

Medical practice variations

Spine surgery

Analysis of the distribution and evolution of medical practice in Belgium, in terms of volume and expenditure per insured (analysis and trends by region, province and district), for the year **2021**



NIHDI – Healthcare Service – Directorate for Research, Development and Quality promotion

Appropriate care unit

Pascal Meeus, Virginie Dalcq, Delphine Beauport, Katrien Declercq, Lucien Hoekx, Kathleen Sierens, Benjamin Swine

Contact: appropriatecare@riziv-inami.fgov.be

Date of report: 23 June 2022

CONTENTS

CONTENTS	2
1. INTRODUCTION	3
2. SPECIFIC METHOD OF ANALYSIS	4
A. NIHDI NOMENCLATURE CODES SELECTED FOR ANALYSIS.....	4
B. PAST HISTORY OF NOMENCLATURE CODES	5
C. SOURCE OF DATA AND ANALYSIS PERIOD.....	6
D. SPECIFIC SELECTION CRITERIA	7
E. STANDARDISATION.....	7
3. RESULTS	8
A. NATIONAL STANDARDISED RATE OF USE.....	8
B. BREAKDOWN OF NOMENCLATURE CODES PROVIDED, BY VOLUME.....	9
C. SPECIALISATION OF HEALTHCARE PROVIDERS	10
D. SPECIALISATION OF PRESCRIBERS.....	11
E. STANDARDISED RATE OF USE BY SEX AND AGE GROUP.....	12
F. STANDARDISED RATE OF USE: HOSPITAL AND OUTPATIENT CARE	16
G. STANDARDISED RATE OF USE BY REIMBURSEMENT SCHEME	18
H. TRENDS IN STANDARDISED RATES OF USE	20
I. GEOGRAPHICAL VARIATIONS IN STANDARDISED RATES OF USE	24
J. STANDARDISED HEALTHCARE EXPENDITURE BORNE BY THE INSURANCE	29
4. KEY DATA SUMMARY	32
5. APPENDICES	33
A. ANALYSIS OF VARIANCE (ANOVA), EXCEPT BRUSSELS	33
B. FREQUENCY OF PRACTICE OCCURRENCES.....	34
C. PATIENT CARE SETTINGS.....	36
D. CODING VARIATIONS AND PRACTICE ALTERNATIVES.....	38

1. INTRODUCTION

The Appropriate Care Unit was set up within the NIHDI's Directorate for Research, Development and Quality under NIHDI's Administration Contract for 2016-2018¹. Article 35 of this contract refers to 'the setting up of an Appropriate Care Unit, aiming specifically to promote an integrated approach to the rational use of resources'. The Appropriate Care Unit has been up and running since the second quarter of 2017.

The tasks of the Unit were set out formally in the '2016-2017 Healthcare monitoring Action plan', published by NIHDI on 18 July 2016². This plan lists around thirty measures designed to make healthcare provision more efficient, by encouraging appropriate practice and tackling unnecessary or inappropriate care.

The plan states that one of the tasks of the Appropriate Care Unit is to analyse the 'appropriateness of care', in order to identify unexplained variations in consumption patterns, identified after standardisation. Such variations can potentially point to non-optimal use of resources.

'Variations in medical practice' documents report on the analyses carried out in this framework. Each report focuses on a particular topic.

In this document, we present the figures and graphs relating to analyses³ of practice in the area of Spine surgery, and give the explanations necessary to understand these.

We have deliberately chosen not to attempt to interpret the figures, preferring to present the results to experts who are in a better position to do so. This document has nevertheless been made available to the public in order to provide objective, open input to discussions on this issue.

¹ (Institut national d'assurance maladie-invalidité, 2016)

² (Institut national d'assurance maladie-invalidité, 2016)

³ Readers interested in the methodology used in these quantitative analyses should consult the document entitled 'Variations in practice – Methodology'.

2. SPECIFIC METHOD OF ANALYSIS

A. NIHDI nomenclature codes selected for analysis

The NIHDI nomenclature codes selected for the analysis are listed below:

Outpatient	Inpatient	Rates	Expenses	Label	Creation	Deletion	Group N	Value
230694	230705	yes	yes	Intervention chirurgicale pour méningocèle	01-04-1985		N21	K180
230716	230720	yes	yes	Cordotomie	01-04-1985		N21	K225
230731	230742	yes	yes	Intervention chirurgicale pour pathologie médullaire	01-04-1985		N21	K225
230753	230764	yes	yes	Radicotomie	01-04-1985		N21	K225
231475	231486	yes	yes	Rhizotomie postérieure pluriétagée sélective sous microscope	01-04-2003		N21	K1000
232492	232503	yes	yes	(Re) mise en place percutanée ou chirurgicale, dans l'espace épidual, d'une ou de deux électrode(s) multipolaire(s) pour la stimulation de la moelle épinière	01-11-1998		N21	K186
232750	232761	yes	yes	Exérèse de lésion expansive envahissant les gaines médullaires, sous microscope opératoire	01-08-1988		N21	K400
232794	232805	yes	yes	Laminarthrectomie lombaire de plus de deux niveaux pour compression de la queue de cheval due à une étroitesse congénitale (Syndrome de Verbiest) ou acquise du canal rachidien	01-08-1988		N21	K400
281035	281046	yes	yes	Ostéosynthèse cervicale, y compris la greffe éventuelle	01-04-1985		N32	N500
281050	281061	yes	yes	Arthrodèse cervicale postérieure, y compris le prélèvement du greffon	01-04-1985		N32	N400
281072	281083	yes	yes	Arthrodèse occipito-cervicale, y compris le prélèvement du greffon	01-04-1985		N32	N500
281094	281105	yes	yes	Arthrodèse intercorporeale cervicale y compris le prélèvement du greffon	01-04-1985		N32	N625
281116	281120	yes	yes	Cure chirurgicale d'une hernie discale cervicale	01-04-1985		N32	N625
281514	281525	yes	yes	Réduction sanglante d'une luxation, fracture ou fracture-luxation de la colonne dorso-lombaire	01-04-1985		N32	N400
281536	281540	yes	yes	Ostéosynthèse vertébrale	01-04-1985		N32	N400
281551	281562	yes	yes	Arthrodèse vertébrale postérieure avec greffon apposé unilatéral ou bilatéral, y compris le prélèvement du greffon	01-04-1985		N32	N400
281573	281584	yes	yes	Arthrodèse vertébrale postérieure avec greffon encastré (Bosworth ou similaire) ou avec évidement élargi (Hibbs ou similaire), y compris le prélèvement du greffon	01-04-1985		N32	N500
281632	281643	yes	yes	Arthrodèse inter-articulaire postérieure, y compris le prélèvement du greffon	01-04-1985		N32	N450
281654	281665	yes	yes	Arthrodèse ou vissage intercorporeal par voie antérieure, y compris le prélèvement éventuel du greffon	01-04-1985		N32	N650
281676	281680	yes	yes	Arthrodèse intercorporeale par voie postérieure intrarachidienne	01-04-1985		N32	N625
281713	281724	yes	yes	Laminectomie sans ouverture de la dure-mère	01-04-1985		N32	N250
281735	281746	yes	yes	Laminectomie avec arthrodèse	01-04-1985		N32	N500
281750	281761	yes	yes	Flavoligamentectomie	01-04-1985		N32	N250
281772	281783	yes	yes	Cure chirurgicale d'une hernie discale autre que cervicale	01-04-1985		N32	N450
281794	281805	yes	yes	Cure chirurgicale de hernie discale et arthrodèse, y compris le prélèvement éventuel du greffon	01-04-1985		N32	N625
281816	281820	yes	yes	Résection de l'arc postérieur	01-04-1985		N32	N350
281853	281864	yes	yes	Résection de l'arc postérieur avec arthrodèse	01-04-1985		N32	N550
281875	281886	yes	yes	Résection d'une ou plusieurs apophyses épineuses	01-04-1985		N32	N200
281890	281901	yes	yes	Résection d'apophyse transverse	01-04-1985		N32	N225
281971	281982	yes	yes	Résection - reconstruction d'un ou plusieurs corps vertébraux	01-04-1985		N32	N700
300355	300366	yes	yes	Nucléotomie percutanée pour hernie discale sous contrôle d'amplificateur de brillance	01-07-1990		N32	N350

This table shows the NIHDI nomenclature codes selected for this analysis, stating whether or not they were included in the analyses of services and expenditure, and giving, for each one, a description, dates of creation and deletion, where appropriate, their N group (in the NIHDI nomenclature) and their value.

B. Past history of nomenclature codes

Outpatient	Inpatient	Date	Label
232492	232503	01-11-1998	Installation en position intradurale d'une électrode définitive à l'occasion d'une preuve d'essai
232492	232503	01-01-2012	(Re) mise en place percutanée ou chirurgicale, dans l'espace épidural, d'une ou de deux électrode(s) multipolaire(s) pour la stimulation de la moelle épinière
281853	281864	01-04-1985	Résection de l'arc postérieur avec arthrodèse
281853	281864	01-01-2014	Résection de l'arc postérieur avec arthrodèse



This table displays the historic evolution of the definitions of the NIHDI-nomenclature codes taken into account for this analysis, if modifications were implemented during the period 2011-2021.

C. Source of data and analysis period

The data used in the analyses have been taken from the following databases:

Document N	for the utilisation rate and amount of expenses of insured persons (who meet the selection criteria) whose age, sex, preferential regime and residence are known 2011-2021
Document P	for the utilisation rate and amount of expenses of insured persons (who meet the selection criteria) by type of medical specialities in 2021
Document P, SHA, ADH	for the practice occurrences and analysis of patient care settings in 2019
-	-

Analysis period	2011-2021
------------------------	-----------



'N Documents' are monthly data sent by the sickness funds to NIHD, within three months. These data show the number of services provided, dates and the fees involved. Every six months, these data are compiled by the insurers, which also add data on patients: age, gender, social category and district of residence. N Documents, however, cannot be used to analyse the combinations of services received by individual patients.

'P Documents' are six-monthly data sent by the sickness funds to NIHD, within four months. These data show the services provided, the service-provider, the prescriber, the place of provision of service, and the hospital where patients were treated. P Documents can be used to monitor medical consumption and pricing, but not (yet) to analyse services per patient.

'Documents SHA, ADH' are sent annually and within six months by the insurer-organisations to the NIHD. They include all the services provided respectively in day admission and standard hospitalisation, in general hospitals per hospital stay.

D. Specific selection criteria

Several filters may have been applied to the data, so that only one section of the population is considered in the analyses. If so, the filters used are shown in the table below:

FILTERS APPLIED TO DATA	
Sex	women and men
Age	all
-	-

E. Standardisation

The data are standardised before analysis per year, based on age, sex and preferential regime per arrondissement, province and region (standardization based on population in 2021).



