swiss medical weekly

ORIGINAL ARTICLE

Swiss caesarean section rates according to Robson's Ten-Group Classification System: an observational study

Stephen Adjahou[a], Gian-Paolo Klinke[b], Alexandre Vallée[c], Benedetta Guani[a], Nordine Ben Ali[a], Jean-Marc Ayoubi[c], Anis Feki[a], Arrigo Fruscalzo[a]

a Department of Obstetrics and Gynecology, Hospital of Fribourg, Switzerland; b Federal Statistical Office OFS, Switzerland; c Epidemiology unit and public health, Foch Hospital, Suresnes, France

Summary

STUDY AIMS: Robson's Ten-Group Classification System (TGCS) was proposed to describe caesarean section rates by ten patient-centred risk-specific groups. The aim of the study was to describe Swiss caesarean section rates according to this classification, further stratifying it according to region and type of structure where delivery took place. We also aimed to compare our results to the standard caesarean section rates, recommended by the World Health Organization (WHO).

METHODS: An observational study including all women delivering in health facilities in Switzerland in the period 2014–2021. A total of 695,733 deliveries were included. Core variables used for classification were semi-automatically generated using routine data provided by the Swiss Federal Statistics Office. Caesarean section rates were reported according to the TGCS. Data were also stratified according to each of the 26 Swiss cantons, as well as to the typology of hospital where delivery took place.

RESULTS: The major relative contributors to the overall caesarean section rate were Group 2 (nulliparous, above 37 weeks, with induction) and Group 5 (women with previous caesarean section, above 37 weeks with a singleton pregnancy), respectively accounting for 20.7% and 30.1% of all caesarean sections. We also showed that the Swiss population was similar to the population considered in the WHO recommendation. Nonetheless, the caesarean section rate among our population exceeded that suggested by the WHO recommendations, being respectively of 44.4% vs 39.9% and 86.0% vs 74.4% for Groups 2 and 5. Large variations were detected in the caesarean section rate when looking at the different cantons, ranging from 29.8% to 59.6% for Group 2 and between 58.0% and 100.0% for Group 5.

CONCLUSION: Routine data collection allowed us to describe caesarean section rates throughout Switzerland according to the TGCS. The Swiss caesarean section rate was higher than the caesarean section rate recommended by the WHO, even though the population characteristics were comparable. Substantial differences were found when stratifying caesarean section rates according to the canton, as well as to the type of structure where delivery took place.

Published
31 January 2026

doi
https://doi.org/10.57187/4231

Cite this as
Swiss Med Wkly. 2026;156:4231

Arrigo Fruscalzo
Department of Obstetrics and Gynecology
Hospital of Fribourg
Chemin des Pensionnats 2-6
CH-1708 Fribourg
Arrigo.Fruscalzo[at]h-fr.ch

Introduction

Caesarean section is one of the most frequently performed surgeries [1]. However, its use increases maternal morbidity, due to surgery complications, and health costs [2]. Furthermore, we know that the first caesarean section will determine the obstetric life of the parturient and increase the need for a caesarean section in the future [3]. With the industrialisation of healthcare, the rate of caesareans has exploded and become a global epidemic. In the United States, the rate of caesarean sections rose from 5.8% to 31.9% between 1970 and 2016, becoming the most frequently performed surgical procedure [4]. A smaller country such as Switzerland is not spared by this global epidemic. In 2021, our country had a caesarean section rate of 32.8% [5].

Analysing the overall caesarean rate can be misleading due to the diverse risk profiles within the population. To facilitate comparative assessments, it is crucial to break down this rate into risk-specific groups. The Ten-Group Classification System (TGCS), introduced by Michael Robson in 2001, offers a clinically relevant framework for evaluating variations in the caesarean rate [6, 7].

Endorsed by the World Health Organization (WHO) for comparing caesarean rates between hospitals, the TGCS is increasingly used for cross-unit and cross-country rate comparisons, as well as for tracking trends over time [8]. This classification system categorises women into ten distinct, non-overlapping groups.

In 1985, the WHO stated that a caesarean section rate higher than 15% could not be medically justified. In 2015, it recommended use of the TGCS when assessing the proper use of caesarean sections [8]. Assessing singleton pregnancies through the lens of the TGCS may lead to better-targeted interventions and thus decrease the caesarean section rate for deliveries with lower risks [9].

With a multicounty survey on maternal and newborn health, the WHO constituted a reference population from 66 health facilities in 22 countries (the WHO MCS population). Based on this population, a target caesarean section rate has been proposed by the WHO for each TGCS group [10]. However, it is questionable whether the population of the included countries could be compared to that of a high-income country, like Switzerland – calling into question the target caesarean section rate proposed by the WHO.

The aim of the present study was to provide a statistical description of caesarean sections performed in Switzerland in the last decade according to Robson's TGCS. We also provided a comparison between the WHO recommended caesarean section rate and the caesarean section rate of our study and a comparison between the main characteristics of the reference population and the population of our study.

Methods

Study design and setting

This was a retrospective ecological study carried out in cooperation with the Swiss Federal Statistical Office. The study was approved by the local ethics committee (*Commission cantonale d'étique de la recherche sur l'être humain, CER-VD*, ID-number 2021-01639, 12 October 2021).

Participants

All women who gave birth in an acute care hospital from January 2014 to December 2021 in Switzerland, starting from the 24th week of gestation, were included. Home births, stillbirths and pregnancy terminations were excluded from the analysis.

Data sources

The Swiss Federal Statistical Office annually collects the diagnoses of discharges for deliveries that occurred in Swiss hospitals and birth centres. For the present study, we used this administrative data source for the period 2014 to 2021. Personal insurance numbers were used for this scope. All deliveries associated with viable newborns that occurred in Switzerland in an inpatient setting are thus covered. All the data were transmitted and analysed in anonymised form. The statistical analysis was performed using the STATA-17 software package.

