) with a least 1 prescription
Alimentary Tract & Metabolism	23 033	11.30	1 467 654	14.01	33.90	54.51
Blood & Blood Forming Organs	2 349	1.15	318 439	3.04	5.70	9.85
Cardiovascular System	7 697	3.77	1 075 426	10.27	13.43	21.71
Dermatologicals	9 116	4.47	211 351	2.02	18.83	35.20
Genito Urinary System & Sex Hormones	1 209	0.59	166 071	1.59	3.12	5.27
Systemic Hormonal Preparations (Excl. Sex Hormones & Insulin)	2 567	1.26	94 681	0.90	3.75	8.82
Antiinfectives for Systemic Use	12 875	6.31	232 970	2.22	25.03	47.31
Antineoplastic & Immunomodulating Agent	301	0.15	39 898	0.38	0.60	0.91
Musculo-Skeletal System	25 120	12.32	275 265	2.63	39.04	66.83
Nervous System	88 327	43.32	5 574 993	53.23	58.76	76.38
Antiparasitic Products, Insecticides & Repellents	373	0.18	6 484	0.06	1.19	1.66
Respiratory System	28 198	13.83	957 594	9.14	35.44	60.60
Sensory Organs	2 709	1.33	49 857	0.48	6.93	14.61
Various	29	0.01	2 867	0.03	0.10	0.27
Total	203 903	100.00	10 473 550		-	-

Table 12 – % of patients with at least one prescription in 2015, per specific ATC codes

Prisoners	N	% No medication	% HIV	% HCV	% Tuberculosis	% Diabetes	% Pulmonary Obstructive Disease	% Psychosis	% Depression	% Anxiety	% Opioid dependence	% Hypertension
All	26 064	21.46	0.43	0.12	0.48	2.59	8.38	21.17	25.35	30.62	7.26	8.20
Stay of 12 months	4 386	5.81	0.52	0.34	1.05	3.90	14.93	30.44	31.46	38.14	6.95	11.92



Figures in Table 12 correspond to the % of prisoners having received at least one prescription of the corresponding medication group, as described in

Table 1. Great variations in medication frequency across prisons could be observed (Table 13).

Table 13 – % of patients with at least one prescription in 2015, per specific ATC codes^p

Prison	Nb of Prison with at least one night in 2015	% No medication	% HIV	% Tuberculosis	% Diabetes	% Pulmonary Obstructive Disease	% Psychosis	% Depression	% Anxiety	% Opioid substitution	% Hypertension
Andenne	618	13.2	0.65	0.16	2.75	11.11	10.68	16.34	34.3	10.84	7.12
Antwerpen	3.243	30.3	0.99	0.12	1.6	4.96	18.38	16	12.52	4.38	5.95
Arlon	354	17.3	2.26	0	3.11	7.06	16.38	11.86	49.44	12.43	4.8
Berkendael	384	27.5	3.39	0.26	3.91	10.42	27.08	26.3	39.84	5.47	8.07
Beveren	522	15.0	1.92	2.49	1.53	6.32	17.43	19.35	20.88	3.26	9.39
Brugge	2.406	22.2	1.29	1.08	2.91	9.93	24.56	28.68	24.27	6.28	10.18
Dendermonde	865	28.4	0.46	0.23	1.04	0.92	22.31	26.59	37.11	7.28	5.66
Dinant	249	18.4	0.8	0	0.4	2.01	16.06	28.11	54.22	12.05	7.23
Forest/Vorst	2.763	36.9	0.58	0.11	2.24	3.91	16.25	14.51	28.92	3.51	4.2
Gent	1.482	22.8	0.34	0	1.75	7.35	17.75	15.99	33.54	7.22	9.24
Hasselt	1.728	28.5	0.35	0.46	2.2	5.03	21.18	22.11	27.66	6.25	6.94
Hoogstraten	349	24.7	0.29	0	0.57	9.46	11.17	12.89	13.18	3.72	4.87
Huy	263	26.6	0	0	2.28	7.6	12.55	21.67	46.01	14.07	7.98
Ieper	456	28.3	0.66	0.44	1.75	6.14	22.81	20.18	15.35	12.06	10.09
Ittre	675	13.8	1.33	0.15	2.81	12.15	10.52	10.52	25.04	3.11	4.3
Jamioulx	1.179	17.5	0.25	0	2.37	8.4	18.32	27.48	42.32	10.77	6.45
Lantin	3.07	27.9	0.98	0.03	2.61	8.99	18.73	28.63	24.36	12.31	7.49

