



Key points

- In 2015, around 18 newborns per 1 000 live births had an APGAR score at five minutes below 7 and around 3 had an APGAR score at five minutes below 4 in Belgium.
- <7 APGAR5 and APGAR5 <4 rate decreased in Belgium from 1998 to 2015.
- <7 APGAR5 and APGAR5 <4 rate are quite similar in the three regions of the country.

- Differences in coding practices seem to appear among regions, particularly for high scores.

References

- [1] Zeitlin J, Mohangoo A, Delnorn M, Alexander S, Blondel B, Bouvier-Colle M, *et al.* European Perinatal Health Report. The health and care of pregnant women and babies in Europe in 2010. 2013.
- [2] American Academy of Pediatrics, American College of Obstetricians, Gynecologists, Committee on Obstetric Practice. The Apgar score. *Pediatrics*. 2006;117(4):1444-7.

14.3. Caesarean sections (MN-3)

14.3.1. Documentation sheet

Description	Number of caesarean sections per 1000 live births
Calculation	Number of caesarean sections (x1000), divided by all live births. Variability is calculated per hospital. Distribution of caesareans by categories, using Robson classification, is also presented. Analysis by Robson categories is done for caesarean rate per 1 000 deliveries.
Rationale	<p>Since 1985 and up to 2015, WHO and international healthcare community have considered that C-sections rate should not be higher than 10-15%.¹ Since then, rates of caesarean delivery have increased in the majority of European countries. Reasons for the increase include scheduling convenience for both physicians and patients, evolution of the expectations and perceptions of the patients, increase of the maternal age, obesity, among others. While caesarean delivery is required in some circumstances, the benefits of caesarean versus vaginal delivery for normal uncomplicated deliveries continue to be debated. There is some evidence from observational studies of increased maternal mortality, maternal and infant morbidity, and increased complications for subsequent deliveries. Nevertheless, the Cochrane Collaboration review on caesarean section for non-medical reasons at term could not reach strong conclusions on the best medical indications due to a lack of trials on the topic.² These concerns, combined with the greater financial cost (the average cost associated with a caesarean section is at least two times greater than a normal delivery in many OECD countries), raise questions about the appropriateness of some caesarean delivery that may not be medically required.³</p> <p>These concerns are translated into professional guidelines. Professional associations of obstetricians and gynaecologists in countries such as Canada now encourage the promotion of normal childbirth without intervention such as caesarean sections.⁴ Recent guidelines from the French Health Authority recommend informing the patient on the increased risk of</p>



	<p>complications for future pregnancy after a caesarean section.⁵ In Belgium, KCE recommends to raise awareness of gynaecologists and obstetricians regarding the consequences of caesarean section without medical indication, especially for nulliparous with single cephalic pregnancy beyond 37 weeks.⁶</p> <p>WHO recommendation has been revised in 2015, stating that “<i>every effort should be made to provide caesarean sections to women in need, rather than striving to achieve a specific rate</i>”.¹</p> <p>Trends and variability of caesarean rates inform on the appropriateness of care. The analysis of geographic variation can also provide a powerful screening tool to identify areas with inappropriate practice of C-sections.^{7,8}</p> <p>Categorisation of caesarean sections has often been done using its indications (why the C-section was being performed). However, the lack of uniform definitions for most common indications has resulted in poor reproducibility and difficult national and international comparison.^{9,10} In its last statement, the World Health Organization (WHO) recommends to use Robson classification.¹ This system classifies women admitted for delivery according to obstetric characteristics that are generally routinely collected in most maternities.¹¹</p>
Data source	<p>SPF Public health (Hospital administrative discharge data (RHM-MZG)) and OECD Health Statistics for international comparison.</p> <p>Caesarean section is one of the five surgical interventions studied by OECD to estimate practice variability between countries.¹²</p> <p>Additional sources: CEpiP and SPE.</p>
Technical definitions	<p>Numerator : ICD9-CM codes: 74.0 Classical caesarean section; 74.1 Low cervical caesarean section; 74.2 Extraperitoneal caesarean section; 74.4 Caesarean section of other specified type; 74.99 Other caesarean section of unspecified type. Robson classification is detailed in</p> <p>Table 137.</p>
Limitations	<p>Change from ICD-9 to ICD-10 classification has resulted in a break in the series of RHM – MZG data from 2016 on (and no 2015 data available).</p> <p>Since Robson categories 2 and 4 may represent a large proportion of the obstetric population, WHO suggests that these categories could be subdivided between induced labor (categories 2a and 4a) and previous labor caesarean (categories 4a and 4b). These subcategories can be important to understand how differences in clinical practice (rates of induced labor or pre-labor caesarean) contribute to the overall rates of caesarean.¹³ However, these subcategories are not routinely recorded in Belgium.</p>
International comparability	<p>Same definition of ICD9 codes, but not all countries use the same definition of live births.</p>
Performance Dimension	<p>Quality (appropriateness); variability of care.</p>



14.3.2. Results

Rate of caesarean sections

In Belgium in 2016, the rate of caesarean section is 216 per 1 000 live births which corresponds to an increase of 38% with respect to the rate of 2000 (156 per 1 000 live births) (Figure 205, Table 133).

Regional differences exist for this indicator: the rate of caesarean section is 223 (per 1 000 live births) in Wallonia, 216 (per 1 000 live births) in Flanders and 206 (per 1 000 live births) in Brussels in 2016 (Figure 205, Table 133).

There are also differences within the districts, the rate of caesarean section per district ranging from 88 (Mons) to 222 (Liège) per 1 000 live births in 2000 and from 117 (Eeklo) to 303 (Arlon) per 1 000 live births in 2016 (Figure 206).

The number of caesarean sections (per 1 000 live births) increased in every Belgian regions from 2000 to 2016 (average annual increase of 5.00 caesarean sections per 1 000 live births in Wallonia, 3.60 in Flanders and 3.33 in Brussels). Nevertheless, after a first period of increase, the caesarean rate started to decrease from 2013 in Brussels and 2014 in Wallonia. The caesarean sections rate is increasing in Flanders (Figure 205, Table 133).

Calculating the rate of caesarean sections per 1 000 births as well as per 1 000 deliveries, does not affect the conclusions: an increase of the caesarean sections rate in every Belgian regions between 2000 and 2016 but a decrease in the recent years in Brussels and Wallonia.

Variation of caesarean sections rate among hospitals

In 2016, it existed differences of caesarean practices between Belgian hospitals: caesarean rate varied from 155 to 352 per 1 000 live births. Although we noted that the variation among hospitals decreased over time (2001 range: 247; 2016 range: 197 caesarean sections per 1 000 live births), the rate of caesarean increases from 2001 to 2016 (Figure 207, Figure 208). However, case-mix was not taken into account and could have an impact on

the observed variations of practices. More severe cases could influence caesarean section rate.

Caesarean sections by Robson classification

Definition of the Robson classification is available in Table 137.