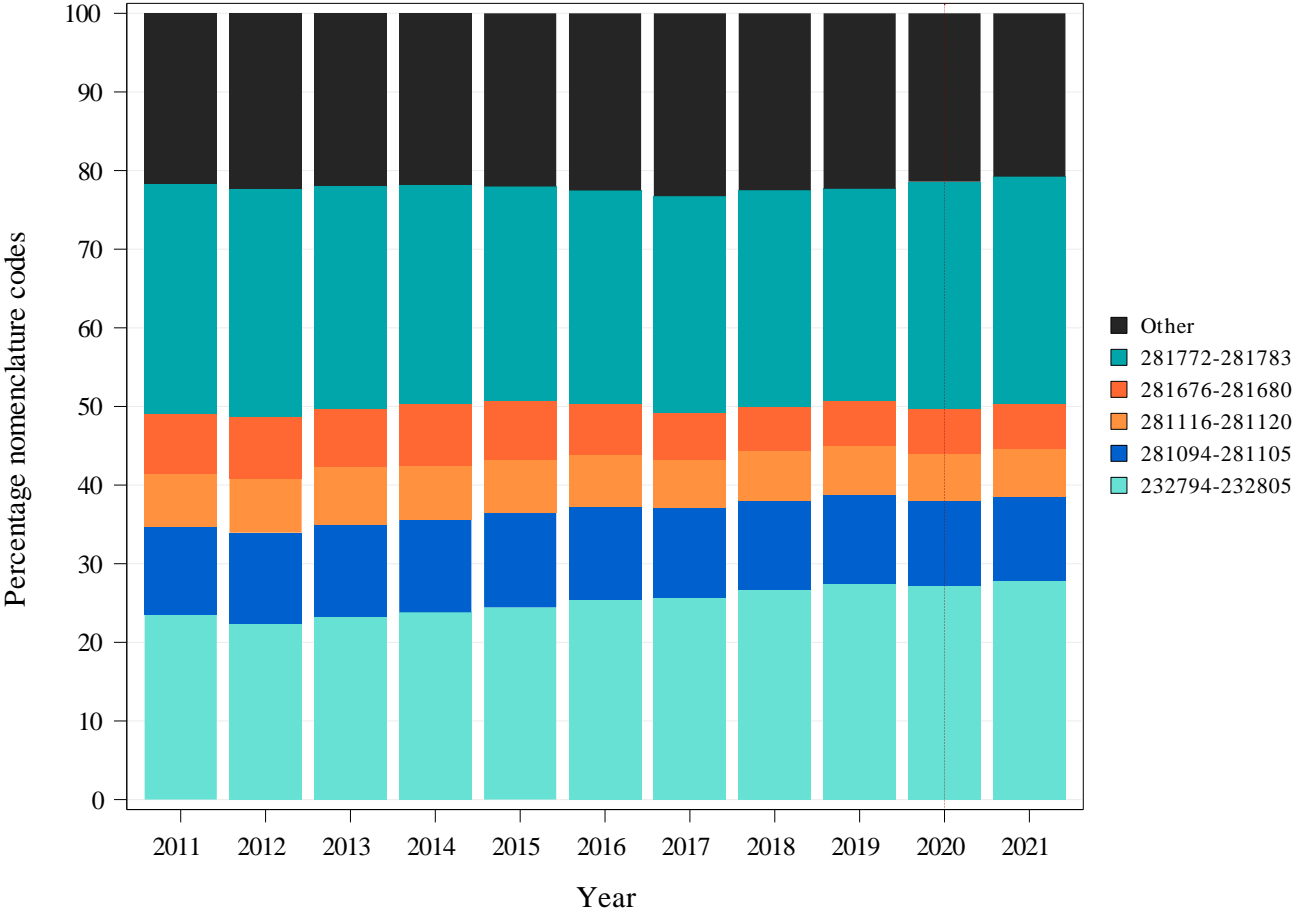
Standardisation renders populations comparable in relation to one or several criteria. If a difference is observed between these populations, we can therefore assume that it is not due to the criteria covered by the standardisation process.

3. RESULTS

A. National standardised rate of use

	TOTAL
Average number of interventions per year	35.387
Standardised rate of use per 100 000 insured persons	309

B. Breakdown of nomenclature codes provided, by volume



See page 4 for details about the NIHDI nomenclature codes selected for analysis.
Note : The year 2020 was highlighted by a vertical dashed line, in order to draw the attention on the impact of the COVID-19 crisis.

C. Specialisation of healthcare providers

Specialisation of the provider	Total providers	Concerned providers	% Providers	Median of H.C. services	Q3 of H.C. services	% Total H.C. services
Neurosurgery	221	187	85%	118	196	74,91%
Orthopedical surgery	1103	121	11%	44	108	22,77%
Anesthesia-reanimation	2328	58	2%	7	14	1,88%
Other specialities	6725	16	0%	2	5	0,44%
Total	10377	382	4%	62	145	100,00%



This table shows the following non-standardised data, by medical specialities (figures for the year 2021):

- The number of service-providers per specialisation who have recorded at least one service (the figures are exceptionally extrapolated from a single semester if an * is indicated in the header, otherwise the full year is taken into account);
- The number of service-providers recording services under the nomenclature codes selected for this analysis;
- The service-providers for these codes as a percentage of the total number of service-providers recording provision of at least one service;
- The median number and third quartile of services per service-provider (recording provision under these codes);
- The service percentage, i.e. the number of services recorded for this specialisation as a percentage of total services provided.

D. Specialisation of prescribers

Specialisation of the prescriber	Total prescribers	Concerned prescribers	% Prescribers	Median of prescriptions	Q3 of prescriptions	% Prescriptions
Not applicable	0	0	0%	0	0	100,00%



This table shows, in order, the following non-standardised data per specialities (figures for the year 2021):

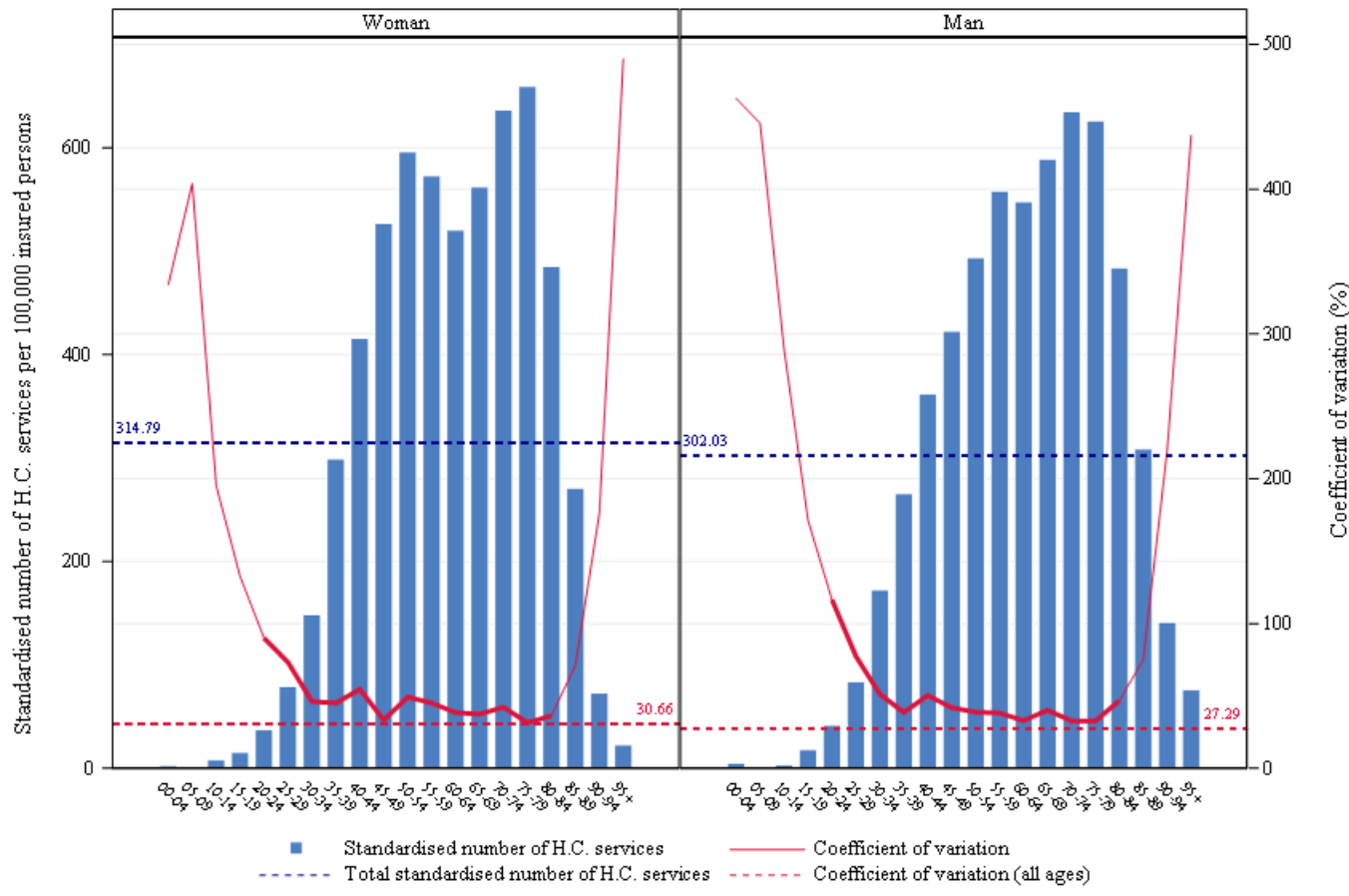
- The number of prescribers who have prescribed at least one service (the figures are exceptionally extrapolated from a single semester if an * is indicated in the header, otherwise the full year is taken into account);
- The number of prescribers prescribing the nomenclature codes selected for this analysis;
- The prescribers prescribing these codes as a percentage of the number of prescribers prescribing at least one service;
- The median number and third quartile of services per prescriber (prescribing these codes);
- The percentage of services prescribed, i.e. the number of prescriptions issued for this specialisation as a percentage of total services prescribed.

E. Standardised rate of use by sex and age group

	TOTAL
<i>Average number of interventions per year</i>	35.387
Median age (years)	58
Mean age (years)	57,79
Max/Min Ratio of the median age (by district)	1,22
Percentage of women	52,68%

Max/Min Ratio:

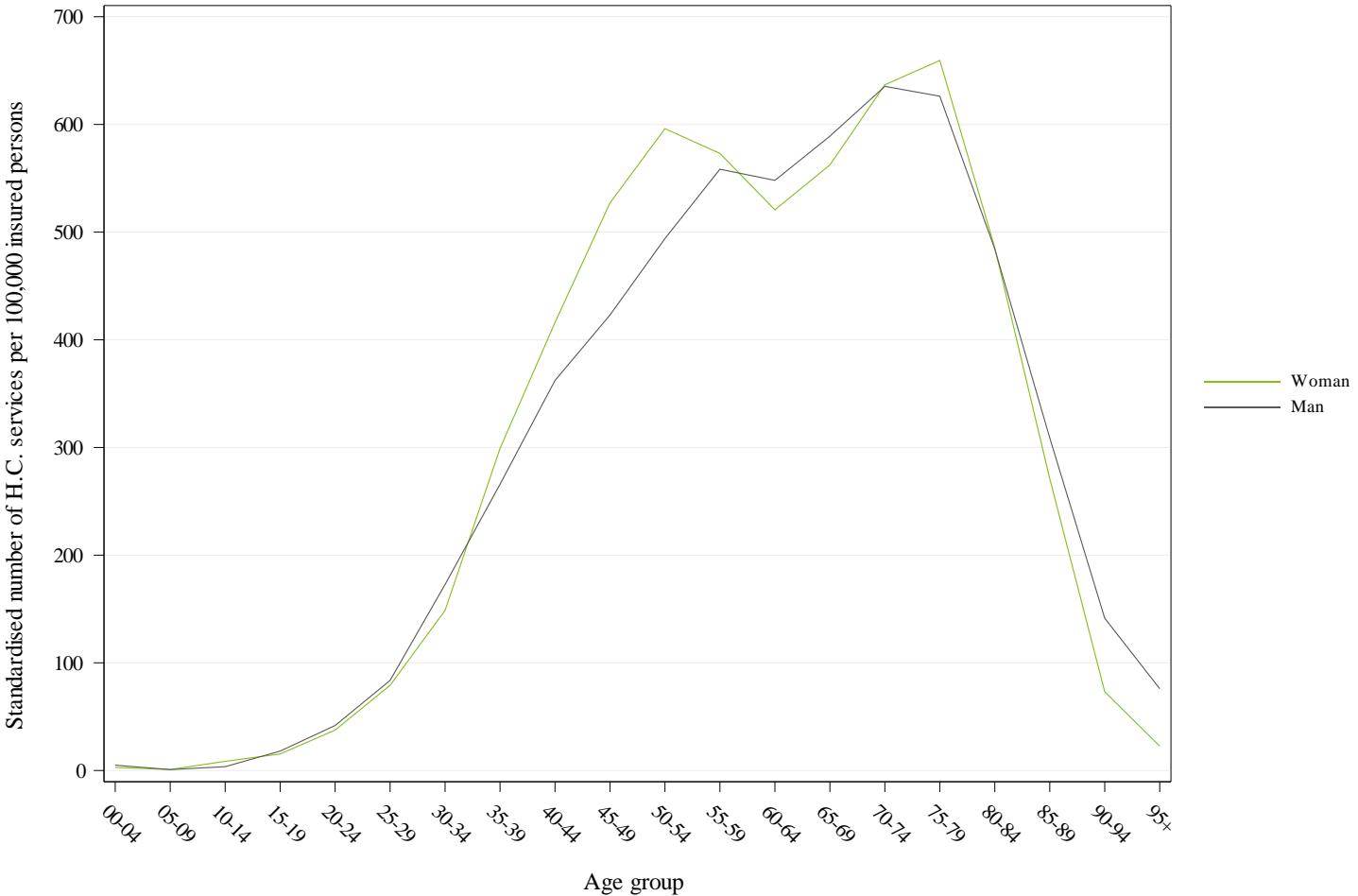
The max/min ratio measures the dispersion of values. It is calculated as the ratio of the maximum value found for the variable, in all districts, to the minimum value. If this minimum value is equal to zero, the max/min ratio cannot be calculated, and is reported as 'NA' ('not applicable').