^p A given prisoner can appear in various prisons



Prison	Nb of Prison with at least one night in 2015	% No medication	% HIV	% Tuberculosis	% Diabetes	% Pulmonary Obstructive Disease	% Psychosis	% Depression	% Anxiety	% Opioid substitution	% Hypertension
Leuven Centraal	721	30.6	0.55	0.97	1.94	7.77	10.68	15.53	8.74	1.66	8.6
Leuven Hulp	1.117	36.9	0.27	0.09	1.43	2.6	11.28	21.22	13.16	4.66	5.01
Leuze	416	17.6	0.72	0.72	0.48	8.65	17.31	13.22	38.7	5.53	2.4
Marche	586	12.3	1.19	0	3.24	22.53	28.16	27.99	46.42	17.06	10.24
Marneffe	262	14.2	0.38	0.38	1.15	9.92	4.58	18.7	41.6	4.2	3.82
Mechelen	585	39.2	2.39	0	1.54	3.76	7.18	10.94	11.97	2.39	5.81
Merksplas	1.369	22.7	0.8	0.88	1.9	8.77	22.28	20.96	10.74	3.8	4.89
Mons	1.164	25.4	0.6	0	2.49	6.53	22.25	24.74	39.95	7.56	8.76
Namur	581	19.3	0.17	0	1.89	4.99	23.92	24.44	49.4	11.7	4.99
Nivelles	631	19.5	1.43	0	1.43	7.13	16.64	23.45	36.45	4.91	5.55
Oudenaarde	438	27.9	0	0	1.6	7.99	9.36	16.89	21.46	6.62	5.02
Paifve	227	2.6	1.76	0	13.22	20.26	67.84	36.56	61.67	0	22.03
Ruiselede	121	29.7	0.83	0	0.83	5.79	9.92	15.7	14.88	2.48	6.61
Saint-Gilles	2.962	33.3	0.44	1.25	1.72	5.17	11.61	20.02	21.13	2.7	3.81
Saint-Hubert	468	22.9	1.5	0	2.56	7.26	11.11	11.11	28.21	8.97	5.77
Tongeren	181	50.3	0	0	0.55	2.21	1.1	14.36	2.76	0.55	1.1
Tournai	580	23.5	0.17	0.17	1.55	8.79	25.17	23.97	40.34	10.34	4.48
Turnhout	941	23.3	0.53	0.43	2.55	5.31	22.64	26.04	14.24	2.98	10.95



Figures correspond to the % of prisoners having received at least one prescription of the corresponding medication.

3.5 Determinants of medical prescriptions

For determinants of medical prescriptions, we modelled obstructive pulmonary disease, as an example. Overall, associations were in the same direction as observed for utilization of medical consultations: higher in the age category 40-<50 years and in women, lower in undocumented migrants and unregistered EU citizen, lower in those speaking another language than French and Dutch. However, there was no statistical difference between accused and convicted individuals, and the difference between internees and convicted was small (+1.9%; 95%CI: +0.3%; +3.4%). There was also no significant differences between new prisoners and others (data not shown). Expectedly, the proportion of prisoners receiving a prescription increased with the time spent in prison during the observation year. There was a great variability among prisons (Table 13). The percentage utilization was overall 7.0% but went from 0.9% in Dendermonde to 22.5% in Marche. Even after adjustment for the effect of covariates (age, sex, nationality, residency entitlement, language, length of stay in prison, legal status), most of these differences remain, as shown in Table 14.

We did the same exercise for opioid substitution. Overall, associations were in the same directions as observed for utilization of medical consultations: higher in the age category 40-<50 years, in women, lower in undocumented migrants and unregistered EU citizen. The proportion of accused (-2.4%; 95%CI: -3.1%, -1.1%) and internees (-5.7%; 95%CI: -7.1%; -4.3%) receiving opioid substitution is lower than in convicted prisoners. Again, great variations were observed across prisons. The percentage utilization of opioid substitution was overall 7.3% but went from 2.7% in St-Gilles to 17.1% in Marche. Even after adjustment for the effect of covariates (age, sex, nationality, residency entitlement, language, length of stay in prison, legal status), most of these differences remain, as shown in Annex 3.

Table 14 – Adjusted absolute % differences in treatment for obstructive pulmonary disease, per prison

Prison	% difference	95%CI		P-value
Andenne	-1.35	-3.73	1.03	0.265
Antwerpen	-2.17	-3.53	-0.82	0.002
Arlon	-1.22	-4.21	1.77	0.424
Berkendael	-2.59	-5.72	0.54	0.105
Beveren	-5.13	-7.48	-2.78	0.000
Brugge	Ref	-	-	-
Dendermonde	-6.76	-8.83	-4.68	0.000
Dinant	-6.04	-9.70	-2.38	0.001
Forest/Vorst	-3.21	-4.79	-1.62	0.000
Gent	-1.97	-3.72	-0.22	0.028
Hasselt	-4.38	-6.04	-2.73	0.000
Hoogstraten	-2.52	-5.32	0.27	0.077
Huy	-3.11	-6.50	0.29	0.073
Ieper	-1.11	-3.74	1.52	0.407
Ittre	-0.67	-2.95	1.61	0.566
Jamioulx	-0.63	-2.61	1.35	0.533
Lantin	-1.24	-2.79	0.31	0.116
Leuven Centraal	-2.66	-4.75	-0.58	0.012
Leuven Hulp	-3.63	-5.49	-1.77	0.000
Leuze	-3.05	-5.73	-0.37	0.026
Marche	9.88	7.36	12.39	0.000
Marneffe	-2.92	-6.17	0.34	0.079
Mechelen	-2.59	-4.93	-0.26	0.029
Merksplas	-2.08	-3.77	-0.38	0.016