In 2016, in all Belgian regions, higher proportions of caesarean sections were attributed to Robson 9 (Brussels: 989 per 1 000 deliveries; Wallonia: 965 per 1 000 deliveries, Flanders: 986 per 1 000 deliveries), Robson 6 (Brussels: 875 per 1 000 deliveries; Wallonia: 915 per 1 000 deliveries, Flanders: 953 per 1 000 deliveries) and Robson 7 (Brussels: 771 per 1 000 deliveries; Wallonia: 837 per 1 000 deliveries, Flanders: 875 per 1 000 deliveries) classes. In other words, it means that women with a single pregnancy and a transverse or oblique lie (including women with previous scars) (Robson 9), nulliparous women with a single breech pregnancy (Robson 6) and multiparous women with a single breech pregnancy (including women with previous scars) (Robson 7) got proportionally more caesarean sections than the women classified in the other Robson classes. (Figure 209, Figure 210). Although Robson categories 9, 7 and 6 show higher caesarean rates, they represent a small part of the population, therefore not contributing much to the total caesarean rates (Figure 212, Table 134 - Table 136).

In 2016, in all Belgian regions, lower proportions of caesarean sections were attributed to Robson 3 (Brussels: 19 per 1 000 deliveries; Wallonia: 21 per 1 000 deliveries, Flanders: 19 per 1 000 deliveries), Robson 4 (Brussels: 74 per 1 000 deliveries; Wallonia: 62 per 1 000 deliveries, Flanders: 74 per 1 000 deliveries) and Robson 1 (Brussels: 103 per 1 000 deliveries; Wallonia: 100 per 1 000 deliveries, Flanders: 100 per 1 000 deliveries) classes. It means that multiparous women without a previous uterine scar with a single cephalic pregnancy, ≥ 37 weeks gestation in spontaneous labour (Robson 3); multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥ 37 weeks gestation who either had labour induced or were delivered by caesarean section before labour (Robson 4); or nulliparous women with a single cephalic pregnancy, ≥ 37 weeks gestation in spontaneous labour (Robson 1) had proportionally less caesarean sections than the women in the other Robson classes (Figure 210, Figure



211). On the other hand, Robson classes 1, 3 and 4 are the most frequent in the Belgian population and also those with the lowest caesarean rates, therefore not contributing much to the total caesarean rates (Figure 212, Table 134 - Table 136).

In 2016, most women with a caesarean section were classified in Robson 5 (Wallonia: 28.77%; Brussels: 30.98%; Flanders: 26.79%), 2 (Wallonia: 19.94%; Brussels: 18.12%; Flanders: 17.38%) (Figure 212).

C-section rate among women in Robson category 5 (multiparous women with at least one previous uterine scar, with single cephalic pregnancy, ≥ 37 weeks gestation) is at or above the upper bound of the expected range (in 2016, 63.9% in Wallonia, 59.7% in Brussels, and 66.5% in Flanders while the expected range is 50-60% according to WHO¹³). This category (Robson 5) also contributed the most to the total C-section rate. Hence, repeated C-sections contribute largely to the overall rate of C-section (Table 134 – Table 136).

No major changes in the proportions of caesarean sections by Robson classification were observed from 2009 to 2016 in Brussels and Wallonia (Figure 209, Figure 210).

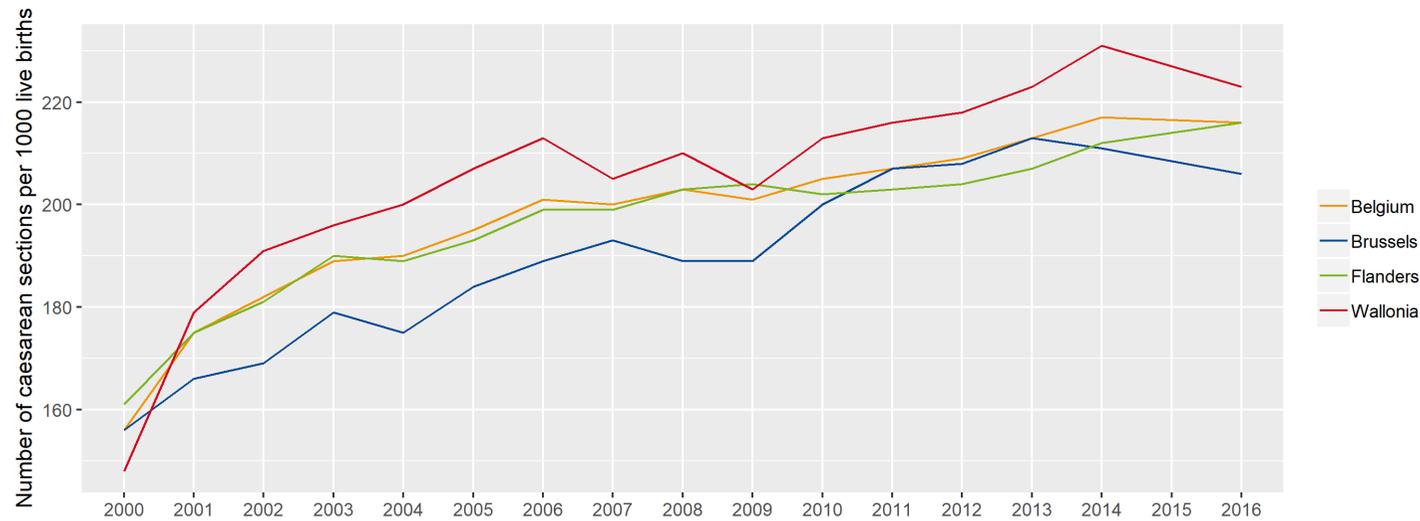
International comparison

In 2016, Belgium had a lower caesarean section rate (210 caesarean section rate per 1 000 live births) than the average EU-13 (Italy, Portugal, Ireland, Luxembourg, Germany, Austria, UK, Spain, Belgium, France, Denmark, Sweden, Finland: 259 caesarean section rate per 1 000 live births) and was classified fifth in terms of caesarean section rate, i.e. between France (208 caesarean section rate per 1 000 live births) and Spain (246 caesarean sections per 1 000 live births) (Figure 213).

Despite a regular increase of the caesarean section rate over the years, Belgium always performed better than the average EU-13 from 2005 to 2016 for this indicator (Figure 214).