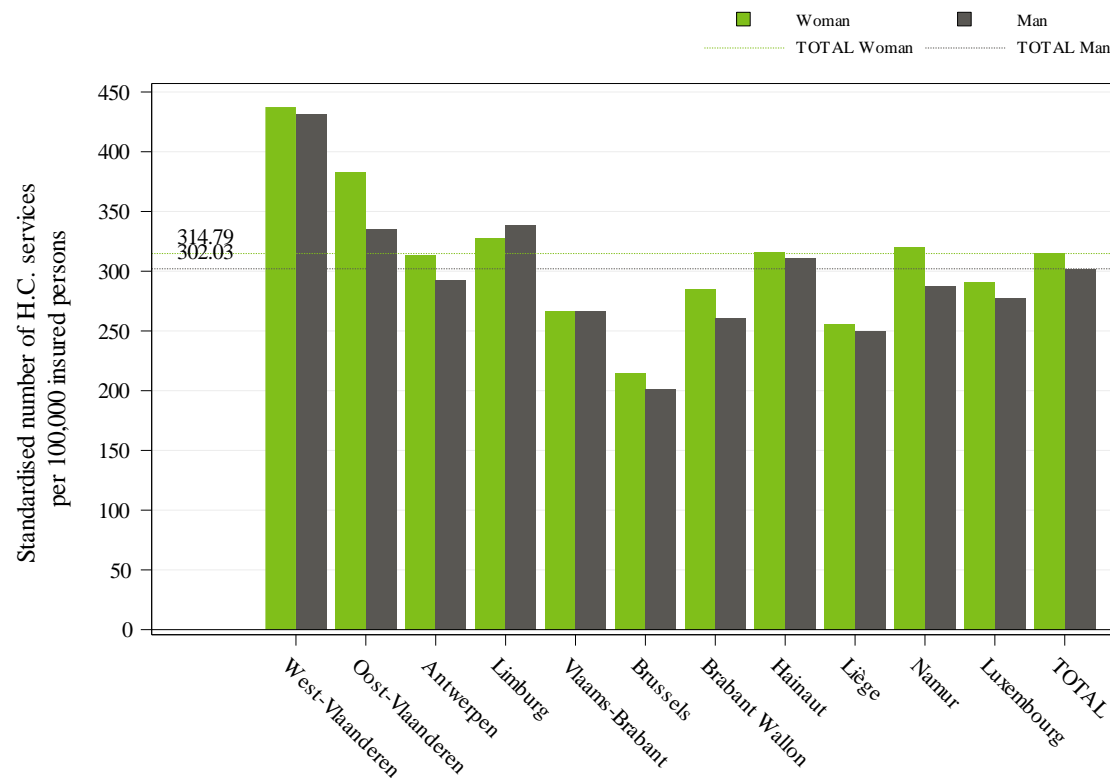
This figure is made up of bar charts for each sex. The **coefficient of variation**, shown by the red line, measures the relative dispersion of the standardised rates of use observed for each district, by age group and sex (standard deviation divided by the mean). This line is shown in bold for age groups where the coefficient of variation can be validly interpreted (i.e. for age groups in which there are sufficient insured persons per district to allow for a proper comparison).

The left-hand vertical axis of the graph represents the standardised rate of use, and the right-hand axis the coefficient of variation. The horizontal axis shows the age groups. The horizontal dotted lines show the total values of the standardised rates of use (in blue) and of the coefficient of variation (in red).

Standardised rate of use per 100 000 insured persons, and coefficient of variation for the districts, by age group and sex, for the year 2021



Comparison of the standardised rates of use by sex (per 100 000) in 2021

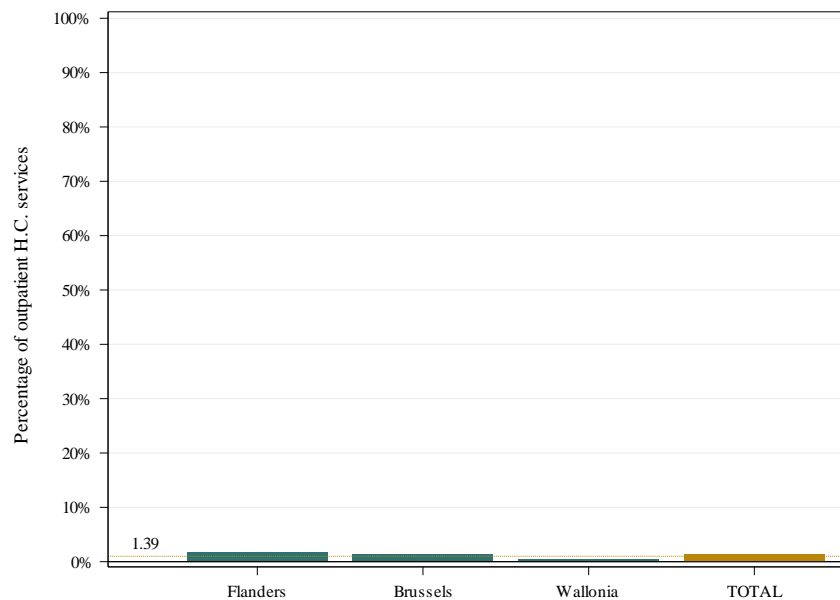


← This histogram shows standardised rates of use by province and by sex. The grey bars show the rates for men, while the green bars show the rates for women, for each province. The grey and green broken lines show the total standardised rates of use, again grey for men, green for women.

Standardised rate of use per 100 000 insured persons, by sex and by province for the year 2021

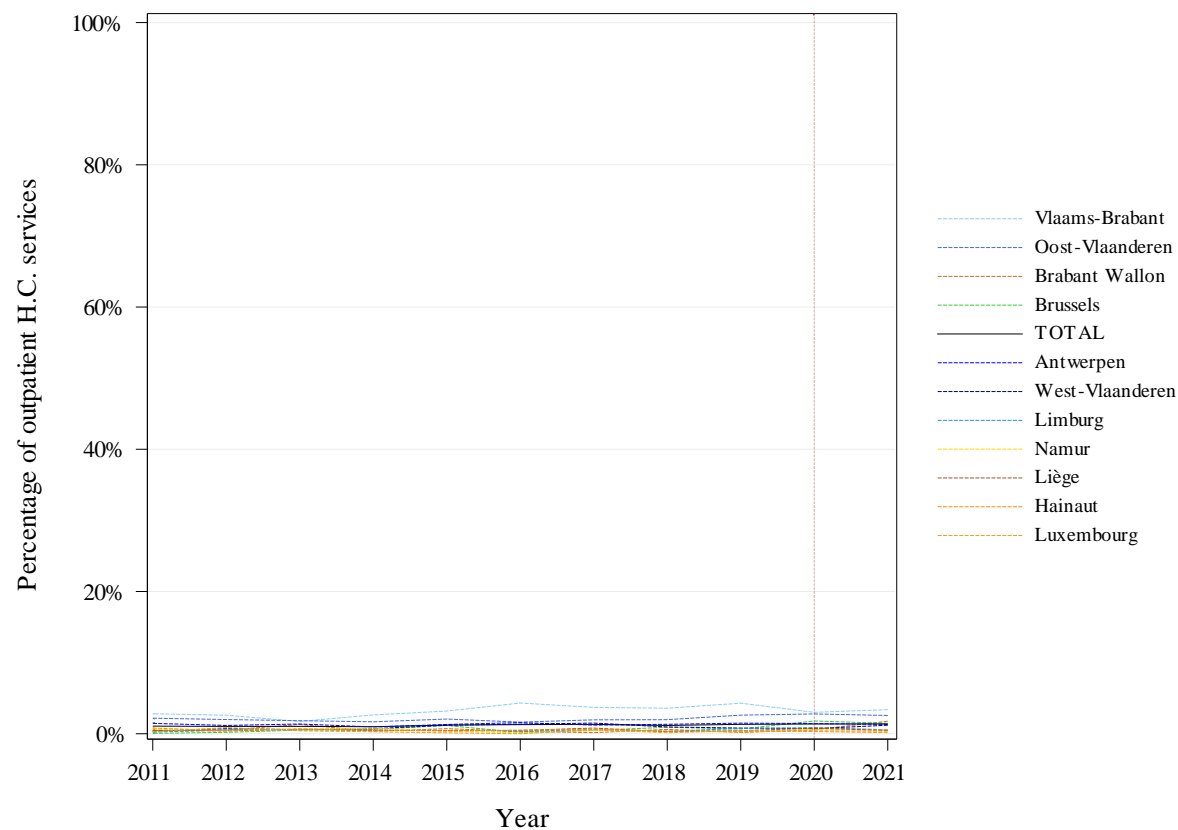
F. Standardised rate of use: hospital and outpatient care

	TOTAL
<i>Average number of interventions per year</i>	35.387
Percentage of out-patient care	1,39%
Max/min ratio of out-patient care percentage (by district)	NA (Min=0)



Percentage of outpatient care, total and by region

This graph shows the percentage of outpatient services (including hospital day admissions), i.e. the number of outpatient services provided as a percentage of total services (outpatient and hospital stays). Besides the bar per region, there is a bar for the entire Belgian population. A dotted line also shows this overall ratio.