Prison	% difference	95%CI		P-value
Mons	-5.06	-7.05	-3.07	0.000
Namur	-4.94	-7.46	-2.42	0.000
Nivelles	-2.31	-4.73	0.10	0.060
Oudenaarde	-0.65	-3.26	1.95	0.623
Paifve	1.13	-2.69	4.95	0.561
Ruiselede	-5.55	-9.99	-1.10	0.014
Saint-Gilles	-3.09	-4.59	-1.58	0.000
Saint-Hubert	-4.82	-7.38	-2.25	0.000
Tongeren	-1.64	-5.34	2.06	0.385
Tournai	-1.04	-3.50	1.43	0.410
Turnhout	-2.95	-4.94	-0.96	0.004

Figures correspond to the absolute % difference of treatment for obstructive pulmonary disease across prisons (as proxied by ATC2 "R03"), after adjustment for covariates (Brugge being the reference prison).

4 DISCUSSION

High consultation rates

The overall mean rate of medical consultations was 23.7 per person-year (95%CI: 23.6; 23.8). This high consultation rate might even be underestimated as specialist consultations done outside prison are not registered in Epicure, and there is also uncertainty around the systematic registration of specialist consultations within prison.

The vast majority of medical consultations in prison was achieved by GP (77.8%). Such a high proportion of GP consultations was not an unexpected finding as health services in prison are centred on primary health care. The GP consultation rate was at 18.3 per person-year (95%CI: 18.2; 18.4), and 16.3 per person-year (95%CI: 16.2; 16.4) if the compulsory entry consultation was discarded. This was a very similar figure as the one reported by Feron et al. (consultation rate=17.2; 95%CI: 15.0; 19.4), who excluded the examination on entry^{1,2}. This was estimated to be 3.8 higher than in the general population (after standardisation on age and sex)¹. An even higher multiplicative factor is verified when using more recent reference data of the Belgian National Health Survey in 2013 where the mean annual GP consultations for people aged 20-50 years was 3.2 (95%CI: 2.8; 3.6)⁸. Factors specific to the prison setting contribute to the high rate of GP consultations. First, a medical examination on entry is legally compulsory. We found that overall, such consultations represented 10.8% of GP consultations, and 22.2% of GP consultations in new prisoners. In their study including 513 prisoners of whom they recoded manually the Epicure data, Feron et al. reported a proportion of 14.7%¹. Second, a number of social factors inherent to living in prison may influence the demand for primary health care, for example inmates may use their rights to health care as strategies to maintain some form of control over their lives² (see chapter 3 for more results on this publication). Lastly, and more importantly, there is an abundant literature demonstrating that the health status of prisoners is in general worse than the general population (see chapter 3 for more details).



Variation in health care utilization

We found that a number of factors were associated with a higher medical consultation rate: a short stay in prison (<3 months), being aged 40-<50 years and >=60 years, being a female. The consultation rate was lower in individuals having no residence permit (by 14%; 95%CI: 9%; 19%) or being an unregistered EU citizen (by 23%; 95%CI: 17%; 28%) in comparison with those with a legal residence status. This is a striking finding, although such differences in health care utilization has also been observed outside prison⁹. One contributing factor may be language barriers, as speaking another language than French and Dutch was also a factor associated with a lower consultation rate. Different health seeking behaviours may also be at stake. Whatsoever, making sure that these individuals benefit an equitable access to health care is an important step forward. This could be facilitated by the use of distance-based translators during the medical consultations, although other factors are likely to play a role.

In summary, the consultation rate, after adjustment for all covariates, was:

- higher
 - o in prisoners having stayed less than 3 months in prison during the observation year, even when the compulsory entry consultation is discarded
 - o in new prisoners
 - o in the age categories 40-<50 years and >=60 years than in other categories,
 - o in females than in males.
 - o in internees than in condemned prisoners
- lower
 - o in individuals having no residence permit or being an unregistered EU citizen in comparison with those with a legal residence status.
 - o in prisoners not speaking French or Dutch
 - o in accused individuals (-16%; 95%: -13%; -20%) than in condemned prisoners.

The consultation rate was also significantly higher (relative increase of 30%; 95%CI: +25%; +36%) in new prisoners than in prisoners whose incarceration had started before the observation year, even after adjustment for the time spent in prison during the observation year. This rate remained higher when the first entry consultation of new prisoners was discarded (relative increase of 15%; 95%CI: +10%; +20%). The higher consultation rate of new prisoners might reflect their greater health needs in comparison to prisoners who had been incarcerated for a longer time. The higher medical consultation rate observed in prisoners with a stay<3 months, is most likely due partly to the same phenomenon.