Figure 205 – Number of caesarean sections per 1 000 live births, per region of the hospital, 2000-2016



Data source: SPF-FOD; Figure: KCE

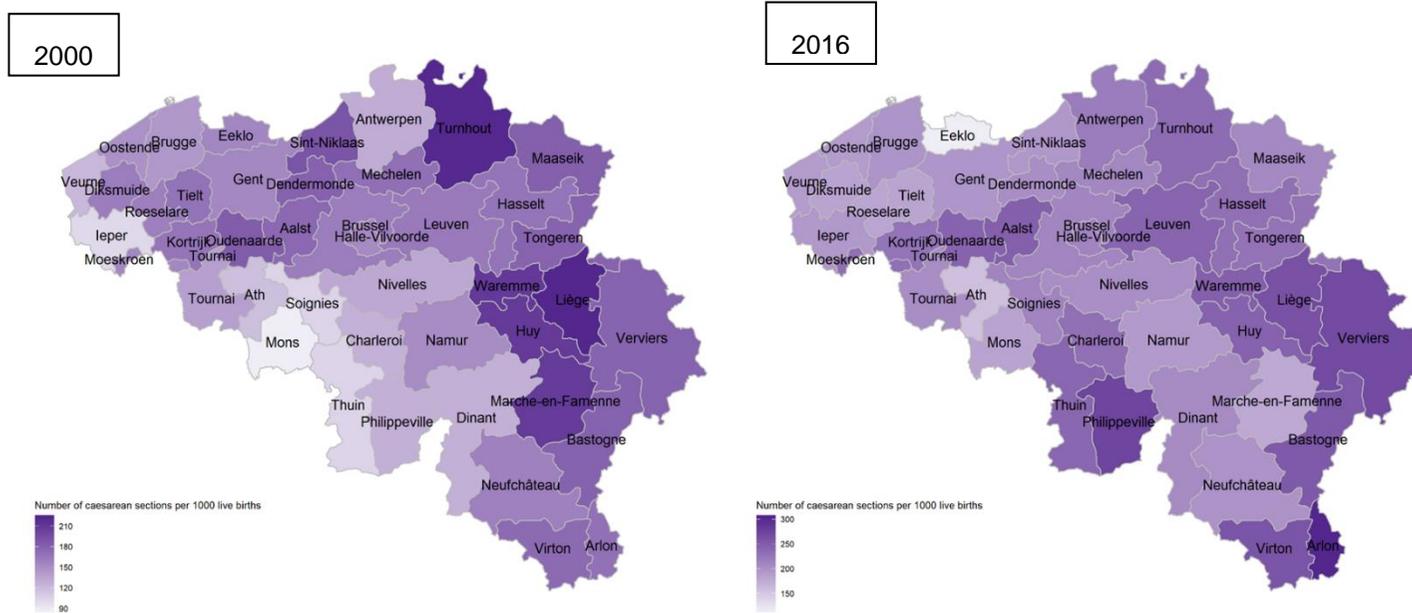
Table 133 – Number of caesarean sections per 1 000 live births, per region of the hospital, 2009-2016

Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average annual difference 2000-2016
Belgium	156	175	182	189	190	195	201	200	203	201	205	207	209	213	217	NA*	216	4.00
Brussels	156	166	169	179	175	184	189	193	189	189	200	207	208	213	211	NA	206	3.33
Flanders	162	175	181	190	189	193	199	199	203	204	202	203	204	207	212	NA	216	3.60
Wallonia	148	179	191	196	200	207	213	205	210	204	213	216	218	223	231	NA	223	5.00

*NA: Not available. Data source: SPF-FOD



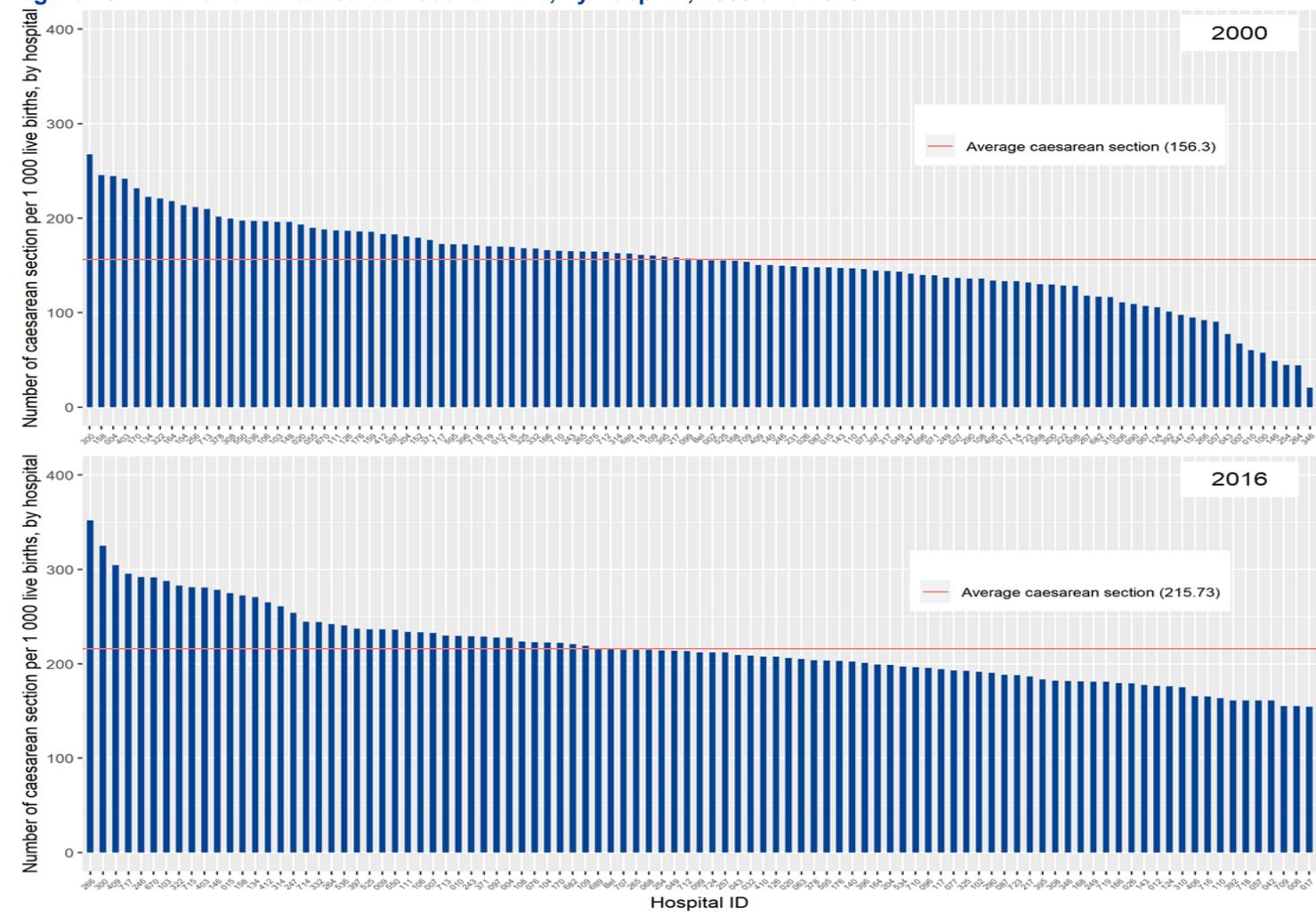
Figure 206 – Number of caesarean sections per 1 000 live births, by district of the mother, 2000 & 2016