Outcome measures

The primary outcome was the cumulative rate of caesarean sections according to Robson's Ten-Group Classification System (table 1). The main features of this classification are that it is fully inclusive and mutually exclusive [6]. To allocate each delivery to a group, we used the number of previous births, the number of fetuses during the pregnancy, the fetal presentation, weeks of amenorrhoea at birth, the presence of a previous uterine scar, the type of labour (spontaneous or induced) and of delivery (caesarean section or vaginal). This information was identified by means of procedures and diagnostic information associated with each discharge, codified respectively with the Swiss classification of surgical procedures (CHOP) and the International Statistical Classification of Diseases, 10th revision German Modification (ICD-10-GM) codes. To evaluate caesarean section rates according to the TGCS, we used the algorithm described in the WHO's implementation manual [10]. A semi-automated classification of the category was performed, as suggested by the WHO guidelines [10]. Data were presented as suggested by the WHO guidelines. First, a quality control verification process was performed in order to assess the plausibility of the data used for classification. Then our population was classed and compared to the WHO multicountry survey

population (WHO MCS) [10]. Finally, we looked at our caesarean section rate by category. Furthermore, we stratified the caesarean section rate for each canton, and type of hospital (university hospitals or other type).

Table 1: The caesarean section classification, according to Robson's Ten-Group Classification System (adapted from reference [10]).

Group	Description
1	Nulliparous, singleton, cephalic, ≥37 weeks, in spontaneous labour
2	Nulliparous, singleton, cephalic, ≥37 weeks, induced labour or pre-labour caesarean
3	Multiparous, without previous caesarean section, singleton, cephalic, ≥37 weeks, spontaneous labour
4	Multiparous, without previous caesarean section, singleton, cephalic, ≥37 weeks, induced or pre-labour caesarean
5	Previous caesarean section, singleton, cephalic, ≥37 weeks
6	Nulliparous, singleton, breech
7	Multiparous, singleton, breech (including previous caesarean section)
8	Multiple pregnancies (including previous caesarean section)
9	Transverse or oblique lies (including previous caesarean section)
10	Preterm, singleton, cephalic, <37 weeks (including previous caesarean section)

Statistical analysis

The characteristics of the study population are presented using means and standard deviations (SD) for continuous variables, and counts and proportions for categorical variables. All data transmitted by the Federal Statistical Office were processed using Stata V17.

Results

The present study covers a total of 695,733 deliveries occurring in Switzerland during the study period 2014–2021. We were able to classify 682,680 deliveries according to the TGCS, accounting for 98.1% of all deliveries.

Among these, 224,969 corresponded to caesarean section deliveries (33.0% of all deliveries) and 457,711 corresponded to vaginal births (67.1% of all deliveries). The mean maternal age over the full period was 31.7 years. The gravidity and parity were, respectively, 1.0 and 0.7. Women with a previous uterine scar accounted for 13.8% of the whole population. The characteristics of the study population are summarised in table 2.

Table 2: Maternal and pregnancy characteristics of the study populations.

Characteristic		Overall	Caesarean section	Vaginal birth
Maternal characteristics: Mean (SD-median)	Age at delivery, in years	31.7 (4.9-32)	32.6 (5.0-33)	31.2 (4.8-31)
	Age at first child, in years	30.5 (4.9-31)	31.6 (5.1-32)	30 (4.7-30)
Pregnancy history	Number of previous pregnancies	1(1.2-1)	1 (1.2-1)	1 (1.2-1)
	Number of previous deliveries	0.7 (0.9-1)	0.7 (0.8-0)	0.7 (0.9-1)
Deliveries distribution: absolute number (percentage)				
Total deliveries		682,680 (100%)	224,969 (32.9%)	457,711 (67.0%)
Fetal position	Vertex	630,365 (92.3%)	179,729 (28.5%)	450,636 (71.5%)
	Breech	34,991 (5.1%)	33,079 (94.5%)	1912 (5.5%)
	Transverse	17,324 (2.5%)	12,161 (70.0%)	5163 (29.0%)
Pregnancy type	Singleton	670,106 (98.1%)	215,108 (32.1%)	454,998 (67.9%)
	Multiple	12,574 (1.8%)	9861 (78.4%)	2713 (21.6%)
	Uterine scar*	94,267 (13.8%)	82,435 (87.4%%)	11,832 (12.5%)
Labour type	Spontaneous	518,640 (76.0%)	182,692 (35.2%)	335,948 (64.8%)
	Induced	164,040 (24.0%)	42,277 (25.7%)	121,763 (74.2%)
Gestational age at delivery	Premature (<37 weeks)	41,583 (6.1%)	23,529 (56.6%)	18,054 (43.4%)
	At term (≥37 weeks)	641,097 (93.9%)	201,440 (31.4%)	439,657 (68.6%)
Macro-region	German-speaking	482,907 (70.7%)	166,320 (34.4%)	316,587 (65.6%)
	French- or Italian-speaking	199,773 (29.2%)	58,649 (29.3%)	141,124 (70.6%)
Institutional characteristics: type of structure**	University hospital	111,197 (16.3%)	39,521 (35.5%)	71,676 (64.5%)
	Centralised care (university excluded)	371,574 (54.4%)	121,603 (32.7%)	249,971 (67.3%)
	Primary care	184,948 (27.1%)	62,645 (33.9%)	122,303 (66.1%)
	Gynaecological/obstetric clinic	14,961 (2.2%)	1200 (8.0%)	13,761 (92.0%)

* All types of uterine scars were included, including previous caesarean section scars and myomectomies
** Centralised care hospitals include hospitals that have between 30,000 and 9000 hospitalisations per year between all the different services or a high level of training. Primary care hospitals have fewer than 9000 hospitalisations per year and a lower level of training. Gynaecological/obstetric clinics include specialised institutions.