Finally, a high variability of consultations rates was observed across prisons, even after accounting for differences in prisoner populations. Even the rate of psychiatric consultations in internees displayed great variations. Likewise, our analysis also reported great variations among prisons in medication prescriptions. Such heterogeneity may reflect a different prison culture and management, a different organization of the health services, varying therapeutic options by medical providers, a different medical offer, or variations in the case mix of patients. For example, the higher % of prisoners being prescribed tuberculosis treatment in Brugge and Saint-Gilles/Sint-Gillis could be linked to the fact they are 2 reference centres. However, that does not explain the higher utilization % in Beveren than in other prisons, and the low % in Lantin which is also a reference centre. The higher % of prisoners using opioid substitutes in Lantin and Huy could be explained by the organization of a specific medical consultation for addicted people. The SUBANOP study¹⁰ also reported that the provision of psychosocial support for prisoners on substitution treatment varies, some prisons providing no such service, others not providing specific training for staff involved, while others do provide such support by trained staff, sometimes in collaboration with professionals outside the prison. Whatsoever, investigating in depth the causes of variations in health care utilization across prison was beyond the scope of this study.



A striking finding was the substantial proportion of prisoners (6.9%) who received no medical consultation during the observation year. This was mainly due to a short stay in prison during the observation year, not being a new prisoner and prison of residence. The differences between prisons were still apparent after adjustment for the other factors. For example, in Huy, even after restriction on new prisoners with a stay >7 days, the % with no medical visit remained substantial (11.3%; 15/133). Whether such high % was due to a specific health care organization (e.g. entry consultation done by a nurse) or to a registration problem should be further investigated.

Our results demonstrate clearly that health care delivery and/or utilization is heterogeneous across prisons, putting the question of equity in prison health care at stake. This finding emphasizes the need to harmonize the health care across prisons. Generating clinical and organizational guidelines would be a great step forward. Many international clinical guidelines for prison health are available, and could be easily adapted for the Belgian context. A good example of an organizational guidelines is the "Guide Méthodologique" in France. Providing health care professionals in prison with a specific training on the basis of these guidelines will be important. Such a training could result in an official accreditation as a way to value prison health professionals. Finally, monitoring the application of recommendations of good practice (e.g. by local audits or by feed-backs on prescriptions) should be implemented in order to early identify difficulties and propose solutions.

Contrasted use of medication prescriptions

As already mentioned, the dataset at our disposal could not allow to assess accurately disease frequency. First, the diagnoses were not readily available. Second, there was uncertainty around the detection rate of pathologies and around the treatment rate of detected pathologies. However, the Epicure dataset was useful for three set of analysis: to assess

what categories of treatment were most used; to investigate the variations in prescriptions and the associated factors (see above); to assess the proportion of patients receiving medications highly specific for a set of diseases (e.g. HIV, tuberculosis, HCV, diabetes).

There were 10 473 550 treatment days, i.e. 1 019 treatment days per person-year. In comparison, in the general population in 2013, this figure was 459¹¹. The most frequent treated pathologies were mental health problems (58.8% of prisoners with at least one prescription of the corresponding ATC category), musculoskeletal problems (39%), respiratory diseases (35.4%), and digestive problems (33.9%). This ranking is fully consistent with the one reported by Feron et al.¹ who based themselves on reasons for encounter and not on medication prescriptions. The Figure 8 shows that the distribution of ATC1 is very different⁹ in the general population, with a much lower utilization of medications for the nervous system⁸. The lower utilization of cardiovascular medication in prisons is expected as the population is younger. Another comparison shows that in 2013, 11.5% of the overall ATC1 treatment-days prescribed to the general population related to the nervous system¹¹. In our study, that ATC category represented 53% of treatment-days. These two comparisons should be interpreted with caution because of the lack of standardisation for age and sex. However, it is expected that the differences would be even greater after standardization.

Within the ATC group relating to the nervous system, there were three remarkable findings:

1. The proportion of patients receiving anti-psychotics (21%), anti-depressants (25%) and anxiolytics (31%) were high. Such high percentages were observed in all types of prisoners, i.e. not specifically in internees. Whether all the treatments were prescribed appropriately

⁹ Of note, the question asked during the Health Survey 2013 was on medications used in the last 2 weeks. The split by ATC1 of overall DDDs prescribed in 2013 can be found at http://www.absym-bvas.be/images/medicament/Farmaceutische_kengetallen/farma_kengetallen_verslag_2013.pdf