Data source: SPF-FOD; Figure: KCE



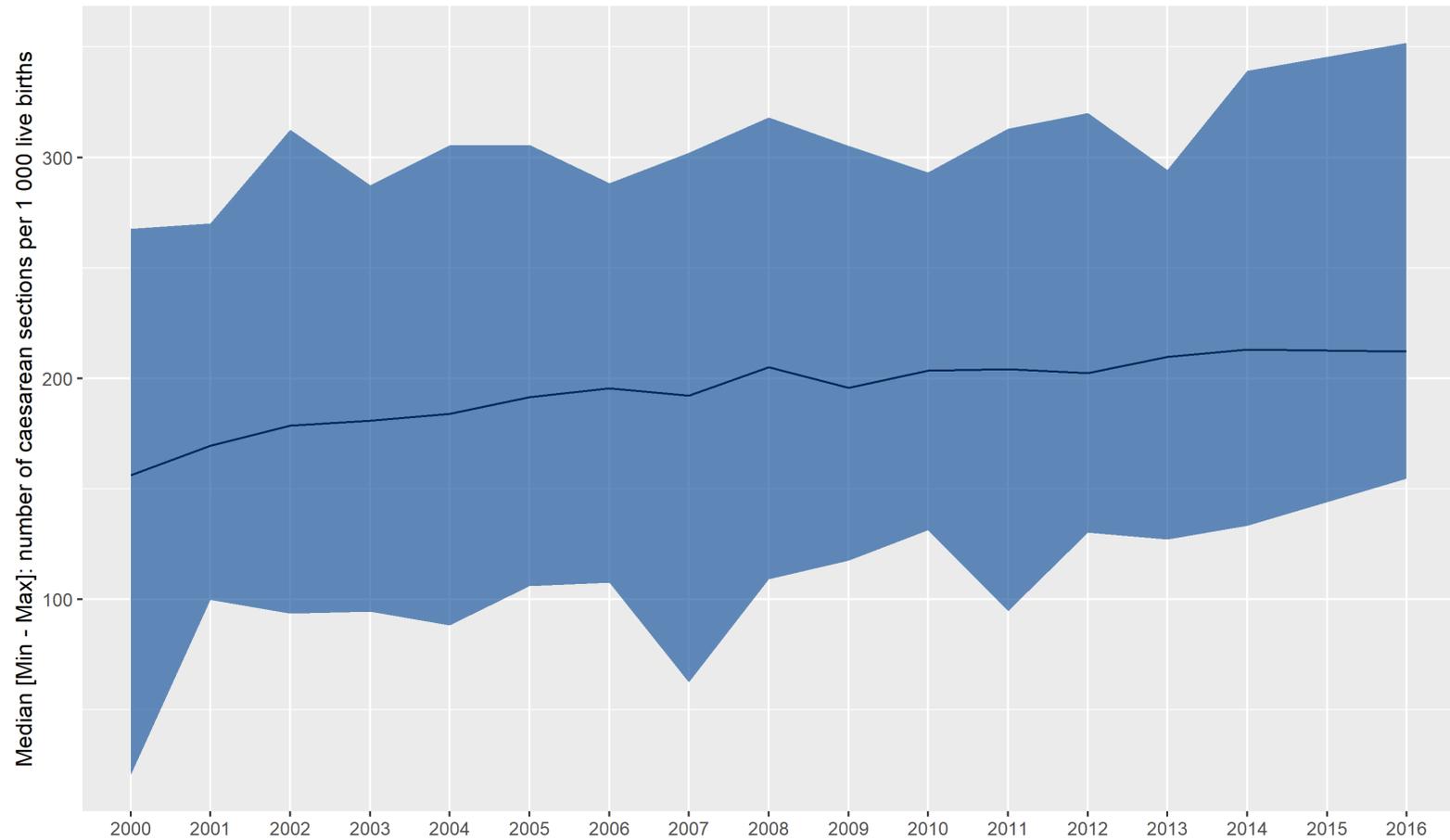
Figure 207 – Variation of caesarean section rate, by hospital, 2000 and 2016



Data source: SPF-FOD; Figure: KCE



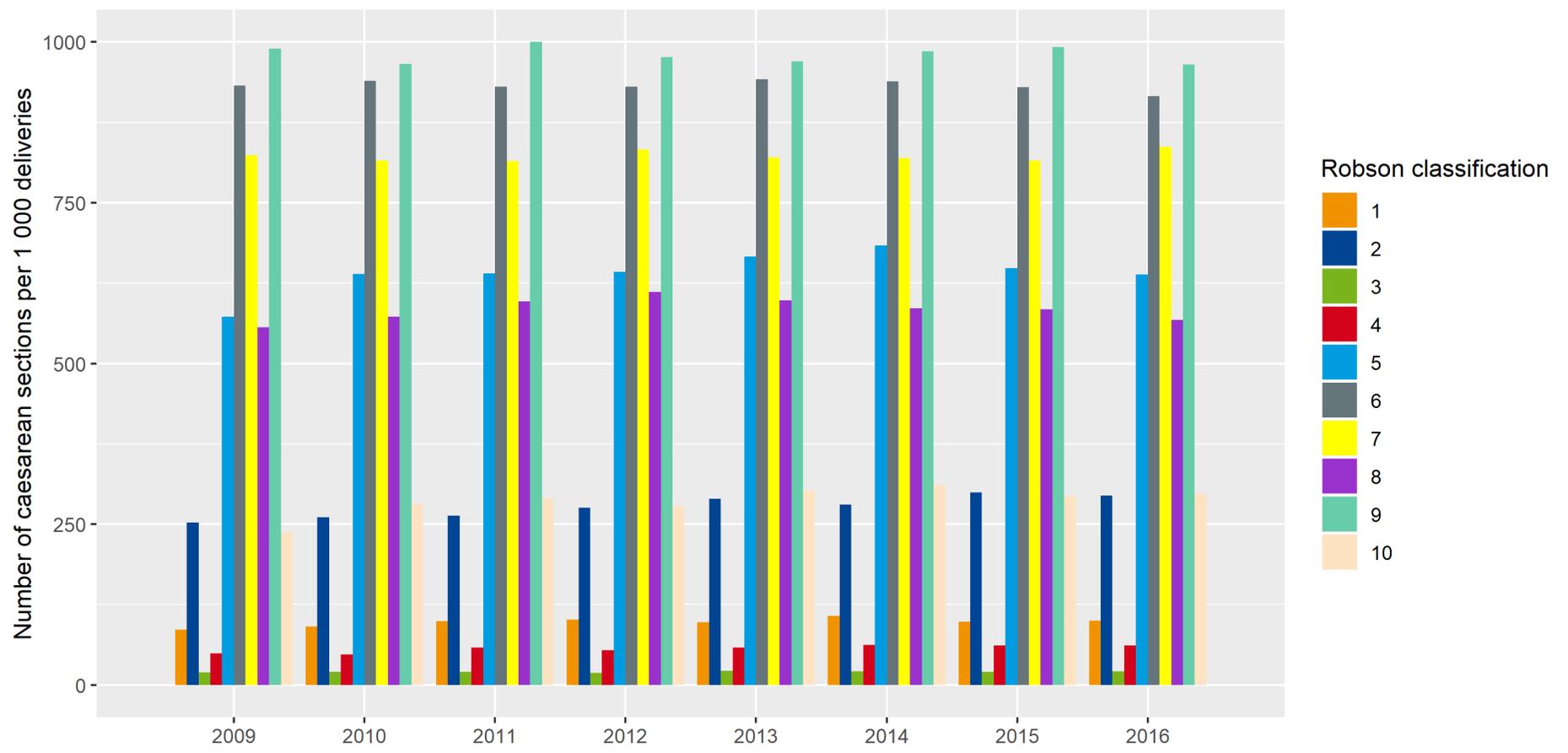
Figure 208 – Variation of caesarean section rate among hospitals, 2000 to 2016