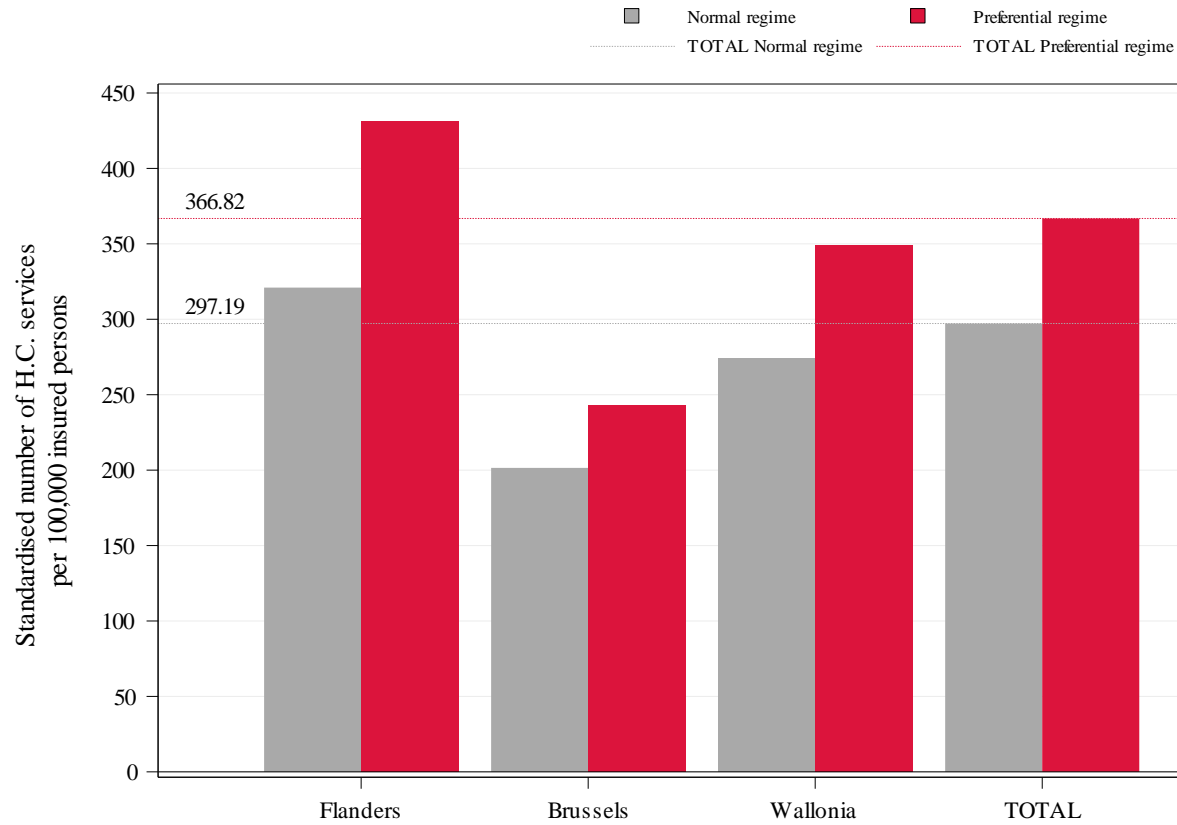
Change over time in the percentage of outpatient care, by province

N.B.:

- The year 2020 was highlighted by a vertical dashed line, in order to draw the attention on the impact of the COVID-19 crisis
- A complementary document to this chapter, about the handling of patients per health care sector, is [enclosed in this report](#) (cf. p.36)

G. Standardised rate of use by reimbursement scheme

	TOTAL
<i>Average number of interventions per year</i>	35.387
Percentage provided under the preferential reimbursement scheme	21,43%
Standardised rate of use with preferential reimbursement scheme (per 100 000)	367
Standardised rate of use without preferential reimbursement scheme (per 100 000)	297
Ratio Preferential scheme /General scheme	1,23



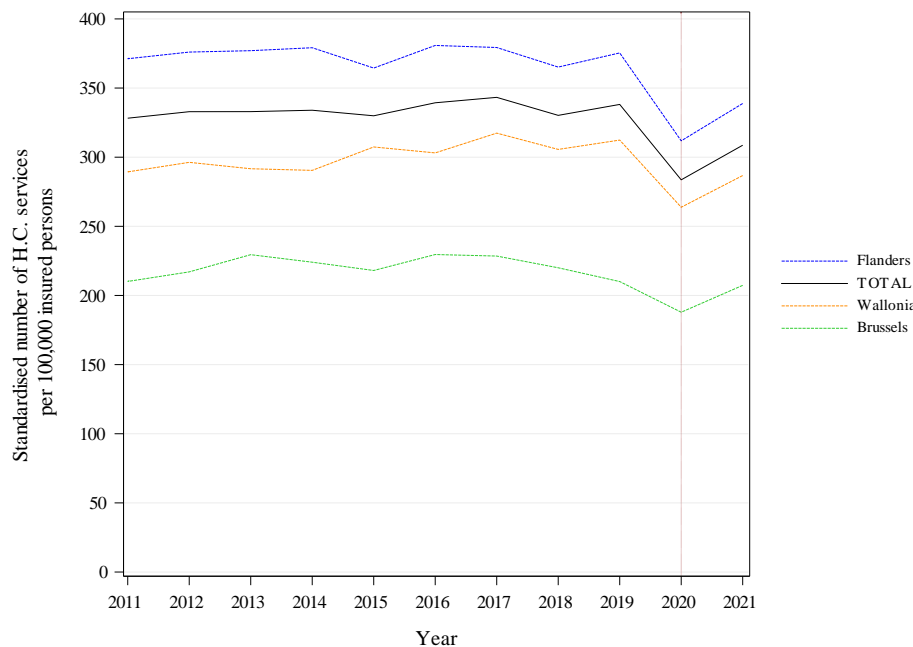
This graph shows the standardised rates of use with (in red) and without (in grey) the preferential reimbursement scheme, by region and in total. The red and grey dotted lines show the overall standardised rates of use, with and without the preferential reimbursement scheme, respectively.

Standardised rate of use by reimbursement scheme and by region

H. Trends in standardised rates of use

	TOTAL
<i>Average number of interventions per year</i>	35.387
Trend (2011-2021)	-0,61%
Trend (2011-2019)	0,37%
Trend (2019-2021)	-4,46%

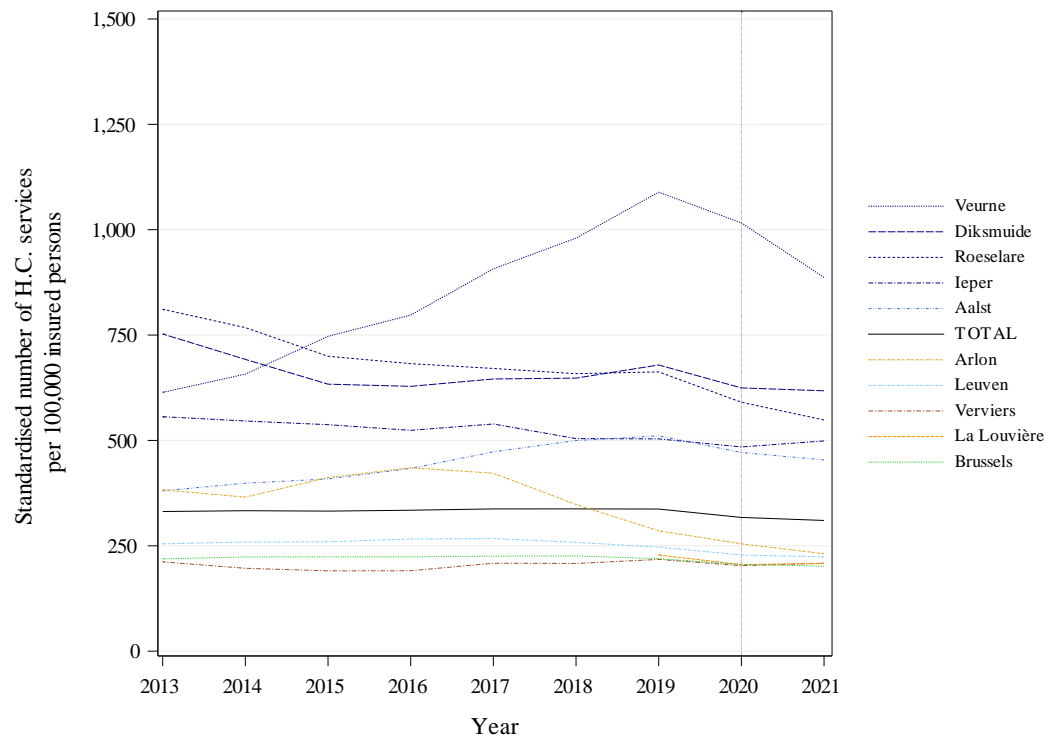
← These trends correspond to the average annual growth rate.



← This graph shows a coloured curve for each region and a black curve for the entire Belgian population. The x-axis shows the years, and the y-axis shows the standardised rate of use per 100 000 insured persons.

Note : The year 2020 was highlighted by a vertical dashed line, in order to draw the attention on the impact of the COVID-19 crisis.

Trends in the standardised rate of use per 100 000 insured persons, by region



Trends in the standardised rate of use per 100 000 insured persons, by district

This graph shows a colored line for each district and a black line for the entire Belgian population. The x-axis shows the years, and the y-axis shows the standardised rate of use per 100 000 insured persons.

To better highlight changes over time, the rates shown are **rolling averages** of the rates for the three years preceding the year in question (including the year itself).

The graph only shows the five districts with the highest average rates and the five districts with the lowest average rates over the last 3 years studied.

Note : The year 2020 was highlighted by a vertical dashed line, in order to draw the attention on the impact of the COVID-19 crisis.

		Rate of use	Annual increase			Structural break
		2021 (per 10 ⁵ insured)	2011- 2021	2011- 2019	2019- 2021	
Provinces	West Flanders	434,67	-2,31%	-0,27%	-10,08%	NA
	East Flanders	359,45	0,23%	0,95%	-2,58%	NA
	Antwerp	302,65	-1,23%	-0,67%	-3,46%	NA
	Limburg	333,59	0,65%	2,27%	-5,56%	NA
	Flemish Brabant	266,99	-0,83%	-0,63%	-1,62%	NA
	Brussels	207,31	-0,14%	0,00%	-0,66%	NA
	Walloon Brabant	273,23	-1,70%	-1,05%	-4,28%	NA
	Hainaut	314,62	-0,28%	1,59%	-7,42%	NA
	Liège	253,33	0,79%	1,12%	-0,54%	NA
	Namur	304,17	0,99%	1,44%	-0,76%	NA
	Luxembourg	284,79	-1,38%	-1,18%	-2,20%	NA
Regions	Flanders	338,83	-0,91%	0,14%	-5,00%	NA
	Brussels	207,31	-0,14%	0,00%	-0,66%	NA
	Wallonia	286,73	-0,09%	0,96%	-4,19%	NA
TOTAL		308,65	-0,61%	0,37%	-4,46%	***

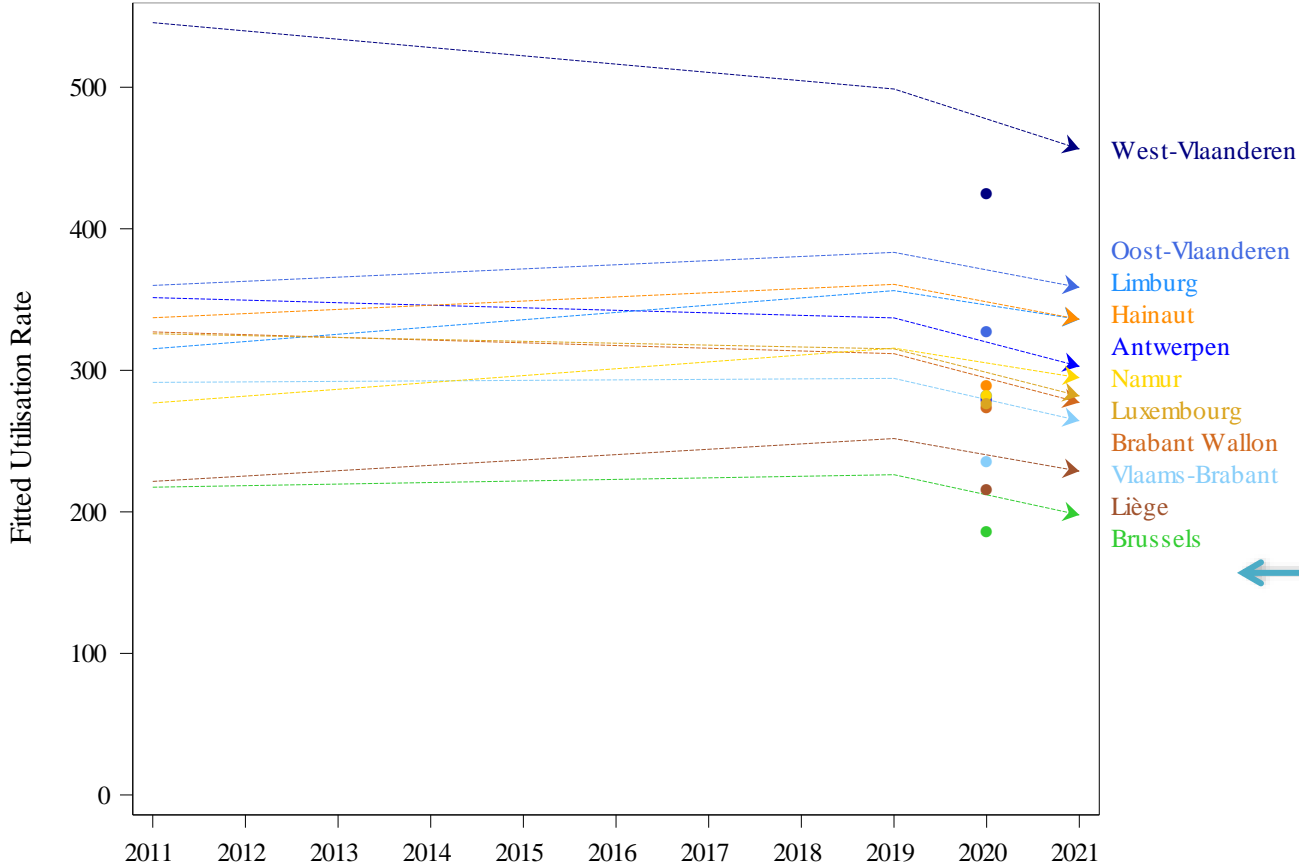
Trends in the rates of use, by province and region

This table reports the standardised **rates of use** for the last year analysed (2021), as well as the average **rates of increase**, by province, by region and in total, for the entire period (2011-2021), for the last three years (2019-2021) and for the period preceding the last three years (2011-2019)

In order to find out whether the trend in the last three years differs from that in the years before, a linear mixed model was fitted in two steps. In the first step a change in trend on the national level is tested. If this test is significant, in a second step, the model tests whether the difference in trend is significant for each province, region and at the national level. The data of 2020 are excluded from the models.