We also performed an analysis of the quality of data collected according to the WHO recommendations (table 3). We evaluated singleton newborns in transverse or oblique lie (group 9). The group size accounted for 2.4% of all caesarean sections (it should be less than 1% ideally; it was found to be 0.4% in the WHO MCS population) while the caesarean section rate in this group was 68.8% (it should by definition be 100%); it was found to be 88.6% in the WHO MCS population.

Table 3: Quality of data according to the WHO's recommendations.

Steps	Interpretation by Robson	WHO MCS population	Our results	
The total numbers of caesarean sections and of women who delivered	These numbers should be identical to the total numbers of caesarean sections and of women who delivered in your hospital	NA	Total live births	
			FSO	696,691
			Our study	682,680 (98.0%)
			Total caesarean sections	
			FSO	224,966
			Our study	224,969
Size of Group 9	Should be less than 1.0%	0.4%	2.4%	
Group 9 caesarean section rate	Should be 100% by convention	88.6%	68.8%	

FSO: Swiss Federal Statistical Office; WHO MCS: World Health Organization Multi-Country Survey on Maternal and Newborn Health [11].
Group 1: Nulliparous, singleton, cephalic, ≥37 weeks in spontaneous labour; Group 2: Nulliparous, singleton, cephalic, ≥37 weeks, induced or caesarean section before labour; Group 3: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks in spontaneous labour; Group 4: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks, induced or CS before labour; Group 5: Previous caesarean section, singleton, cephalic, ≥37 weeks; Group 6: All nulliparous, singleton, breech; Group 7: Multiparous, singleton, breech (including previous caesarean section); Group 8: All multiple births (including previous caesarean section); Group 9: All singleton, abnormal lie (including previous caesarean section); Group 10: All singleton, cephalic, ≤36 weeks (including previous caesarean section).

Table 4 illustrates our results according to WHO guidelines. The two major contributors to the overall caesarean section rate are TGCS Groups 5 and 2, accounting for a relative contribution of 30.1% and 20.7%, respectively, responsible for 50.8% of the overall caesarean section rate.

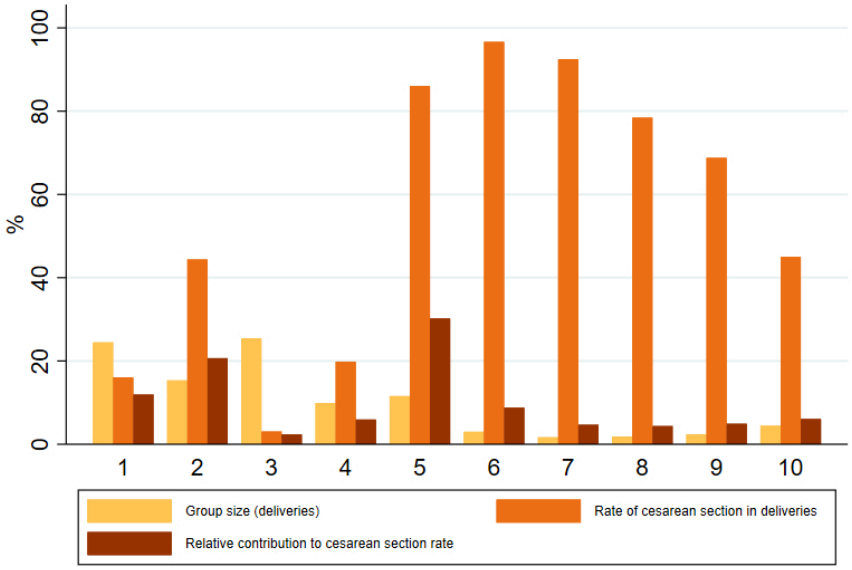
Table 4: Results according to the TGCS report table.

Group	Number of caesareans in group	Number of women in group	Group size (%)	Group CS rate (%)	Absolute group contribution to overall CS rate (%)	Relative group contribution to overall CS rate (%)
1	26,834	167,323	24.5%	16.0%	3.9%	11.9%
2	46,544	104,862	15.4%	44.4%	6.8%	20.7%
3	5406	173,318	25.4%	3.1%	0.8%	2.4%
4	13,520	67,487	9.9%	20.0%	2.0%	6.0%
5	67,708	78,753	11.5%	86.0%	9.9%	30.1%
6	19,764	20,450	3.0%	96.6%	2.9%	8.8%
7	10,566	11,426	1.7%	92.5%	1.5%	4.7%
8	9861	12,574	1.8%	78.4%	1.4%	4.4%
9	11,095	16,130	2.4%	68.8%	1.6%	4.9%
10	13,671	30,357	4.4%	45.0%	2.0%	6.1%
Total	**224,969**	**682,680**	**100**%			**100**%

Group 1: Nulliparous, singleton, cephalic, ≥37 weeks in spontaneous labour; Group 2: Nulliparous, singleton, cephalic, ≥37 weeks, induced or caesarean section before labour; Group 3: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks in spontaneous labour; Group 4: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks, induced or CS before labour; Group 5: Previous caesarean section, singleton, cephalic, ≥37 weeks; Group 6: All nulliparous, singleton, breech; Group 7: Multiparous, singleton, breech (including previous caesarean section); Group 8: All multiple births (including previous caesarean section); Group 9: All singleton, abnormal lie (including previous caesarean section); Group 10: All singleton, cephalic, ≤36 weeks (including previous caesarean section).