Data source: SPF-FOD; Figure: KCE



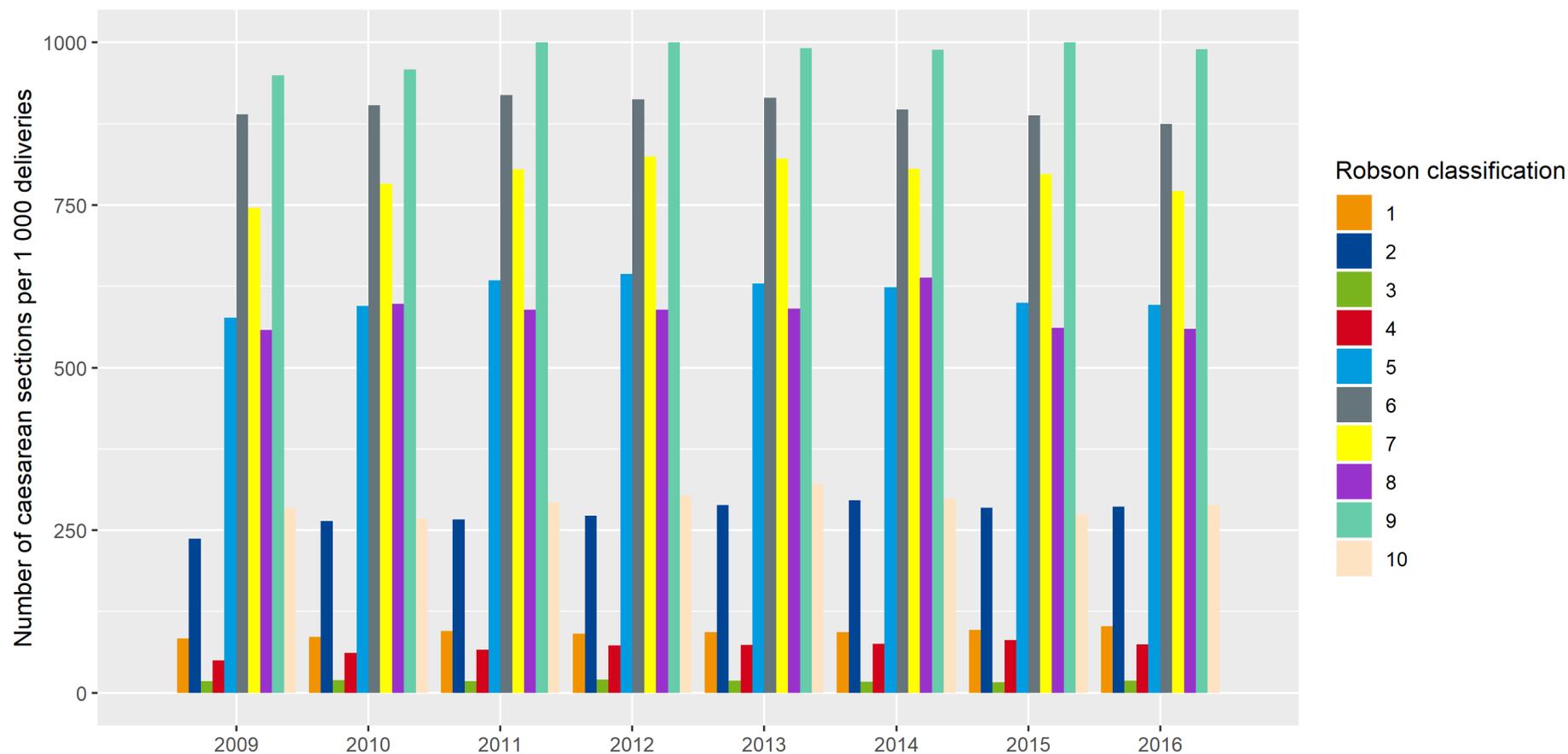
Figure 209 – Number of caesarean sections per 1 000 deliveries, by Robson classification*, Wallonia, 2009-2016



*Definition of the Robson classification is available in Table 137
Data source: CEpiP; Calculation: KCE



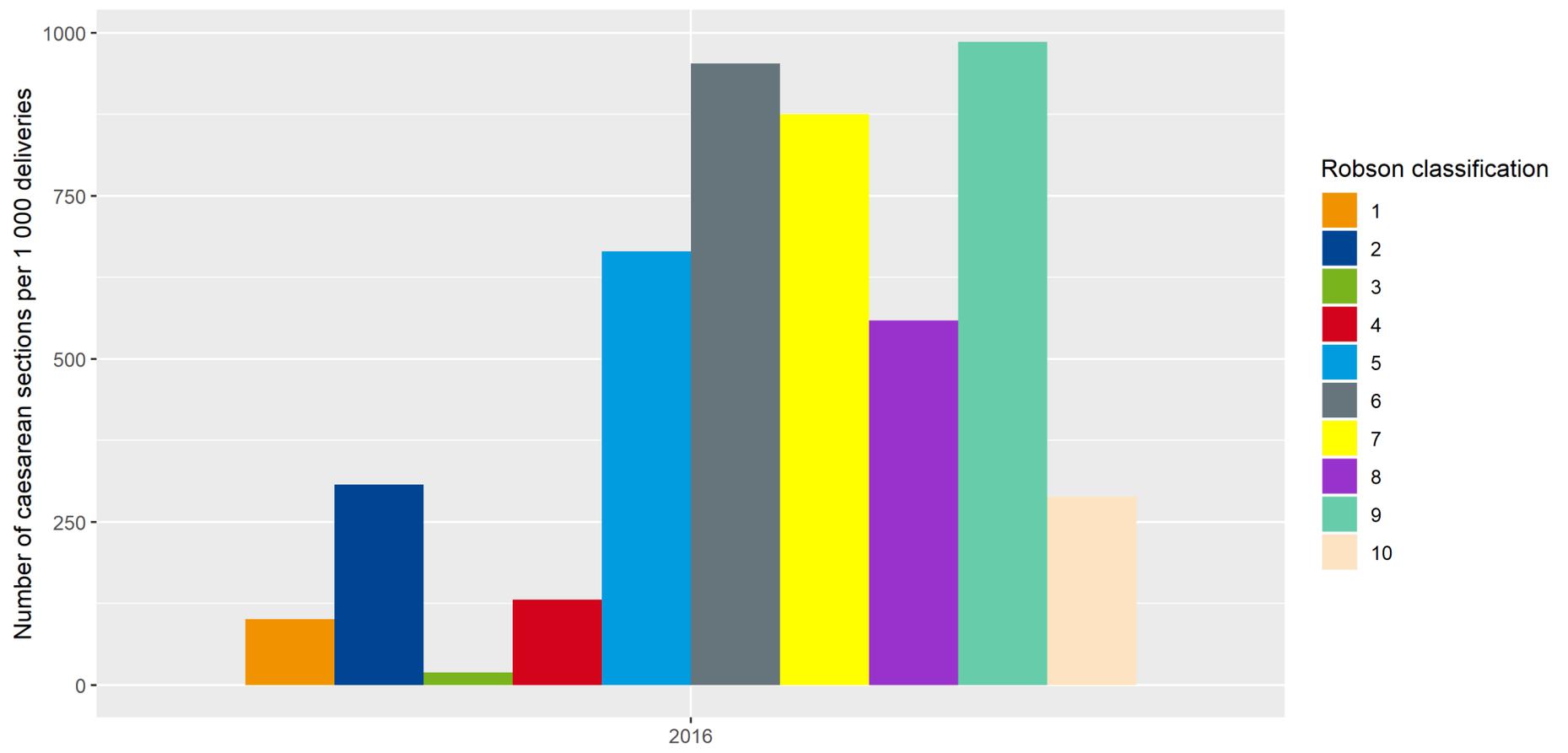
Figure 210 – Number of caesarean sections per 1 000 deliveries, by Robson classification*, Brussels, 2009-2016