The significance of the test for a change in trend is reported in the Structural break column : * P-value ≤ 0.05 / ** P-value ≤ 0.01 / *** P-value ≤ 0.001 and NS for a non-significant result.

'NA' is shown where the nomenclature codes selected for the analysis have not been used for the entire three-year period or when the statistical tests cannot be evaluated.



Regression lines per province showing a possibly different slope for the last three years (2019-2021) compared to the years before (2011-2019).

Data of 2020 was excluded from this analysis, but is indicated on the graph for information.

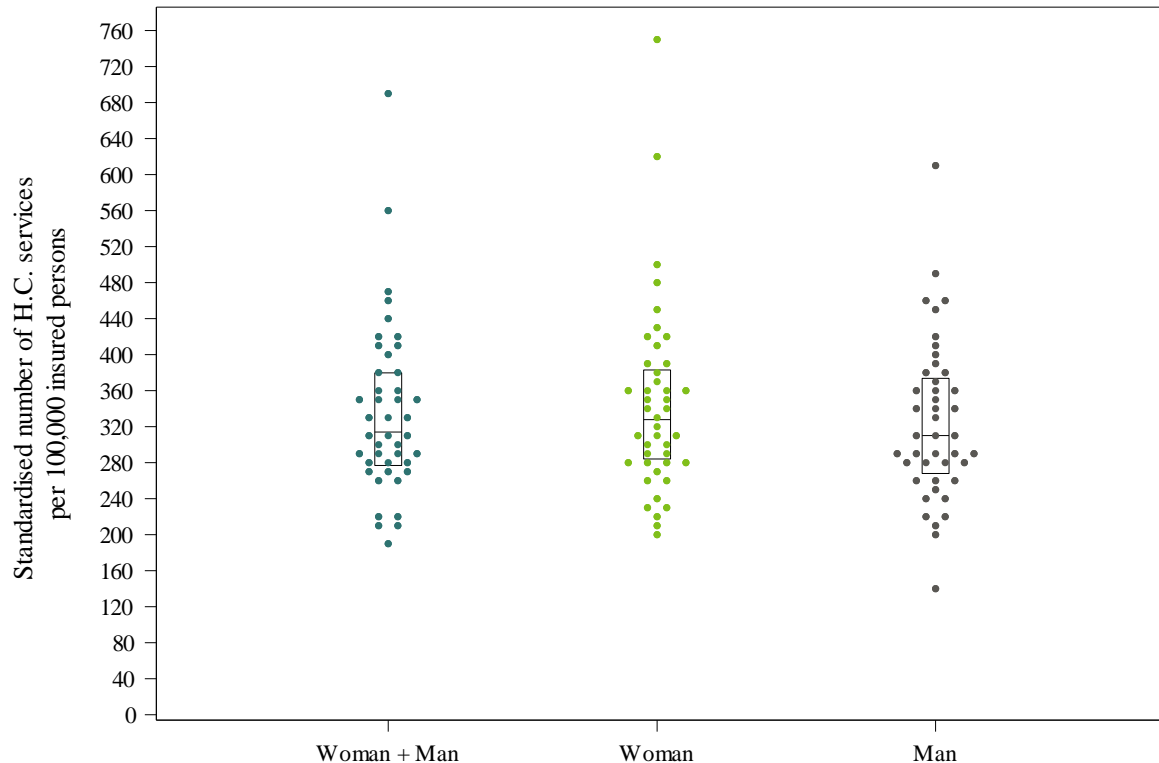
Trend break assessment model by province – Regression lines

I. Geographical variations in standardised rates of use

	TOTAL
<i>Average number of interventions per year</i>	35.387
Coefficient of Variation (2021)	28,29
Max/Min Ratio* of the standardised rates of use (by region)	1,63
Max/Min Ratio* of the standardised rates of use (by district)	3,54

Coefficient of Variation (2019-2021)	35,5
Coefficient of Variation (2011-2013)	35,97
<i>Statistically significant difference? ($p \leq 0.05$)</i>	<i>No</i>

* An 'NA' result indicates a ratio which cannot be calculated, i.e. the minimum value = zero (cf. E. Standardised rate of use by sex and age group)

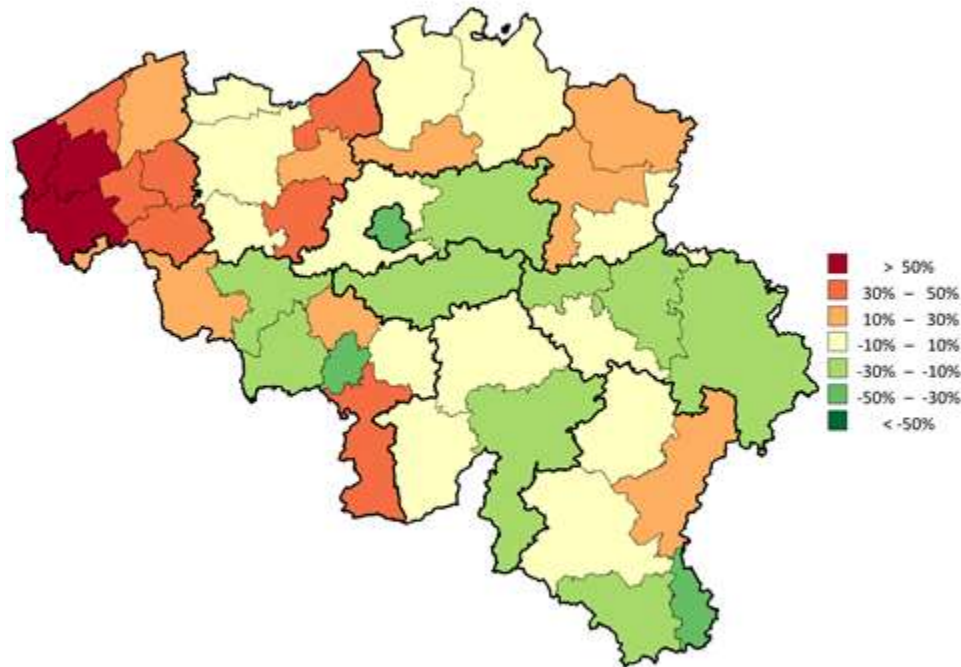


'Dot plot' showing standardised rates of use by district, by sex

A **dot plot** is a distribution chart, which is useful for highlighting groups in the data, gaps in the distribution and outliers. Here, each dot represents the rate of use of a district, for its entire population or broken down by sex.

The rates are rounded to the nearest unit, ten, hundred, etc., depending on the value of the maximum rate, in order to better group the values.

The graph also shows a box with the 25th, 50th and 75th percentiles of the non-rounded standardised rates of use for all patients. The bottom line of the box represents the 25th percentile, while the upper line represents the 75th percentile. The line inside the box represents the 50th percentile.

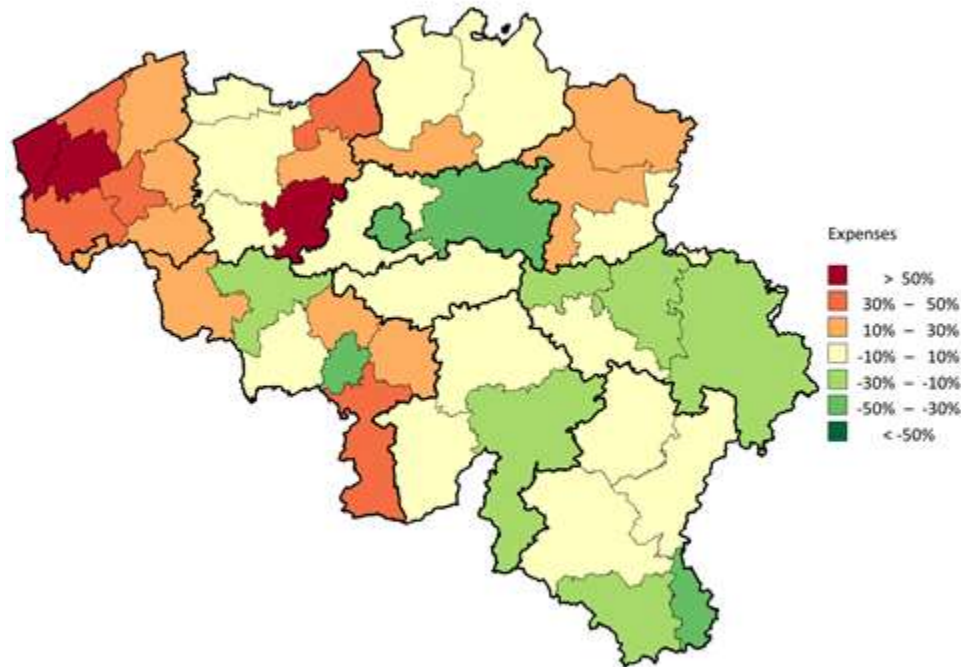


Map showing distribution of standardised rates of use, by district

On this map of Belgium, thin lines show the boundaries of the districts, while thick lines show the provincial borders. The districts are coloured using a colour scale based on the level of rate of use in the district compared to the Belgian national rate (overall rate). This ratio is expressed as a percentage: e.g. 0% if the district rate is equal to the overall rate, 20% if the rate is 20% above the overall rate, and -20% if the rate is 20% below the overall rate. The percentages are calculated using the standardised rates of the last year analysed, and are displayed in bands of 20%. The following colour coding applies:

Colour	Category
Dark Red	More than 50%
Red	Between 30% and 50%
Orange	Between 10% and 30%
Yellow	Between -10% and 10%
Light Green	Between -30% and -10%
Green	Between -50% and -30%
Dark Green	Less than -50%
White	Not used