Figure 1 shows the group size, caesarean section rate and relative contribution by TGCS Group. It reveals that Groups 1 and 3 represented almost half of all our deliveries. However, the highest caesarean section rate was recorded for the nulliparous and multiparous breech presentation (Groups 6 and 7, respectively, with 96.6% and 92.5%), followed by Group 5 (previous caesarean section, singleton, cephalic, ≥37 weeks) then Group 2 (nulliparous, singleton, cephalic, ≥37 weeks, induced) with a caesarean section rate of 86.0% and 44.4%, respectively. Considering both the group size and the caesarean section rate, we observe that the major relative contributors to the overall caesarean section rate were Groups 5 and 2, accounting for 30.1% and 20.7%, respectively, of all caesarean sections.

Figure 1: Caesarean sections in Switzerland between 2014 and 2021, according to Robson's Ten-Group Classification System. CS: caesarean section; Group size: The percentage of patients belonging to the category compared to the overall study population; Relative contribution of group to overall caesarean section rate: number of caesareans in the group compared to the overall caesarean sections in the study, as a percentage. Group 1: Nulliparous, singleton, cephalic, ≥37 weeks in spontaneous labour; Group 2: Nulliparous, singleton, cephalic, ≥37 weeks, induced or caesarean section before labour; Group 3: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks in spontaneous labour; Group 4: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks, induced or CS before labour; Group 5: Previous caesarean section, singleton, cephalic, ≥37 weeks; Group 6: All nulliparous, singleton, breech; Group 7: Multiparous, singleton, breech (including previous caesarean section); Group 8: All multiple births (including previous caesarean section); Group 9: All singleton, abnormal lie (including previous caesarean section); Group 10: All singleton, cephalic, ≤36 weeks (including previous caesarean section).



When evaluating caesarean section trends in our population, we noted a declining trend in the overall caesarean section rate over the study period. Considering the ten TGCS Groups, it appears that the caesarean section rate for all Groups has been decreasing from the year 2014 and 2015 to the year 2021, except for Group 10.

Figure 2 shows the temporal trend in caesarean section rate according to the TGCS.

Figure 2: Mode of delivery by TGCS Groups in 2014, 2015 and 2021.

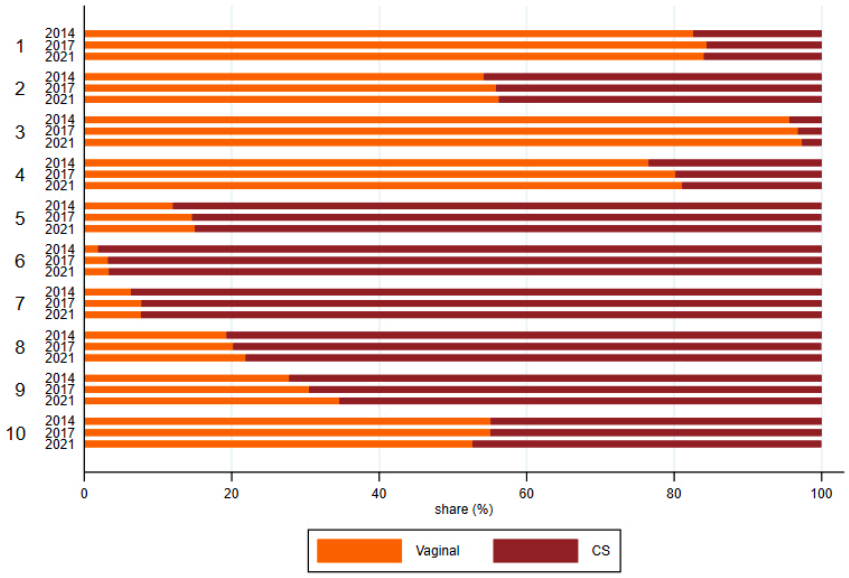


Table 5 compares our population to the WHO reference population [10]. Our rate of nulliparous at-term with a cephalic presentation reached 39.9% of the population, while the rate of multiparous with a cephalic presentation at term was recorded at 35.3%. The third group in our study consisted of women with a previous caesarean section, comprising 11.5% of the total. This group also showed a high induction rate, with a ratio of 1.6 when comparing Groups 1 and 2.

Table 5: Characteristics of the study population compared to the WHO's reference population.

Step	Robson guideline	WHO MCS population	Our results (Switzerland)
1. Look at the size of Groups 1 + 2 (Column 4)	This usually represents 35–42% of the obstetric population of most hospitals	38.1%	39.9%
2. Look at the size of Groups 3 + 4 (Column 4)	This usually represents about 30% of women	46.5%	35.3%
3. Look at the size of Group 5 (Column 4)	This is related to the overall caesarean section rate. The size of Group 5 is usually about half of the total caesarean section rate. In settings with low overall caesarean section rates, it is usually under 10%.	7.2%	11.5%
4. Look at the size of Groups 6 + 7 (Column 4)	This should be 3–4%	2.7%	4.7%
5. Look at the size of Group 8 (Column 4)	This should be 1.5–2%	0.9%	1.8%
6. Look at the size of Group 10 (Column 4)	This should be less than 5% in most normal risk settings	4.2%	4.4%
7. Look at the Ratio of the size of Group 1 vs Group 2 (Divide the size of Group 1 by the size of Group 2; Column 4)	This is usually 2 or higher	Ratio 3.3	1.6
8. Look at the Ratio of the size of Group 3 versus Group 4 (Divide the size of Group 3 by the size of Group 4; Column 4)	This is always higher than the ratio of Group 1/Group 2 in the same institution, i.e. larger than 2:1. This is a very reliable finding in confirming data quality and culture of the organisation.	2	2.6
9. Look at the Ratio of the size of Group 6 versus Group 7 (Divide the size of Group 6 by the size of Group 7; Column 4)	This is usually 2:1 because breeches are more frequent in nulliparous women than in multiparous women.	Ratio 0.8	1.8

WHO MCS: World Health Organization Multi-Country Survey on Maternal and Newborn Health Characteristics of the population according to the WHO's recommendations [10, 11].
Group 1: Nulliparous, singleton, cephalic, ≥37 weeks in spontaneous labour; Group 2: Nulliparous, singleton, cephalic, ≥37 weeks, induced or caesarean section before labour; Group 3: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks in spontaneous labour; Group 4: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks, induced or CS before labour; Group 5: Previous caesarean section, singleton, cephalic, ≥37 weeks; Group 6: All nulliparous, singleton, breech; Group 7: Multiparous, singleton, breech (including previous caesarean section); Group 8: All multiple births (including previous caesarean section); Group 9: All singleton, abnormal lie (including previous caesarean section); Group 10: All singleton, cephalic, ≤36 weeks (including previous caesarean section).