*Definition of the Robson classification is available in Table 137.
Data source: CEpiP; Calculation: KCE



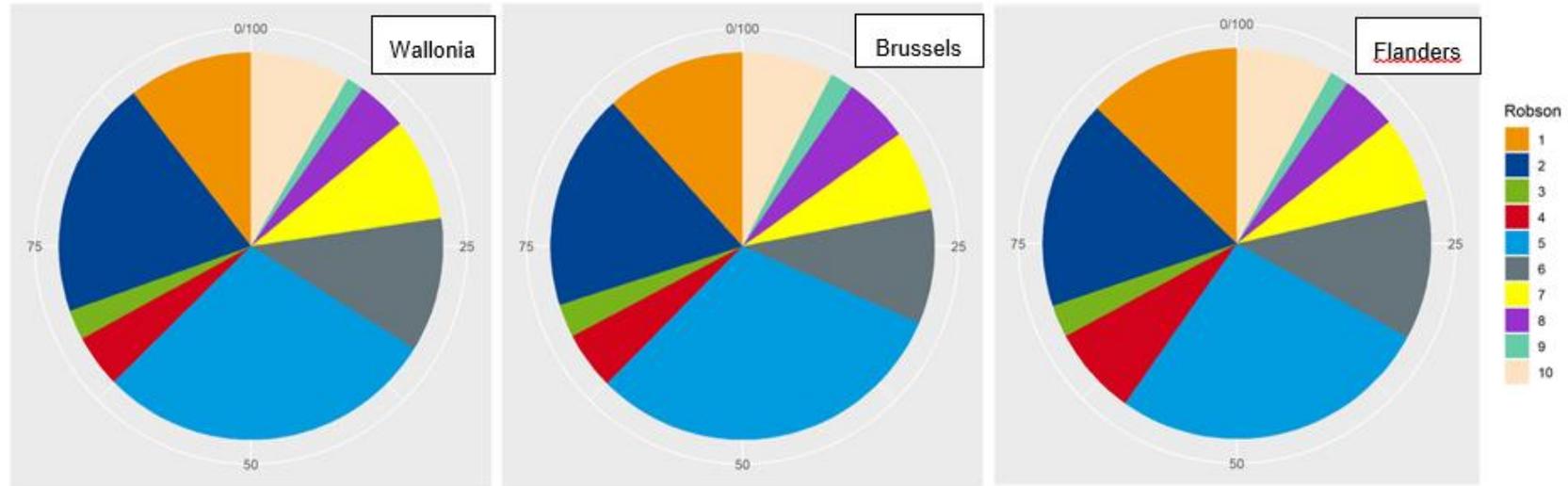
Figure 211 – Number of caesarean sections per 1 000 deliveries, by Robson classification*, Flanders, 2016



*Definition of the Robson classification is available in Table 137.
Data source: SPE; Calculation: KCE



Figure 212 – Distribution of the Robson categories* among caesarean sections, by region, 2016



Definition of the Robson classification is available in Table 137
Data source: CEpiP (BRU&WAL) & SPE (FL); Calculation: KCE



Table 134 – Caesarean section, by Robson classification, Brussels, 2016, N = 23 792

Robson	Number of caesarean sections / Total number of deliveries	Relative size on total deliveries	Proportion of caesarean section	Contribution to the overall proportion
1 Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour	561/5 472	23.00%	10.25%	2.36%
2 Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by caesarean section before labour	862/3 015	12.67%	28.59%	3.62%
3 Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour	132/6 963	29.27%	1.90%	0.55%
4 Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by caesarean section before labour	231/3 109	13.07%	7.43%	0.97%
5 All multiparous women with a least one previous uterine scar, with a single cephalic pregnancy ≥37 weeks gestation	1 474/2 471	10.39%	59.65%	6.20%
6 All nulliparous women with a single breech pregnancy	454/519	2.18%	87.48%	1.91%
7 All multiparous with a single breech pregnancy, including women with previous uterine scars	323/419	1.76%	77.09%	1.36%
8 All women with multiple pregnancies, including women with previous uterine scars	262/468	1.97%	55.98%	1.10%
9 All women with a single pregnancy with a transverse or oblique lie, including women with previous uterine scars	94/95	0.40%	98.95%	0.40%
10 All women with a single cephalic pregnancy <37 weeks gestation, including women with previous scars	365/1 261	5.30%	28.95%	1.53%
TOTAL*	4 758/23 792	100.00%		20.00%

* Unknown for 90 deliveries (0.4% of the total number of deliveries). Data source: CEpiP; Calculation: KCE



Table 135 – Caesarean section, by Robson classification, Wallonia, 2016, N = 35 288