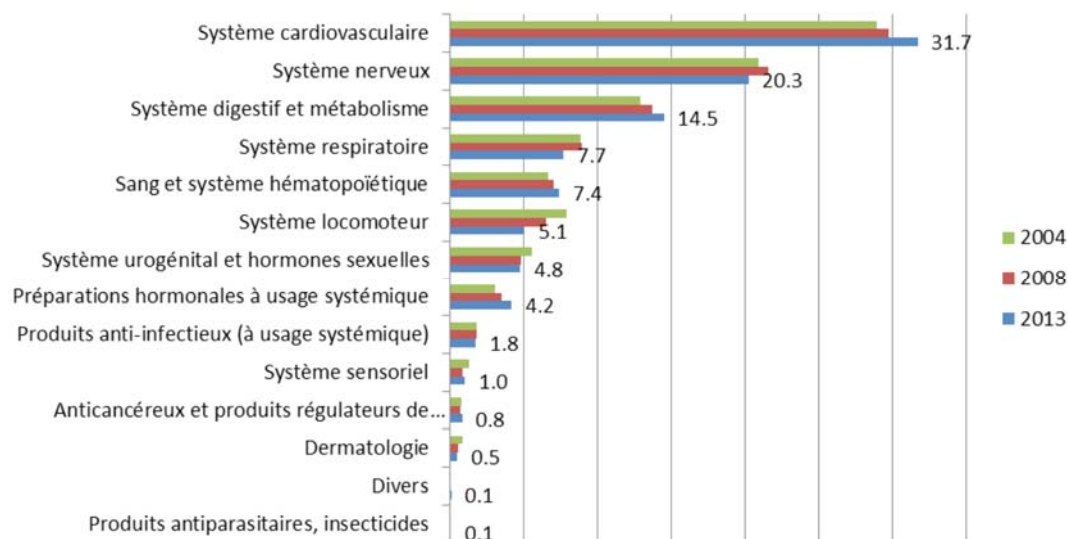
is unknown in the absence of confirmed clinical diagnosis. But the problem should be considered seriously as identifying prisoners with mental illness and administering treatment in prison have important protective effects against reoffending¹². Repeated screening with improved accuracy in identification is necessary to prevent cases being missed. It is also striking that this high utilization of medications for the nervous system contrasted with the relatively low proportion of consultations by specialists of mental health problems. A reinforcement of this category of medical staff should be considered. Mental health problems need also to be addressed/prevented by non-pharmacological approaches to mental health problems and changes in the prison environment and services offer, e.g. the organization of regular sport activities or peer-to-peer support groups.

2. The prescription of treatment for opioid dependence was much lower than expected (7% of prisoners), although variable across prisons (figures in Huy and Marche are close to 15%). For example, a survey of self-reported opiate use in Belgian prisons in 2008 mentioned 32% of users¹⁰. According to the European Monitoring Centre for Drugs and Drug Addiction, lifetime prevalence of illicit drug use, is reported to be

very high among prisoners, up to 50% for cocaine, heroin and amphetamines¹³. The low prescription rate of substitution treatment is alarming and is in clear violation of international human rights law and minimum standards on the treatment of prisoners¹⁴. It appears that the management of drug dependence is worst in prisons, where the problem is highly prevalent. Carael et al. in 2012 reported that of 10% of prisoners who were on a drug substitution treatment upon admission, only half continued that treatment in prison¹⁵. Similarly, Todts et al, in 2009 reported that 18.5% of prisoners said they had to stop their substitution treatment in prison (dictated by the medical personnel)¹⁶. For improving prisoner health and reducing the rate of reoffending, there is an urgent need to define and apply a strong and efficient program to promote substitution treatment and reduce harms¹⁴. The FPS Public Health is currently in the process of setting up a pilot program in the prisons of Berkendael, Lantin and Hasselt. Defining the elements of such an approach can also be based on the international scientific literature. For example, the effectiveness of opioid substitution therapy interventions were reported in nine identified SRs¹⁷⁻²⁵. For more information, please see chapter 3 of the scientific report.



Figure 8 – Distribution (in %) of the medication consumption per ATC1 group in general population, 2013



Source: ISP – WIV. Enquête de Santé 2013 (p 576). https://his.wiv-isp.be/fr/Documents%20partages/DR_FR_2013.pdf

For infectious diseases, the proportion of patients being treated was much higher than in the free society. In 2006, it was reported that the incidence of TB detection in the prison population was more than 10 times higher than in the general population²⁶. In our study, between 0.48% and 1.05% of prisoners received anti-tuberculosis treatments in 2015. Of course, the figures from prison setting is a mixture of incident and prevalent cases, and preventive therapy, which hampers a true comparison with national figures (the incidence of tuberculosis is 0.0088 % per year in Belgium²⁷).

As regards HIV, there were 15 266 patients with a medical follow-up in Belgium in 2015, which corresponds to a proportion of 0.17% of the adult population⁸. In the prison population, the proportion of treated prisoners was on average between 0.43% and 0.52%. In 2008, the HIV prevalence in

prison was reported to be 1%, i.e. five times higher than in the general population²⁸. Based on our analysis, this multiplicative factor seems to have remained quite constant (around 4). For chronic hepatitis C, between 0.12 % and 0.34% of prisoners were prescribed a treatment in 2015.