Figure 3 shows the caesarean section rate by TGCS Group in 2021 in the different regions of Switzerland. These cartographies reveal wide disparities between different part of our country, especially for the caesarean section rate for the two main contributors to our overall caesarean section rate, Groups 2 and 5, ranging from 29.8% to 59.6% for Group 2 and between 58.0% and 100% for Group 5; vs caesarean section rates in Switzerland overall of 44.4% in Group 2 and 86.0% in Group 5.

Figure 3: Caesarean section rate in Switzerland in 2021, according to Robson's Ten-Group Classification System. Group 1: Nulliparous, singleton, cephalic, ≥37 weeks in spontaneous labour; Group 2: Nulliparous, singleton, cephalic, ≥37 weeks, induced or caesarean section before labour; Group 3: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks in spontaneous labour; Group 4: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks, induced or CS before labour; Group 5: Previous caesarean section, singleton, cephalic, ≥37 weeks; Group 6: All nulliparous, singleton, breech; Group 7: Multiparous, singleton, breech (including previous caesarean section); Group 8: All multiple births (including previous caesarean section); Group 9: All singleton, abnormal lie (including previous caesarean section); Group 10: All singleton, cephalic, ≤36 weeks (including previous caesarean section).

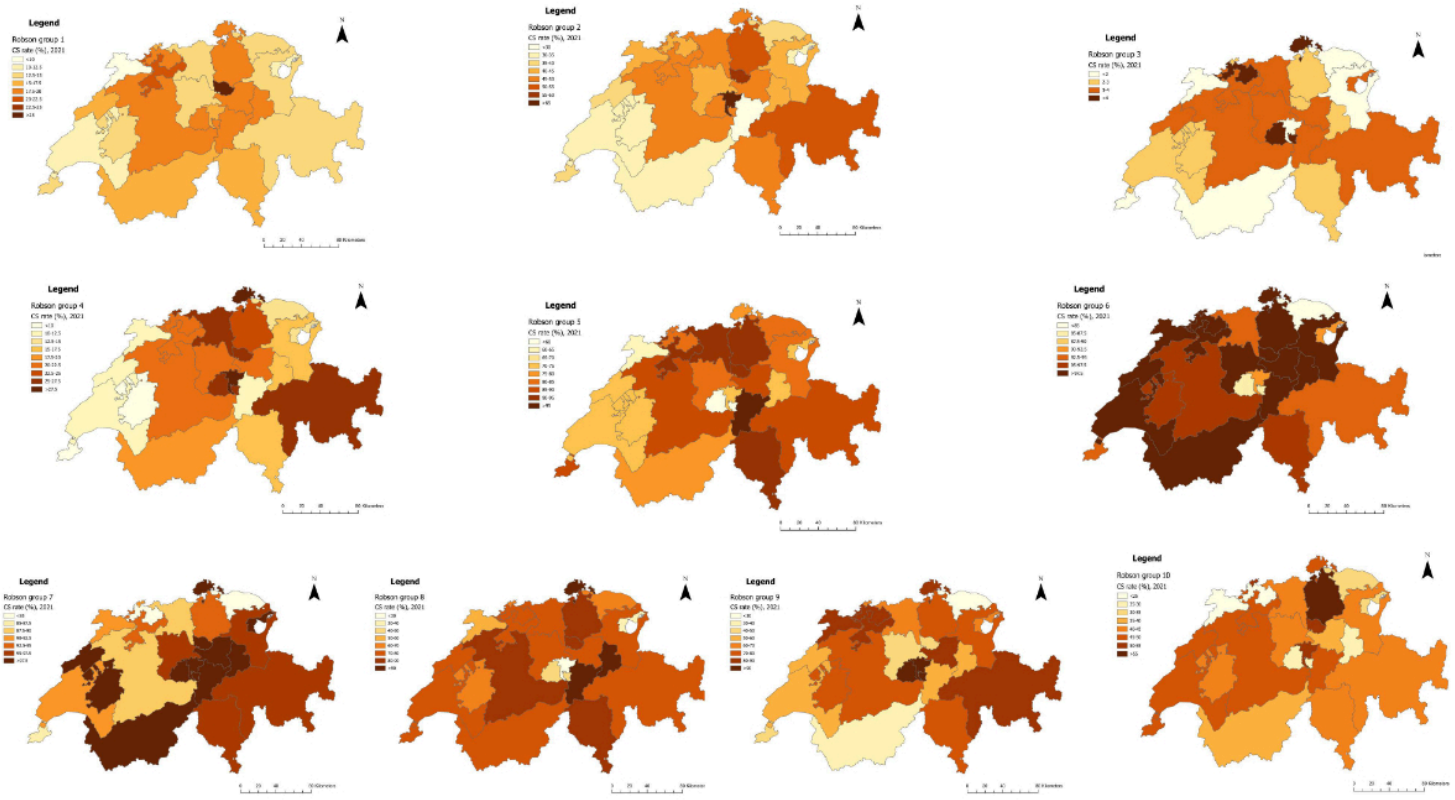
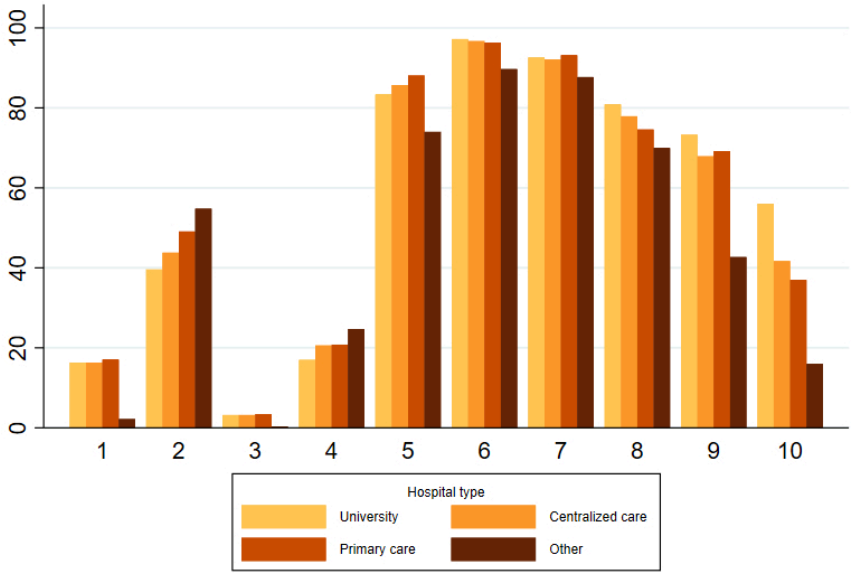