Robson	Number of caesarean sections /Total number of deliveries	Relative size on total deliveries	Proportion of caesarean section	Contribution to the overall proportion
1 Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour	791/7 900	22.39%	10.01%	2.24%
2 Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by caesarean section before labour	1 504/5 106	14.47%	29.46%	4.26%
3 Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour	188/8 952	25.37%	2.10%	0.53%
4 Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by caesarean section before labour	335/5 430	15.39%	6.17%	0.95%
5 All multiparous women with a least one previous uterine scar, with a single cephalic pregnancy ≥37 weeks gestation	2 170/3 398	9.63%	63.86%	6.15%
6 All nulliparous women with a single breech pregnancy	845/923	2.62%	91.55%	2.39%
7 All multiparous with a single breech pregnancy, including women with previous uterine scars	646/772	2.19%	83.68%	1.83%
8 All women with multiple pregnancies, including women with previous uterine scars	320/564	1.60%	56.74%	0.91%
9 All women with a single pregnancy with a transverse or oblique lie, including women with previous uterine scars	111/115	0.33%	96.52%	0.31%
10 All women with a single cephalic pregnancy <37 weeks gestation, including women with previous scars	633/2 128	6.03%	29.75%	1.79%
TOTAL*	7 543/35 288	100.00%		21.38%

* Unknown for 84 deliveries (0.2% of the total number of deliveries). Data source: CEpiP; Calculation: KCE



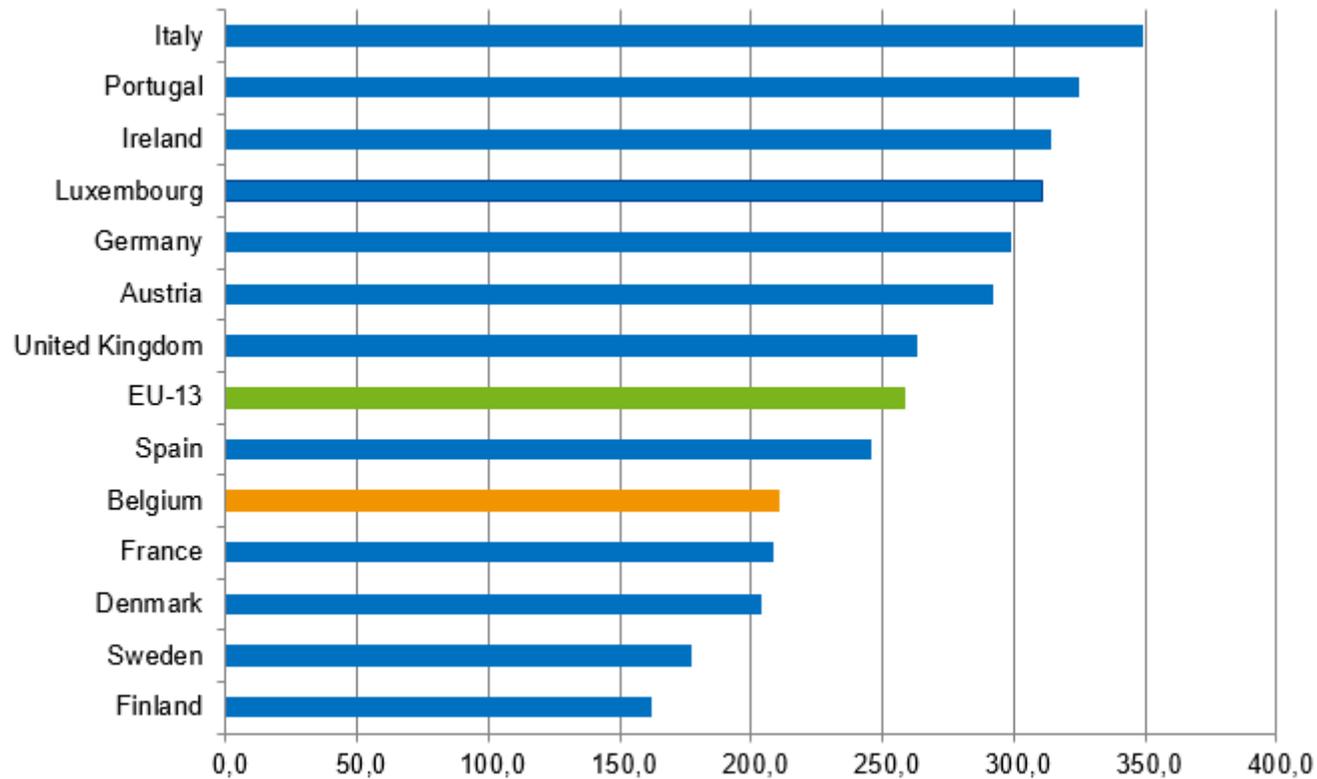
Table 136 – Caesarean section, by Robson classification, Flanders, 2016, N = 63 431

Robson	Number of caesarean sections /Total number of deliveries	Relative size on total deliveries	Proportion of caesarean section	Contribution to the overall proportion
1 Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour	1 699/16 893	26.63%	10.06%	2.68%
2 Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by caesarean section before labour	2 306/7 497	11.82%	17.38%	3.64%
3 Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour	3 54/18 507	29.18%	1.91%	0.56%
4 Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by caesarean section before labour	979/7 472	11.78%	7.38%	1.54%
5 All multiparous women with a least one previous uterine scar, with a single cephalic pregnancy ≥37 weeks gestation	3 555/5 346	8.43%	66.50%	5.60%
6 All nulliparous women with a single breech pregnancy	1 537/1 613	2.54%	95.29%	2.42%
7 All multiparous with a single breech pregnancy, including women with previous uterine scars	940/1 074	1.69%	87.52%	1.48%
8 All women with multiple pregnancies, including women with previous uterine scars	621/1 112	1.75%	55.85%	0.98%
9 All women with a single pregnancy with a transverse or oblique lie, including women with previous uterine scars	208/211	0.33%	98.58%	0.33%
10 All women with a single cephalic pregnancy <37 weeks gestation, including women with previous scars	1 069/3 706	5.84%	28.85%	1.69%
TOTAL	13 268/63 431	100.00%		20.91%