However, the proportion of untreated prisoners for these pathologies is unknown but might be substantial. For example, the frequency of HIV infection in prisoners was somewhat higher in neighbouring countries (France 2010: 2%; Ireland 2011: 1.9%; Luxembourg 2014: 2.2%; Spain 2010: 1.2%; UK 2014: 0.6%)²⁹. It has also been reported that the rate of HCV infection in prison ranges from 3.1% to 38%²⁹⁻³³. Although the treatment in Belgium was recommended until recently only for advanced stages of hepatitis, the % of treatment seems very low in comparison of what would



have been expected. A number of explanations for missed treatment opportunities in Belgian prisons can be put forward. First, the screening is not standardized or prisoners may be unaware of it. In 75% of the studied prisons (26/35 responded to the survey), TBC screening is the only type of screening being systematically offered when inmates enter the prison. Only in six prisons, inmates also get proposed to be screened for Hepatitis and HIV at entry. During the inmates' stay in prison, TBC screening is again systematically proposed in all surveyed prisons. Additionally, 50% of the surveyed prisons offer screening for hepatitis and HIV. Also the study of Michel et al.³⁴ found that the availability of systematic HIV testing was only 18% in Belgian prisons. Second, the necessary treatment is not necessarily implemented either for logistical reasons (e.g. when the length of stay of the prisoner is unknown) or budgetary reasons (e.g. treatment for hepatitis C is very expensive and currently the budget for health services in prison is closed). These elements point towards the need to reinforce the screening of infectious diseases and ensure that all screened prisoner receive the appropriate treatment.

Electronic medical files

The existence of an electronic medical file which allows the sharing of patient information among health care provider within a prison, but also amongst prisons, is an asset in terms of continuity of health care and information. Such electronic medical file in prison is implemented in only few countries³. However, its usability for health service monitoring and disease epidemiology is limited since the diagnosis recording does not follow a validated classification but are written in free text. Moreover, in case of hospitalization outside the prison, the health information are very inconsistently inserted in EPICURE. Moreover, the systematic use of Epicure by the health staff in charge of interneers ("zorgteams") is uncertain^r. These limits should be overcome by sensitizing health care providers to the importance of accurate data collection and strict recommendations on coding diagnosis following a validated and standardized methodology. Another software which would be designed to allow health care providers and researchers to monitor the frequency of health problems and which would be connected to the general health information system is also absolutely necessary.

^r During a field visit in Merksplas, it was observed that psychiatrists held a parallel register of consultations in Excel.



■ APPENDICES

APPENDIX 1. DETERMINANTS OF HIGH CONSULTATION INTENSITY

We assessed in multilevel multivariate regression model which covariates were associated with a high medical consultation number per time unit ("high intensity"). The proportion of "high intensity" was significantly higher in the age category 40-<50 years with no significant differences in the 2 upper categories compared to younger age. Being a woman was a factor significantly associated with "high intensity" (+10%; 95%CI: 8%-13%). A foreign nationality resulted in a slight decrease of the probability of "high intensity" (-2%), whereas both the absence of entitlement to stay on the Belgian territory (-7%; 95%CI: -9%; -5%) and being an unregistered EU citizen (-8%; 95%CI: -10%; -6%) were significantly associated with a lower probability of "high intensity". Declaring speaking English or an unknown language was also associated with a lower probability in comparison to prisoners speaking French or Dutch.

Regarding the legal status of prisoners being accused resulted in a lower probability of "high density" (-11%; 95%CI: -12%; -10%) as compared to convicted prisoners. On the contrary interneers presented a slightly higher probability. New prisoners (entry after 01/04/2015) had a significantly higher probability of "high" density" (+10%; 95%CI: 8%; 11%) than others.

Even after adjusting for the effect of the variables described above, there were important variations in medical consultations intensity among prisons. A higher number was expected in the prisons hosting a medical centre (Brugge, Lantin and Saint-Gilles/Sint-Gillis). By comparison to Brugge, expectedly, the probability of "high intensity" was lower in many prisons, but there were huge variations in this difference going to a low -27% (95%CI: -31%; -23%) in Saint-Hubert to non-significant differences in leper, Gent or Leuven-Hulp.


Table 15 – Factors associated with high consultation intensity (>percentile 75 of medical consultation per time unit)

Reference category	Category	% difference in comparison with reference category	95%CI		p-value
Age category: 40y-<50y	<20y	-12.28	-15.49	-9.07	0.000
	20-<30y	-5.84	-7.12	-4.57	0.000
	30-<40y	-2.19	-3.45	-0.94	0.001
	50-<60y	-0.53	-2.30	1.23	0.553
	>=60y	1.95	-0.67	4.58	0.145
Sex: male	Female	10.56	8.40	12.73	0.000
Nationality: Belgian	Non Belgian	-2.10	-3.41	-0.79	0.002
Residence status: allowed	Not allowed	-7.11	-8.75	-5.46	0.000
	Unregistered EU citizens	-8.08	-9.89	-6.28	0.000
Language: French	German	-3.48	-8.88	1.92	0.207
	English	-6.88	-9.77	-3.99	0.000
	Spanish	-5.17	-11.00	0.67	0.083
	Unknown	-2.80	-4.68	-0.92	0.004
	Dutch	-0.95	-2.55	0.64	0.242
Status: Condemned	Accused	-10.92	-12.05	-9.80	0.000
	Internees	2.69	0.43	4.95	0.020
New prisoners: yes	Prisoners entered before 01/04/2015	9.57	8.48	10.66	0.000
Prison: Brugge	Andenne	-15.16	-18.86	-11.46	0.000
	Antwerpen	-9.67	-11.76	-7.58	0.000
	Arlon	-11.02	-15.65	-6.39	0.000
	Berkendael	2.03	-2.83	6.90	0.412
	Beveren	-13.11	-16.79	-9.44	0.000
	Dendermonde	-13.02	-16.20	-9.84	0.000
	Dinant	0.38	-5.11	5.86	0.892
	Forest/Vorst	-7.99	-10.46	-5.53	0.000
	Gent	-1.32	-4.04	1.39	0.340
	Hasselt	-18.05	-20.60	-15.50	0.000
	Hoogstraten	-27.74	-32.08	-23.41	0.000
	Huy	-24.80	-30.07	-19.53	0.000