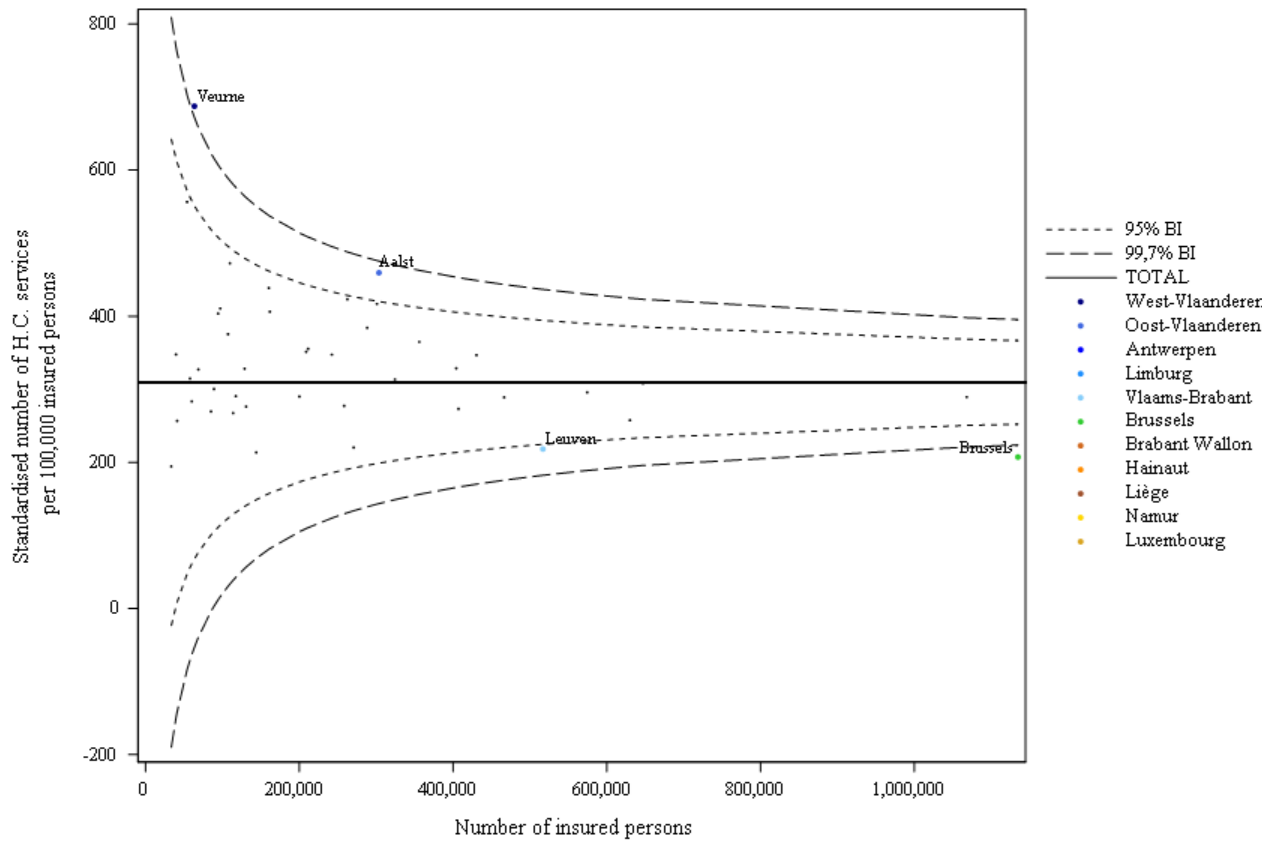
N.B.: The interpretation of this map is to be done in parallel with [the graph in funnel plot](#) (p.28)



Map showing distribution of standardised expenditure, by district

On this map of Belgium, thin lines show the boundaries of the districts, while thick lines show the provincial borders. The districts are coloured using a colour scale based on the level of expenditure in the district compared to Belgian national (overall) expenditure. This ratio is expressed as a percentage: e.g. 0% if expenditure in the district is equal to the overall expenditure, 20% if it is 20% higher, and -20% if it is 20% lower. The percentages are calculated using the standardised expenditure of the last year analysed and are displayed in bands of 20%. The following colour coding applies:

Colour	Category
Dark Red	More than 50%
Red	Between 30% and 50%
Orange	Between 10% and 30%
Yellow	Between - 10% and 10%
Light Green	Between -30% and -10%
Green	Between -50% and - 30%
Dark Green	Less than -50%
White	No expenditure



In this graph, the standardised rate of use in a district is positioned versus the size of its population. Besides the dots representing the districts, 95% and 99.7% **confidence intervals** are also shown on the graph. These are dependent of the size of the districts. The thicker horizontal line shows the national standardised rate of use. The outlier districts are identified as those districts that fall outside the 99.7% confidence intervals, the zone between the 95% and 99.7% confidence intervals being considered as "warning zone".

N.B.: The interpretation of this graph is to be done in parallel with the [map of the distribution of rates of use](#) (p.26)

'Funnel plot' showing the standardised rates of use by district, by the number of insured persons

J. Standardised healthcare expenditure borne by the insurance

	TOTAL
<i>Average number of interventions per year</i>	35.387
Average annual expenditure (€)	27.083.943
Average cost per intervention (€)	765,36
Average annual expenditure per insured (€)	2,36
Max/Min Ratio* of expenditure per insured (by region)	1,65
Max/Min Ratio* of expenditure per insured (by district)	2,79

* An 'NA' result indicates a ratio which cannot be calculated, i.e. the minimum value = zero (cf. E. Standardised rate of use by sex and age group)

		Standardised expenditure (per insured)	
Provinces	West Flanders	3,13 €	
	East Flanders	2,88 €	
	Antwerp	2,29 €	
	Limburg	2,61 €	
	Flemish Brabant	1,96 €	
	Brussels	1,56 €	
	Walloon Brabant	2,17 €	
	Hainaut	2,49 €	
	Liège	1,91 €	
	Namur	2,32 €	
	Luxembourg	2,25 €	
	Regions	Flanders	2,58 €
		Brussels	1,56 €
Wallonia		2,23 €	
TOTAL		2,36 €	

Regional and provincial distribution of standardised expenditure (2021)

Nomenclature	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average annual growth rate
230694-230705	329,34	341,68	334,55	323,19	334,96	319,46	326,56	342,27	332,24	326,91	341,48	0,36%
230716-230720	293,01	0,00	0,00	450,82	450,82	450,82	0,00	461,40	0,00	0,00	0,00	NA
230731-230742	400,31	405,97	426,07	423,69	427,45	432,77	432,90	418,22	433,02	425,70	436,26	0,86%
230753-230764	388,86	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NA
231475-231486	0,00	0,00	0,00	2.276,91	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NA
232492-232503	97,71	312,95	340,43	348,97	349,78	349,01	352,68	356,45	358,35	357,41	358,64	13,89%
232750-232761	939,94	955,27	965,39	979,82	981,45	985,12	993,46	1.001,09	1.011,19	1.020,51	1.025,61	0,88%
232794-232805	934,70	949,26	961,51	974,59	978,65	978,63	985,52	1.000,35	1.004,94	1.014,85	1.025,31	0,93%
281035-281046	343,11	326,88	332,69	358,98	359,32	385,37	390,59	391,93	375,57	394,59	472,30	3,25%
281050-281061	371,54	393,16	398,73	394,82	407,81	377,55	396,33	375,27	389,61	419,14	407,74	0,93%
281072-281083	463,67	468,40	502,46	518,96	525,56	486,31	494,05	516,35	543,94	547,32	535,84	1,46%
281094-281105	811,85	819,55	832,64	844,49	842,89	847,37	852,80	866,03	865,73	873,31	887,03	0,89%
281116-281120	798,38	809,31	825,65	844,12	845,81	848,79	851,99	863,65	859,53	873,74	888,23	1,07%
281514-281525	384,37	389,33	390,07	434,91	410,60	403,34	414,11	435,69	411,42	393,39	425,70	1,03%
281536-281540	396,29	402,42	390,74	389,23	378,01	389,76	397,36	405,61	409,66	417,41	419,67	0,57%
281551-281562	392,99	400,12	415,32	419,65	417,42	421,97	408,80	412,29	431,57	421,10	419,76	0,66%
281573-281584	485,76	483,47	509,70	517,15	521,33	526,74	514,07	530,78	538,81	537,44	542,82	1,12%
281632-281643	257,43	272,69	290,02	285,28	295,70	294,07	318,94	317,41	312,26	321,12	390,83	4,26%
281654-281665	839,01	854,95	866,56	882,58	886,88	880,31	886,33	893,49	897,26	893,40	907,43	0,79%
281676-281680	758,50	780,02	807,47	808,18	815,70	823,36	822,65	818,40	825,60	827,99	842,49	1,06%
281713-281724	239,41	252,59	258,88	259,28	249,07	244,68	241,20	257,78	258,15	263,57	270,07	1,21%
281735-281746	503,77	523,70	529,09	535,58	534,47	530,85	544,22	553,48	558,15	555,73	549,63	0,88%
281750-281761	223,01	247,19	227,81	250,25	175,09	177,92	185,79	189,97	193,56	200,58	246,19	0,99%
281772-281783	464,99	472,95	480,11	488,21	489,35	489,30	492,65	501,09	503,26	506,82	513,00	0,99%
281794-281805	799,67	804,52	825,89	835,18	829,97	833,89	827,23	820,14	825,11	843,71	849,92	0,61%
281816-281820	295,60	333,25	301,77	315,26	319,30	324,52	323,16	314,30	330,07	342,63	350,88	1,73%
281853-281864	562,37	580,10	579,97	598,96	574,74	594,69	581,24	609,99	590,24	603,90	611,60	0,84%
281875-281886	211,66	201,64	208,77	200,15	219,23	207,71	202,46	212,04	204,83	221,69	228,37	0,76%
281890-281901	232,91	244,09	244,26	243,26	224,02	243,83	253,53	256,06	253,43	251,69	196,59	-1,68%
281971-281982	908,03	922,31	939,54	950,69	953,80	943,04	960,51	953,27	964,21	974,54	990,60	0,87%
300355-300366	342,88	349,71	354,88	363,61	358,97	359,10	360,22	361,64	361,54	368,29	372,69	0,84%

Change over time in expenditure, by service and by nomenclature code

4. KEY DATA SUMMARY

		TOTAL
PROVIDERS & PRESCRIBERS		
Main healthcare providers:	Neurosurgery	74,91%
Main prescribers:	Not applicable	-
RATE OF USE		
Average number of interventions (per year)		35.387
Standardised rate of use (per 100 000 insured persons)		308,65
≥ 2 occurrences per patient (2019) ⁴		9,3%
Percentage of outpatient care		1,39%
POPULATION		
Median age		58 years
Max/min ratio ⁵ of the median age (by district)		1,22
Percentage of women		52,68%
Ratio Preferential rate/General rate		1,23
TRENDS		
Trend (2011-2021)		-0,61%
Trend ⁶ (2011-2019)		0,37%
Trend ⁶ (2019-2021)		-4,46%
GEOGRAPHICAL VARIATIONS		
Coefficient of variation ⁶ (2011-2013)		35,97
Coefficient of variation ⁶ (2019-2021)		35,5
Max/min ⁵ Ratio of number of interventions ⁶ (per 100 000 insured persons, by region)		1,63
Max/min Ratio ⁵ of number of interventions (per 100 000 insured persons, by district)		3,54
DIRECT EXPENDITURE		
Average annual expenditure		27.083.943 €
Average annual expenditure per insured		2,36 €
Max/Min Ratio ⁵ of expenditure per insured (by region)		1,65
Max/Min Ratio ⁵ of expenditure per insured (by district)		2,79
Average cost of interventions		765,36 €
CODING VARIATIONS & PRACTICE ALTERNATIVES⁴		
Variations in practice coding ⁶ (by province)		Yes
Variations in the choice of practice alternatives ⁶ (by province)		Yes

⁴ More detailed results are shown in a document enclosed to this report.

⁵ An 'NA' result indicates a ratio, which cannot be calculated, i.e. the minimum value equals zero.

⁶ If the result(s) show(s) a significant difference, the level of statistical significance is symbolized by one to three asterisks (increasingly significant). Otherwise, NS is displayed (not significant). 'NA' indicates the test is not applicable.