Figure 4 shows the difference in the caesarean section rate between hospitals based on their size and type of activity. We can observe that for the two main contributors to our overall caesarean section, namely Groups 2 and 5, the biggest hospitals tend to have a lower caesarean section rate. The Group 2 caesarean section rate was 39.6% in university hospitals, while structures with the lowest number of patients hospitalised per year had a rate higher than 50%. The same remark can be made for Group 4: university hospitals had a caesarean section rate less than a fifth while this rate climbed to almost a third in structures with fewer than 9000 hospitalisations per year. Regarding Group 5, there is a slight increase when comparing university hospitals with small facilities but all types of hospital had a caesarean section rate hovering around 80%. Conversely, for the category of caesarean section that required neonatal support, Group 10, it seems that the biggest hospital had a higher caesarean section rate, 56.0%. Finally, for Group 9, which should have a caesarean section rate of 100%, the biggest facilities seem to have a better quality of data entry.

Figure 4: Caesarean rate by hospital type. Centralised care hospitals include hospitals that have between 30,000 and 9000 hospitalisations per year between all the different services or a high level of training. Primary care hospitals have fewer than 9000 hospitalisations per year and a lower level of training. Other hospitals include specialised hospitals where one specialty is predominant. Group 1: Nulliparous, singleton, cephalic, ≥37 weeks in spontaneous labour; Group 2: Nulliparous, singleton, cephalic, ≥37 weeks, induced or caesarean section before labour; Group 3: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks in spontaneous labour; Group 4: Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks, induced or CS before labour; Group 5: Previous caesarean section, singleton, cephalic, ≥37 weeks; Group 6: All nulliparous, singleton, breech; Group 7: Multiparous, singleton, breech (including previous caesarean section); Group 8: All multiple births (including previous caesarean section); Group 9: All singleton, abnormal lie (including previous caesarean section); Group 10: All singleton, cephalic, ≤36 weeks (including previous caesarean section).



Discussion

Main study findings

In this study, we described caesarean section rates in Switzerland according to Robson's Ten-Group Classification System (TGCS). According to these data, the major contributors were Groups 5 and 2. We also detected large differences in the distribution of the caesarean section rate according to the region and the type of hospital considered, without significant trends during the study period.

Considering our data, we observed that our population is mainly composed of nulliparous and multiparous without any obstetric risk, such as the WHO population [10]. We showed in table 4, a relative contribution of 30.1% from Group 5 and 20.7% from Group 2. The two groups together account for 50.8% of the overall caesarean section rate. These results are in accordance with the current literature showing that these two Groups are those where most efforts should be addressed [3, 12]. When evaluating the caesarean section rate among our population among the most representative TGCS Groups, we found that it exceeded that suggested by the WHO recommendations, being 44.4% vs 39.9% and 86.0% vs 74.4%, respectively for Group 2 and Group 5 [10].

When evaluating caesarean section trends in our population, we noted a stable global caesarean section rate over the study period. When we look at the different regions, we can clearly see that some areas reach a caesarean section rate under the Multi-Country Survey on Maternal and Newborn Health population and close to the WHO recommendation. For instance, the goal for Group 2 – WHO recommends a caesarean section rate around 20–35% – is reached by several regions in our country. The same observation can be made with Group 4. It is interesting to see the difference in the caesarean section rate also according to the type of hospital where delivery took place.

Strengths and limitations

One of the strengths of this study is that data collected from the Swiss Federal Statistical Office are population-based and representative of national practices. They include all deliveries performed in Switzerland, except for home births, which, according to a national survey published in 2015, accounted for about 2.5% of all deliveries [13]. We also chose to perform the study over an 8-year period in order to include a large number of patients and to evaluate whether variations were detectable during the study period. The starting period selected was 2014, given that before this year no distinction was made between planned and emergency caesarean sections. The absence of this information would affect the classification of these deliveries to the correct TGCS Group. Using routine data processed by the Swiss Federal Statistical Office, we were able to classify the great majority of the deliveries that occurred, thus providing a comprehensive overview of caesarean section contributors for all Swiss acute care hospitals.