	leper	1.20	-2.92	5.32	0.569
	Ittre	-13.20	-16.75	-9.65	0.000
	Jamioulx	-12.84	-15.88	-9.79	0.000
	Lantin	-1.95	-4.35	0.46	0.112
	Leuven Centraal	-13.24	-16.48	-10.00	0.000
	Leuven Hulp	2.76	-0.13	5.65	0.061
	Leuze	-6.84	-11.03	-2.64	0.001
	Marche	-11.13	-15.03	-7.23	0.000
	Marneffe	-20.81	-25.88	-15.75	0.000
	Mechelen	-10.71	-14.28	-7.14	0.000
	Merksplas	-23.37	-26.01	-20.72	0.000
	Mons	-22.43	-25.50	-19.36	0.000
	Namur	-7.70	-11.61	-3.78	0.000
	Nivelles	-16.00	-19.76	-12.24	0.000
	Oudenaarde	-9.30	-13.34	-5.25	0.000
	Paifve	-10.31	-16.16	-4.46	0.001
	Ruiselede	-18.34	-25.30	-11.38	0.000
	Saint-Gilles/Sint-Gillis	-11.37	-13.72	-9.03	0.000
	Saint-Hubert	-26.62	-30.64	-22.59	0.000
	Tongeren	-26.28	-32.16	-20.40	0.000
	Tournai	-15.95	-19.73	-12.16	0.000
	Turnhout	-8.43	-11.49	-5.38	0.000
Number of days in prison	-	-0.11	-0.11	-0.10	0.000

Figures correspond to the absolute % difference, after adjustment for covariates (Brugge being the reference prison). Results are from a multilevel linear regression model.



APPENDIX 2. FREQUENCY OF MEDICATIONS BY ATC2

Table 16 – Number of medication prescriptions in 2015, per ATC2 level

ATC2	N	%
STOMATOLOGICAL PREPARATIONS	1257	0.62
DRUGS FOR ACID RELATED DISORDERS	7766	3.81
DRUGS FOR FUNCTIONAL GASTROINTESTINAL D	3810	1.87
ANTIEMETICS & ANTINAUSEANTS	6	0.00
BILE & LIVER THERAPY	8	0.00
LAXATIVES	2933	1.44
ANTIDIARRHEALS, INTESTINAL ANTIINFLAMMA	2250	1.10
ANTIOBESITY PREPARATIONS, EXCL. DIET PR	17	0.01
DIGESTIVES, INCL. ENZYMES	7	0.00
DRUGS USED IN DIABETES	1645	0.81
VITAMINS	3183	1.56
MINERAL SUPPLEMENTS	133	0.07
OTHER ALIMINARY TRACT & METABOLISM PRO	13	0.01
ANTITHROMBOTIC AGENTS	1765	0.87
ANTIHEMORRHAGICS	49	0.02
ANTIANEMIC PREPARATIONS	535	0.26
CARDIAC THERAPY	327	0.16
ANTIHYPERTENSIVES	83	0.04
DIURETICS	691	0.34
PERIPHERAL VASODILATORS	16	0.01
VASOPROTECTIVES	1761	0.86
BETA BLOCKING AGENTS	1702	0.83
CALCIUM CHANNEL BLOCKERS	609	0.30



ATC2	N	%
AGENTS ACTING ON THE RENIN-ANGIOTENSIN	1151	0.56
LIPID MODIFYING AGENTS	1352	0.66
ANTIFUNGALS FOR DERMATOLOGICAL USE	2739	1.34
EMOLLIENTS & PROTECTIVES	54	0.03
PREPARATIONS FOR TREATMENT OF WOUNDS &	42	0.02
ANTI-PRURITICS, INCL. ANTIHISTAMINES, AN	12	0.01
ANTIPSORIATICS	450	0.22
ANTIBIOTICS & CHEMOTHERAPEUTICS FOR DER	1186	0.58
CORTICOSTEROIDS, DERMATOLOGICAL PREPARA	3579	1.76
ANTISEPTICS & DISINFECTANTS	404	0.20
MEDICATED DRESSINGS	116	0.06
ANTI-ACNE PREPARATIONS	384	0.19
OTHER DERMATOLOGICAL PREPARATIONS	149	0.07
GYNECOLOGICAL ANTIINFECTIVES & ANTISEPT	90	0.04
OTHER GYNECOLOGICALS	14	0.01
SEX HORMONES & MODULATORS OF THE GENITA	442	0.22
UROLOGICALS	663	0.33
PITUITARY & HYPOTHALAMIC HORMONES & ANA	20	0.01
CORTICOSTEROIDS FOR SYSTEMIC USE	2149	1.05
THYROID THERAPY	391	0.19
PANCREATIC HORMONES	1	0.00
CALCIUM HOMEOSTASIS	6	0.00
ANTIBACTERIALS FOR SYSTEMIC USE	11124	5.46
ANTIMYCOTICS FOR SYSTEMIC USE	830	0.41
ANTIMYCOBACTERIALS	271	0.13
ANTIVIRALS FOR SYSTEMIC USE	477	0.23