5. APPENDICES

A. Analysis of variance (ANOVA), except Brussels

Statistical significance of the differences observed in 2021		
<i>By region?</i>	Yes	**
<i>By sex?</i>	Yes	***
<i>By reimbursement scheme?</i>	Yes	***
<i>By sex and per region?</i>	No	NS
<i>By reimbursement scheme and per region?</i>	Yes	*
<i>By sex and per reimbursement scheme?</i>	Yes	***
<i>By sex and reimbursement scheme and per region?</i>	No	NS

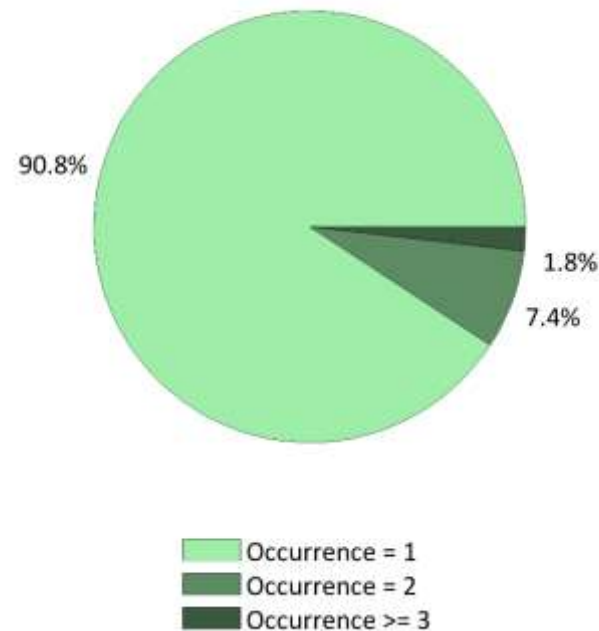
In order to be able to assess the significance of the observed differences, a linear mixed **ANOVA** model was fitted to the data of all districts of the Walloon and Flemish regions, after standardising for age. The model has region, sex and reimbursement scheme as fixed effects and also contains all two-way and three-way interactions between these effects.

In order to interpret the model correctly, first the three-way interaction should be evaluated, followed by the two-way interactions and finally by the main effects. If the three-way interaction is significant, the interpretation of the model should be done at this level only and the two-way interactions and main effects should not be interpreted. If the three-way interaction is not significant, the two-way interactions are evaluated. Every main effects that appears in a significant interaction should be interpreted at the level of the interaction and not at the level of that main effect. Main effects can only be interpreted directly if they don't appear in a significant interaction.

The **asterisks** represent the level of statistical significance of the tests: * P-value $\leq 0,05$ / ** P-value $\leq 0,01$ / *** P-value $\leq 0,001$ or NS for a non-significant result.

B. Frequency of practice occurrences

Frequency	Per year	Per day
2 occurrences	7,4%	2,2%
≥ 3 occurrences	1,8%	0,9%
≥ 2 occurrences	9,3%	3,1%



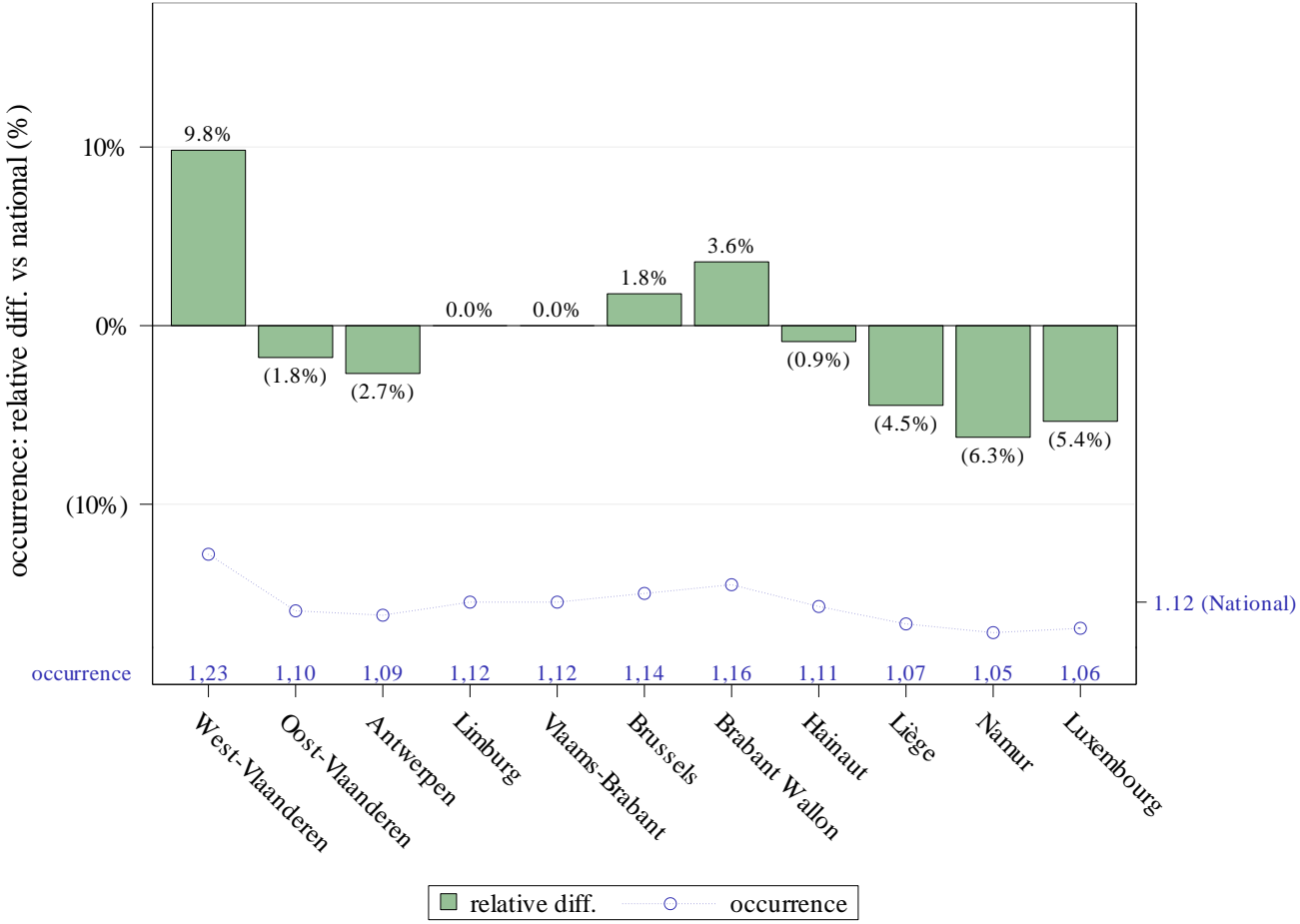
Distribution of practice recurrences per year (2019)

Some practices may be billed several times for the same patient in the same year or even on the same day. This may be due to a **repetition of the practice**, but also to an anatomical effect, which may lead, depending on the organ concerned, to performing the same practice **bilaterally**, which may therefore cause a double occurrence on the same day.

In order to interpret the results per day validly, it is useful to note that the same patient may be counted several times if, for example, he or she has received two identical services simultaneously, twice a year.

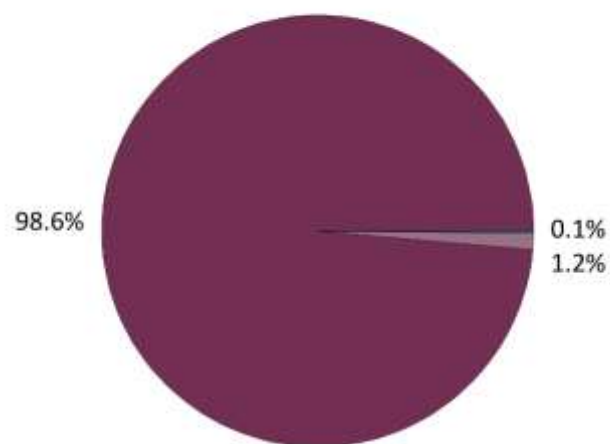
These frequency analyses of occurrences are carried out over the year **2019** using the following databases: Documents P, ADH and SHA.

Values « **n.a.** » are indicated if the data were not available at the time of this report.



Frequency of practice occurrences by province and variation vs national value (2019)

C. Patient care settings



■ Inpatient ■ One-day
■ Outpatient (clinic)

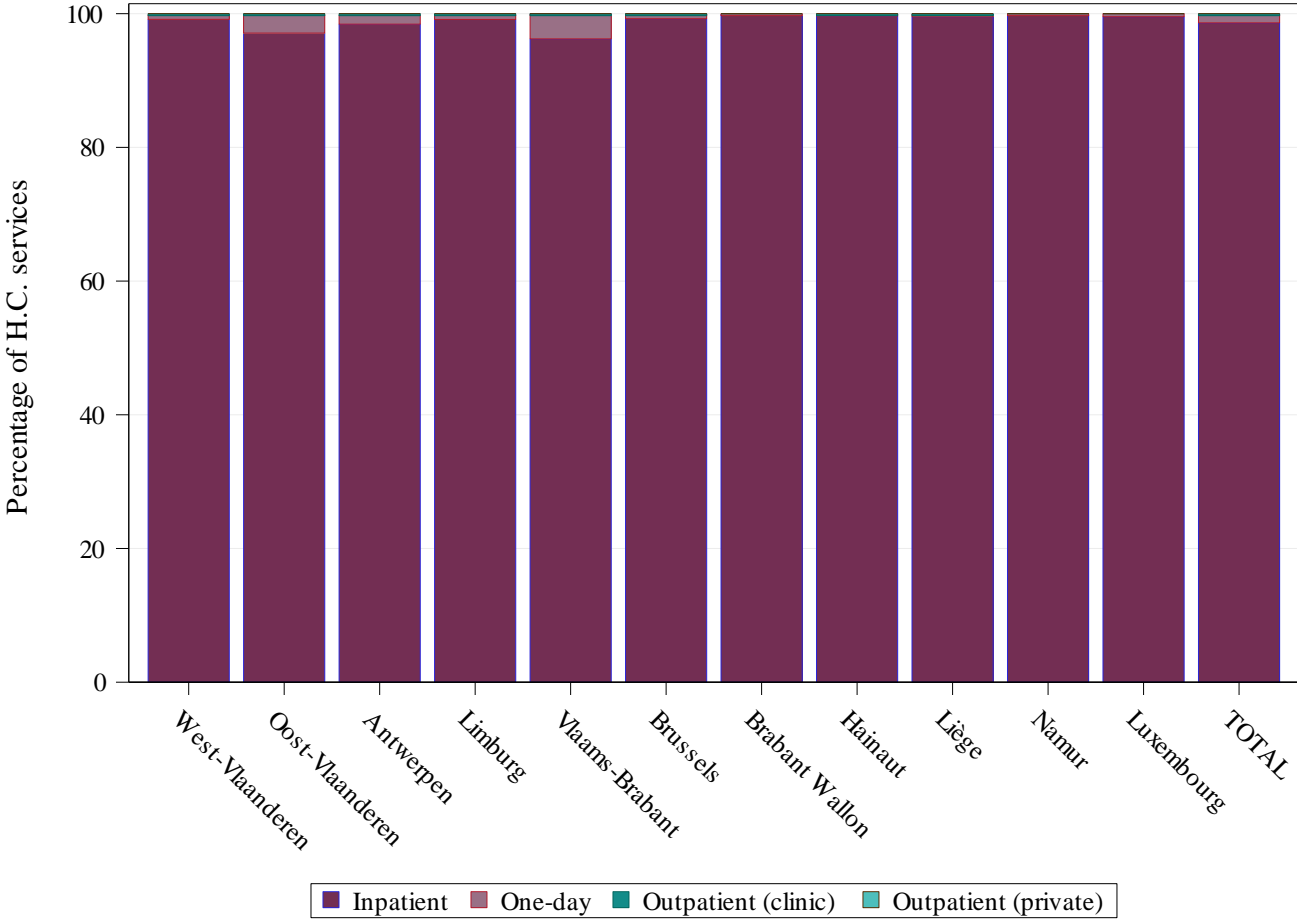
Distribution of patient care settings in 2019

Care Settings	
Outpatient (private)	0,0%
Outpatient (polyclinic)	0,1%
(Day) Hospital	1,2%
Hospital (stay)	98,6%

In addition to the chapter on [standardised inpatient and outpatient use rates](#) (see p.16), the analysis of patient care settings can be refined by identifying the outpatient (private and polyclinic) and inpatient (day or standard hospitalisation) sub-sectors.