The main limitations of our study are the type of data collected and its retrospective nature. In Switzerland, codification is done by non-medical personnel according to the discharge summary of patients. The variable used for defining the ten TGCS Groups was extrapolated using the ICD-10 and the Swiss classification of surgical procedures (CHOP) codes, respectively, for defining the diagnosis and the procedures performed. Consequently, the quality of data can vary considerably, increasing the number of misclassifications in the TGCS Groups.This was reflected by the control of data quality, performed according to the WHO guidelines; for example, concerning the number of singleton pregnancies with abnormal presentation undergoing a vaginal birth. However, in our experience, the most challenging Group to be correctly identified was Group 5 (women with a history of caesarean section, singleton, cephalic, fetus in the ≥37 weeks of gestation), which also represents a relevant category of caesarean sections in terms of numerosity. Furthermore, according to the coding system, caesarean section was indicated for all forms of uterine scars, including a potential small part of women who have had a previous myomectomy or other interventions on the uterine wall excluding the caesarean section.

According to a previous single-centre retrospective study conducted in Switzerland, the relative rate of caesarean sections accounting for Group 5 represented the 66.8% of all delivering women with at least one previous caesarean section[12]. This rate of caesarean section is much lower than the 86.0% rate we found in our population but can be linked to a specific population of study and institutional confounding factors. On the contrary, our data are superposable with the national data presented in a multicentre study, again, based on information provided by the national register on the basis of the standard codification system [14].

In order to reduce misclassifications, we followed up each woman having already delivered for a period of 10 years before the study period. Women were tracked by using their personal identity code. We were able to track 98.0% of all women with a previous history of childbirth. However, this does not avoid potential errors in classification due to lack of information or errors in tracking the women. Thus, according to our experience, there is an urgent need to improve the perinatal audit in Switzerland. Supporting the use of electronic patient records will probably help to provide a better collection of routine data, helping to implement current and future research and medical practice.

Interpretation

The caesarean section rate of 32.9% in Switzerland during the study period stands notably above the threshold recommended by the World Health Organization (15%). Although Swiss maternal demographics are broadly comparable to those in the WHO reference population, the higher caesarean rate suggests that clinical practice and healthcare system characteristics may be influencing obstetric outcomes beyond medical necessity.

One of the main insights from our study is the regional variability across the 26 Swiss cantons. For example, caesarean section rates in Group 2 (nulliparous, term, singleton, cephalic pregnancies with induction or pre-labour caesarean) ranged from 29.8% to 59.6% across regions. Similarly, in Group 5 (women with a previous caesarean), rates ranged from 58.0% to 100%. These disparities point towards localised differences in obstetric decision-making and institutional policies rather than clinical risk profiles alone.

This variation is even more evident when analysing the type of healthcare institution. University hospitals generally reported lower caesarean rates, particularly in Groups 2 and 4, compared to primary care hospitals and smaller clinics. This suggests that larger institutions, potentially due to greater adherence to evidence-based protocols or access to multidisciplinary teams, may be more capable of promoting vaginal deliveries in appropriate cases.

Furthermore, although the TGCS revealed that the main caesarean drivers in Switzerland are Groups 2 and 5, which is consistent with other high-income countries, our national rates exceeded WHO's proposed targets for these groups. For instance, Swiss caesarean rates reached 44.4% in Group 2 (vs WHO's 39.9%) and 86.0% in Group 5 (vs WHO's 74.4%). This suggests opportunities for targeted interventions to reduce unnecessary repeat caesareans and to improve labour management in induced nulliparous women.

While the WHO's recommendations are based on data predominantly collected in low- and middle-income countries, our results affirm that such international benchmarks can still offer valuable points of comparison for Switzerland. Several Swiss regions already meet or come close to these targets, showing that a more uniform, quality-driven approach to delivery care is feasible within the country.

However, targeting specific groups by developing adapted strategies for reducing caesarean section rate can be more challenging than expected. There are many confounding factors that seem to influence the caesarean section rate, even when considering the TGCS. They include organisational factors as well as pregnancy-related factors concerning maternal and fetal conditions, that could impact both the overall and specific incidence of caesarean sections by TGCS Group [15]. Thus, the TGCS alone might not be the best tool to compare different hospitals. Some studies have evaluated the impact of these confounding factors, showing a potential benefit in including the TGCS when calculating the adjusted risk for caesarean section [16–18].

Our study also highlights limitations in the current perinatal data collection infrastructure in Switzerland. The study revealed poor data quality which was particularly visible for Group 9. This indicates the need for standardised data acquisition systems. Strengthening electronic health records and ensuring medically trained coders are involved in classification would enhance the accuracy and utility of future audits [19]. We would also recommend limiting the number of free fields in the patient's medical record to multiple-choice pre-established forms, which would make it easier to obtain clear and complete data.

Conclusions

In conclusion, Switzerland, while a high-resource and high-performing health system, still shows considerable variation and overuse of caesarean sections. Our study underscores the possibility for our country to reach the WHO's recommendation. This could be reached by harmonising obstetric practices, improving institutional protocols and supporting shared decision-making models across all regions and facility types. National efforts to promote vaginal birth after caesarean, refine induction protocols, and invest in staff training could contribute to reducing the caesarean section rate without compromising maternal or neonatal outcomes.

Data sharing statement

Data of this work belong to the Swiss Federal Statistical Office and are subject to a data protection contract; they will not be shared publicly. However, data could be available upon reasonable request.

Acknowledgments

Author's contributions: Conceptualisation: Arrigo Fruscalzo; Methodology: Arrigo Fruscalzo, S.A., G.P.K.; Validation: A.V., J-M.A.; Formal analysis: S.A., G.P.K.; Writing—review and editing: S.A., G.B., Ben Ali N., Anis Feki, Arrigo Fruscalzo. All authors have read and agreed to the published version of the manuscript.