ATC2	N	%
IMMUNE SERA & IMMUNOGLOBULINS	3	0.00
VACCINES	170	0.08
ANTINEOPLASTIC AGENTS	97	0.05
ENDOCRINE THERAPY	57	0.03
IMMUNOSTIMULANTS	24	0.01
IMMUNOSUPPRESSANTS	123	0.06
ANTIINFLAMMATORY & ANTIRHEUMATIC PRODUC	24562	12.05
TOPICAL PRODUCTS FOR JOINT & MUSCULAR P	49	0.02
MUSCLE RELAXANTS	86	0.04
ANTIGOUT PREPARATIONS	408	0.20
DRUGS FOR TREATMENT OF BONE DISEASES	15	0.01
ANESTHETICS	8	0.00
ANALGESICS	19284	9.46
ANTIEPILEPTICS	02703	1.33
ANTI-PARKINSON DRUGS	719	0.35
PSYCHOLEPTICS	40030	19.64
PSYCHOANALEPTICS	13881	6.81
OTHER NERVOUS SYSTEM DRUGS	11680	5.73
ANTIPROTOZOALS	149	0.07
ANTHELMINTICS	39	0.02
ECTOPARASITICIDES, INCL. SCABICIDES, IN	185	0.09
NASAL PREPARATIONS	8159	4.00
THROAT PREPARATIONS	3591	1.76
DRUGS FOR OBSTRUCTIVE AIRWAY DISEASES	5048	2.48
COUGH & COLD PREPARATIONS	7727	3.79
ANTIHISTAMINES FOR SYSTEMIC USE	3669	1.80



ATC2	N	%
OPHTHALMOLOGICALS	2047	1.00
OTOLOGICALS	481	0.24
OPHTHALMOLOGICAL & OTOLOGICAL PREPARATI	181	0.09
ALL OTHER THERAPEUTIC PRODUCTS	6	0.00
ALL OTHER NON-THERAPEUTIC PRODUCTS	23	0.01
TOTAL	203 903	100%



APPENDIX 3. OPIOID SUBSTITUTION

Table 17 – Adjusted absolute % differences in opioid substitution, per prison

Prisons	% difference with Marche		95%CI	P-value
Andenne	-4.94	-7.49	-2.38	0.000
Antwerpen	-7.49	-9.73	-5.25	0.000
Arlon	-2.66	-5.68	0.36	0.084
Berkendael	-8.63	-11.93	-5.34	0.000
Beveren	-9.68	-12.44	-6.93	0.000
Brugge	-7.30	-9.56	-5.04	0.000
Dendermonde	-5.26	-7.89	-2.63	0.000
Dinant	-3.02	-6.57	0.53	0.096
Forest/Vorst	-8.58	-10.73	-6.43	0.000
Gent	-6.27	-8.71	-3.82	0.000
Hasselt	-7.26	-9.66	-4.86	0.000
Hoogstraten	-10.69	-13.75	-7.63	0.000
Huy	-1.73	-5.10	1.63	0.313
Ieper	-3.08	-6.08	-0.08	0.044
Ittre	-11.07	-13.56	-8.58	0.000
Jamioulx	-3.05	-5.41	-0.69	0.011
Lantin	-2.94	-5.00	-0.88	0.005
Leuven Centraal	-11.56	-14.14	-8.99	0.000
Leuven Hulp	-6.71	-9.16	-4.25	0.000
Leuze	-10.01	-12.76	-7.26	0.000
Marneffe	-13.06	-16.23	-9.89	0.000
Mechelen	-9.06	-11.85	-6.26	0.000
Merksplas	-9.88	-12.27	-7.50	0.000



Prisons	% difference with Marche		95%CI	P-value
Mons	-8.16	-10.52	-5.81	0.000
Namur	-3.24	-5.96	-0.51	0.020
Nivelles	-9.27	-11.89	-6.64	0.000
Oudenaarde	-7.99	-10.96	-5.01	0.000
Paifve	-12.79	-16.59	-8.99	0.000
Ruiselede	-16.61	-20.87	-12.35	0.000
Saint-Gilles/Sint-Gillis	-9.98	-12.06	-7.90	0.000
Saint-Hubert	-7.02	-9.68	-4.37	0.000
Tongeren	-10.54	-14.09	-6.99	0.000
Tournai	-3.98	-6.67	-1.29	0.004
Turnhout	-8.93	-11.53	-6.33	0.000

Figures correspond to the absolute % difference in opioid substitution, after adjustment for covariates (Marche being the reference prison). Results are from a multilevel linear regression model.



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