* Data source & calculation: SPE



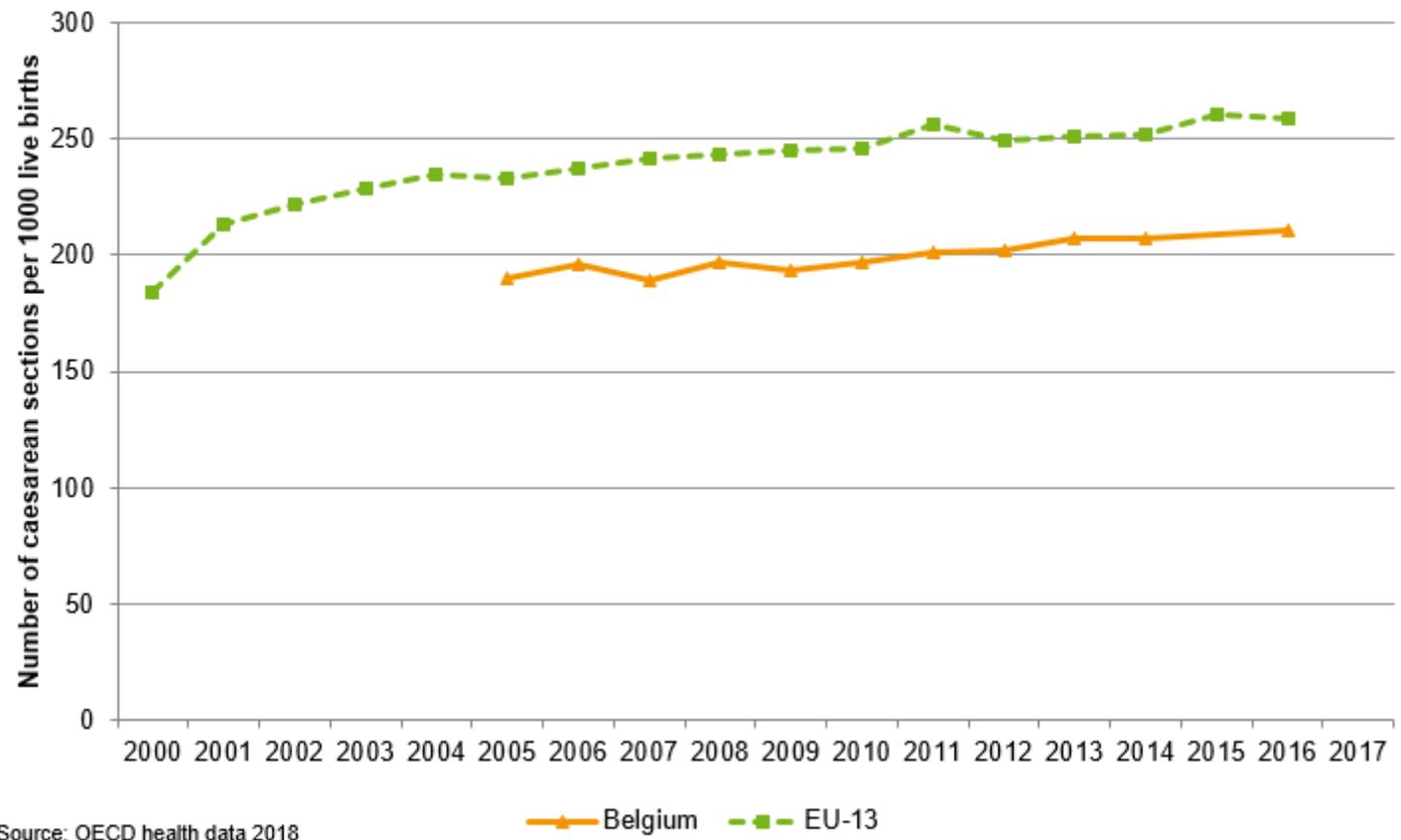
Figure 213 – Number of caesarean sections per 1 000 live births, by EU-13 country, 2016



Source: OECD health data 2018 **Number of caesarean sections per 1000 live births**



Figure 214 – Number of caesarean sections per 1 000 live births, by EU-13* country, 2000-2016



Source: OECD health data 2018

* Italy, Portugal, Ireland, Luxembourg, Germany, Austria, UK, Spain, Belgium, France, Denmark, Sweden, Finland

**Table 137 – Robson classification**

Robson classification	
1	Nulliparous women with a single cephalic pregnancy, ≥ 37 weeks gestation in spontaneous labour
2	Nulliparous women with a single cephalic pregnancy, ≥ 37 weeks gestation who either had labour induced or were delivered by caesarean section before labour
3	Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥ 37 weeks gestation in spontaneous labour
4	Multiparous women without a previous uterine scar, with a single cephalic pregnancy, ≥ 37 weeks gestation who either had labour induced or were delivered by caesarean section before labour
5	All multiparous women with a least one previous uterine scar, with a single cephalic pregnancy ≥ 37 weeks gestation
6	All nulliparous women with a single breech pregnancy
7	All multiparous with a single breech pregnancy, including women with previous uterine scars
8	All women with multiple pregnancies, including women with previous uterine scars
9	All women with a single pregnancy with a transverse or oblique lie, including women with previous uterine scars
10	All women with a single cephalic pregnancy < 37 weeks gestation, including women with previous scars

Key points

- **In 2016, the caesarean sections rate is 216 per 1 000 live births which corresponds to an increase of 38% with respect to the rate of 2000 (156 per 1 000 live births).**
 - **Globally, the caesarean sections rate increased in every Belgian regions from 2000 to 2016. Nevertheless, a decrease is observed in Brussels since 2013 and in Wallonia since 2014.**
 - **An important heterogeneity in the practices exists at the district level, the caesarean rate ranging from 117 to 303 per 1 000 live births in 2016.**
 - **Important variability is observed across hospitals, the caesarean rate ranging from 155 to 352 per 1 000 live births in 2016.**
- **Repeated C-sections (Robson 5: multiparous women with a least one previous uterine scar, with a single cephalic pregnancy ≥ 37 weeks gestation) contribute the most to the total caesarean rate.**
 - **Despite an increase of the caesarean rate over the years, Belgium performed better than the average EU-13 from 2005 to 2016 for this indicator.**



References

- [1] World Health Organization. WHO statement on caesarean section rates. World Health Organization; 2015.
- [2] Lavender T, Hofmeyr GJ, Neilson JP, Kingdon C, Gyte GM. Caesarean section for non-medical reasons at term. The Cochrane database of systematic reviews. 2012;3:CD004660.
- [3] OECD. Health at a Glance 2013: OECD indicators. 2013.
- [4] Halpern S. SOGC Joint Policy Statement on Normal Childbirth. J Obstet Gynaecol Can. 2008;30:1163-5.
- [5] Haute Autorité de Santé. Indications de la césarienne programmée à terme. 2012. St-Denis la Plaine: HAS
- [6] Stordeur S, Jonckheer P, Fairon N, De Laet C. Elective caesarean section in low-risk women at term: consequences for mother and offspring. Health technology assessment. 2016. KCE Report 275
- [7] Aelvoet W, Windey F, Molenberghs G, Verstraelen H, Van Reempts P, Foidart J-M. Screening for inter-hospital differences in cesarean section rates in low-risk deliveries using administrative data: an initiative to improve the quality of care. BMC health services research. 2008;8(1):3.
- [8] García-Armesto S, Angulo-Pueyo E, Martínez-Lizaga N, Mateus C, Joaquim I, Bernal-Delgado E. Potential of geographical variation analysis for realigning providers to value-based care. ECHO case study on lower-value indications of C-section in five European countries. The European Journal of Public Health. 2015;25(suppl_1):44-51.
- [9] Leroy C, van Leeuw V, Englert Y, Wei-Hong Z. Santé périnatale en Wallonie-Année 2015. Centre d'épidémiologie périnatale. 2017.
- [10] Torloni MR, Betran AP, Souza JP, Widmer M, Allen T, Gulmezoglu M, *et al.* Classifications for cesarean section: a systematic review. PloS one. 2011;6(1):e14566.
- [11] Robson MS. Classification of caesarean sections. Fetal and maternal medicine review. 2001;12(1):23-39.
- [12] McPherson K, Gon G, Scott M. International variations in a selected number of surgical procedures. 2013.
- [13] World Health Organization. Robson classification: implementation manual. 2017. (9241513195)