These analyses are carried out over the year **2019** using the following databases: Documents P, ADH and SHA.

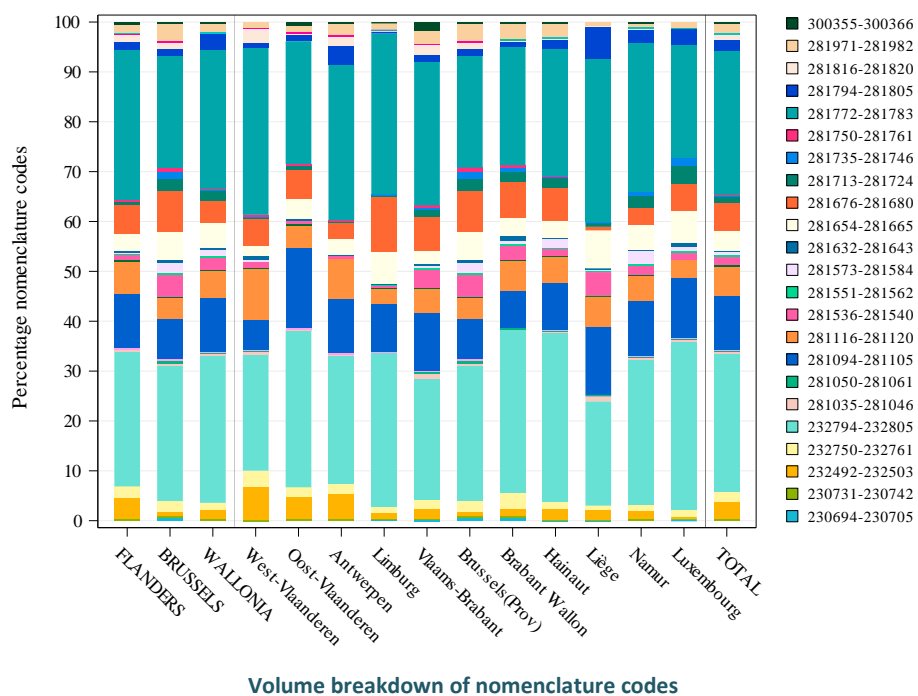
Values « **n.a.** » are indicated if the data were not available at the time of this report.



Distribution of patient care settings by province (2019)

D. Coding variations and practice alternatives

➔ Variations in coding:



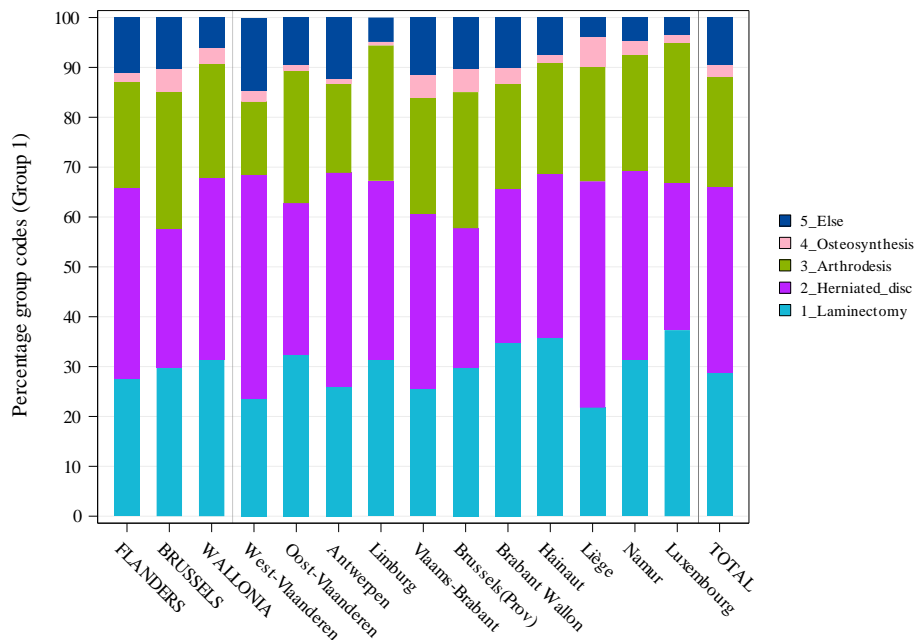
[Due to the large number of nomenclature codes selected for this analysis, we cannot include them in the legend here. We therefore invite you to read the details concerning them on page 4 of this report.]

Significance	By region	By province
Use of Nomenclature codes ⁷	***	***

⁷The calculation of significance is carried out here by comparing the geographical differences in the use of the different nomenclature codes to code the practice.

The asterisks represent the level of statistical significance of Chi-square test: * P-value ≤ 0,05 / ** P-value ≤ 0,01 / *** P-value ≤ 0,001. NS and NA respectively indicate that the variations are not significant or not applicable.

→ Variations in practice alternatives (Group 1):



Breakdown of choice for practice alternatives

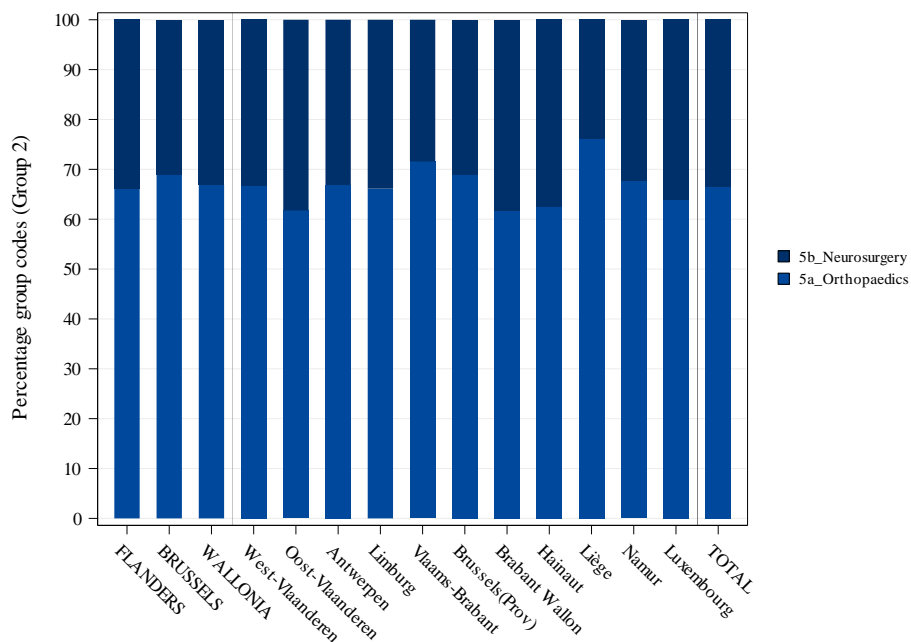
Significance	By region	By province
Choice of Practice alternatives	***	***

Combined codes	Groupings
230694-230705	5_Else
230731-230742	5_Else
232492-232503	5_Else
232750-232761	5_Else
232794-232805	1_Laminectomy
281035-281046	4_Osteosynthesis
281050-281061	3_Arthrodesis
281072-281083	3_Arthrodesis
281094-281105	3_Arthrodesis
281116-281120	2_Herniated_disc
281514-281525	5_Else
281536-281540	4_Osteosynthesis
281551-281562	3_Arthrodesis
281573-281584	3_Arthrodesis
281632-281643	3_Arthrodesis
281654-281665	3_Arthrodesis
281676-281680	3_Arthrodesis
281713-281724	1_Laminectomy
281735-281746	3_Arthrodesis
281750-281761	5_Else
281772-281783	2_Herniated_disc
281794-281805	2_Herniated_disc
281816-281820	5_Else
281853-281864	5_Else
281875-281886	5_Else
281890-281901	5_Else
281971-281982	5_Else
300355-300366	5_Else



According to the nature of the practice and the analytical tools available, it may be possible to identify and define alternatives for carrying out the practice. In this case, the nomenclature codes defined for the analysis of the practice are grouped together with the aim of analysing whether or not the choices of these alternatives are homogeneous across the territory. The calculation of significance displayed in the table is carried out by comparing these groups of codes with each other.

➔ Variations in practice alternatives (Group 2) :

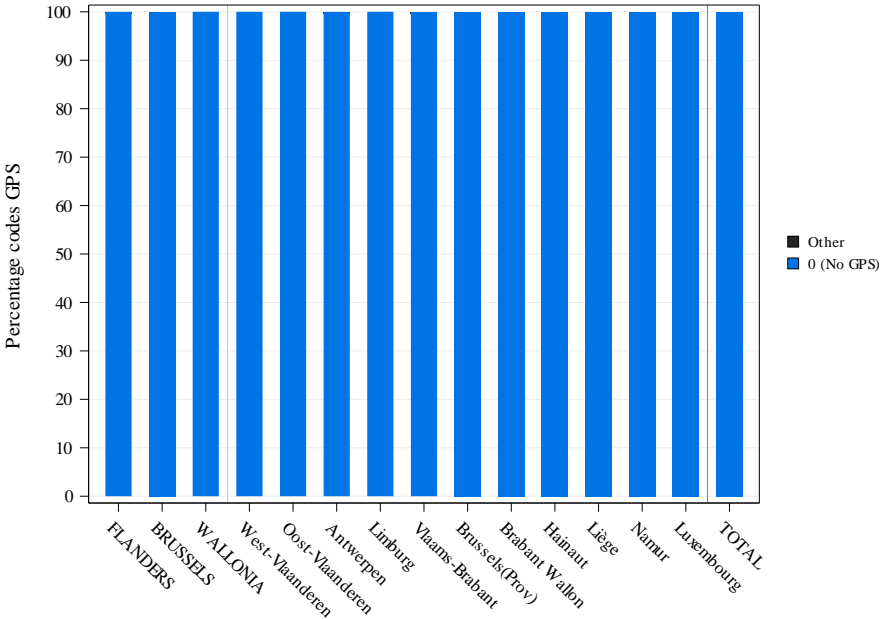


Breakdown of choice for practice alternatives

Significance	By region	By province
Choice of Practice alternatives	*	***

Combined codes	Groupings
230694-230705	5b_Neurosurgery
230731-230742	5b_Neurosurgery
232492-232503	5b_Neurosurgery
232750-232761	5b_Neurosurgery
232794-232805	5b_Neurosurgery
281035-281046	5a_Orthopaedics
281050-281061	5a_Orthopaedics
281072-281083	5a_Orthopaedics
281094-281105	5a_Orthopaedics
281116-281120	5a_Orthopaedics
281514-281525	5a_Orthopaedics
281536-281540	5a_Orthopaedics
281551-281562	5a_Orthopaedics
281573-281584	5a_Orthopaedics
281632-281643	5a_Orthopaedics
281654-281665	5a_Orthopaedics
281676-281680	5a_Orthopaedics
281713-281724	5a_Orthopaedics
281735-281746	5a_Orthopaedics
281750-281761	5a_Orthopaedics
281772-281783	5a_Orthopaedics
281794-281805	5a_Orthopaedics
281816-281820	5a_Orthopaedics
281853-281864	5a_Orthopaedics
281875-281886	5a_Orthopaedics
281890-281901	5a_Orthopaedics
281971-281982	5a_Orthopaedics
300355-300366	5a_Orthopaedics

➔ Variation in the use of Global Payment with Standardisation (GPS) :



Pseudocodes	Label
-------------	-------

Breakdown by volume of pseudocodes of GPS

Significance	By region	By province
Use of Global Payment with Standardisation ⁸	NS	NS

⁸ The calculation of significance is carried out here by comparing the use of Global Payment with Standardisation as a whole compared to the non-use of these packages.