Financial disclosure

This study received no funding.

Potential competing interests

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflict of interest related to the content of this manuscript was disclosed.

References

1. McDermott KW , Liang L . Overview of Operating Room Procedures During Inpatient Stays in U.S. Hospitals, 2018. In: Healthcare Cost and Utilization Project (HCUP) Statistical Briefs [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2006 [cited 2025 Mar 23]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK574416/
2. Souza JP , Gülmezoglu A , Lumbiganon P , Laopaiboon M , Carroli G , Fawole B , et al.; WHO Global Survey on Maternal and Perinatal Health Research Group . Caesarean section without medical indications is associated with an increased risk of adverse short-term maternal outcomes: the 2004-2008 WHO Global Survey on Maternal and Perinatal Health. BMC Med. 2010 Nov;(1):71. https://doi.org/10.1186/1741-7015-8-71 21067593 1741-7015
3. Pyykönen A , Gissler M , Løkkegaard E , Bergholt T , Rasmussen SC , Smárason A , et al. Cesarean section trends in the Nordic Countries - a comparative analysis with the Robson classification. Acta Obstet Gynecol Scand. 2017 May;(5):607–16. https://doi.org/10.1111/aogs.13108 28176334 1600-0412
4. Antoine C , Young BK . Cesarean section one hundred years 1920-2020: the Good, the Bad and the Ugly. J Perinat Med. 2020 Sep;(1):5–16. https://doi.org/10.1515/jpm-2020-0305 32887190 1619-3997
5. Office fédéral de la statistique, Sections Services de santé, Santé de la population. Santé reproductive [Internet]. 2021. Available from: https://www.bfs.admin.ch/bfs/fr/home/statistiques/sante/etat-sante/reproductive.html
6. Robson MS . The 10-Group Classification System-a new way of thinking. Am J Obstet Gynecol. 2018 Jul;(1):1–4. https://doi.org/10.1016/j.ajog.2018.05.026 29941276 1097-6868
7. Triep K , Torbica N , Raio L , Surbek D , Endrich O . The Robson classification for caesarean section—A proposed method based on routinely collected health data. Ryckman KK, editor. PLOS ONE. 2020 Nov 30;15(11):e0242736.
8. Betran A , Torloni M , Zhang J , Gülmezoglu A , the WHO Working Group on Caesarean Section, Aleem H, et al. Statement on Caesarean Section Rates. BJOG Int J Obstet Gynaecol. 2016 Apr;123(5):667–70.
9. Gu J , Karmakar-Hore S , Hogan ME , Azzam HM , Barrett JF , Brown A , et al. Examining Cesarean Section Rates in Canada Using the Modified Robson Classification. J Obstet Gynaecol Can. 2020 Jun;(6):757–65. https://doi.org/10.1016/j.jogc.2019.09.009 31883751 2665-9867
10. World Health Organization. Robson classification: implementation manual [Internet]. Geneva: World Health Organization; 2017 [cited 2023 Feb 22]. 51 p. Available from: https://apps.who.int/iris/handle/10665/259512
11. Souza JP , Gülmezoglu AM , Vogel J , Carroli G , Lumbiganon P , Qureshi Z , et al. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. Lancet. 2013 May;(9879):1747–55. https://doi.org/10.1016/S0140-6736(13)60686-8 23683641 1474-547X
12. Haydar DA , Vial PY , Baud D . Evolution du taux de césariennes dans une maternité universitaire suisse selon la classification de Robson. Rev MÉDICALE SUISSE; 2017. p. 5.
13. Erdin R , Schmid M , Pehlke-Milde J . Recensement des activités des sages-femmes indépendantes de Suisse.
14. Zeitlin J , Durox M , Macfarlane A , Alexander S , Heller G , Loghi M , et al.; Euro-Peristat Network . Using Robson's Ten-Group Classification System for comparing caesarean section rates in Europe: an analysis of routine data from the Euro-Peristat study. BJOG. 2021 Aug;(9):1444–53. https://doi.org/10.1111/1471-0528.16634 33338307 1471-0528
15. Le Ray C , Blondel B , Prunet C , Khireddine I , Deneux-Tharaux C , Goffinet F . Stabilising the caesarean rate: which target population? BJOG. 2015 Apr;(5):690–9. https://doi.org/10.1111/1471-0528.13199 25412695 1471-0528
16. Quibel T , Rozenberg P , Bouyer C , Bouyer J . Variation between hospital caesarean delivery rates when Robson's classification is considered: An observational study from a French perinatal network. Shamshirsaz AA, editor. PLOS ONE. 2021 Aug 20;16(8):e0251141.
17. Colais P , Fantini MP , Fusco D , Carretta E , Stivanello E , Lenzi J , et al. Risk adjustment models for interhospital comparison of CS rates using Robson's ten group classification system and other socio-demographic and clinical variables. BMC Pregnancy Childbirth. 2012 Jun;(1):54. https://doi.org/10.1186/1471-2393-12-54 22720844 1471-2393
18. Muraca GM , Joseph KS , Razaz N , Ladfors LV , Lisonkova S , Stephansson O . Crude and adjusted comparisons of cesarean delivery rates using the Robson classification: A population-based cohort study in Canada and Sweden, 2004 to 2016. PLoS Med. 2022 Aug;(8):e1004077. https://doi.org/10.1371/journal.pmed.1004077 35913981 1549-1676
19. Robson MS . Known knowns, unknown unknowns and everything in-between - the Ten Group Classification System (TGCS). BJOG. 2021 Aug;(9):1454–5. https://doi.org/10.1111/1471-0528.16679 33666329 1471-0528