

CS in Uruguay From 2008 to 2018: Country Analysis Based on the Robson Classification

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Abstract

Background: The use of caesarean section has steadily increased all over the globe, with Latin America being the region with the highest rates. Multiple factors account for that increase. The Robson classification is appropriate to systematically evaluate and compare determinants at the clinical level for caesarean section rates over time, as well as to account for local and international needs. The purpose of this study is to describe the evolution of caesarean section rates by Robson groups in Uruguay from 2008 to 2018 using a country level database.

Methods: Caesarean section rates were calculated by Robson groups for each of the years included, disaggregated by care sector (public/private) and by geographical area (Capital City/Non-Capital).

Results: Among the groups at lower risk of caesarean section (1 to 4), the highest rates of caesarean section were seen in women in group 2B, followed by those in group 4B. Women in groups 2B, 3 and 4 (A and B) (Figure 2) had a significant increase in the number of caesarean section in those 11 years. A significant growth was also observed in groups 5, 8, and 10.

A tendency towards a relative increased was seen in groups 2A, 3, 4A-B, and 5 (Figure S5 – Supplementary Material).

The private sector had higher rates of caesarean section for all groups throughout the period, except for women in group 9. The private sector in Montevideo presented the highest rates in the groups with the lowest risk of caesarean section 1, 2A, 3 and 4A, followed by the private sector outside of the capital.

The analysis of the relative contribution to the overall caesarean section rate, showed that group 5 was the one with the highest contribution, and it kept growing steadily over the years, while there was a decrease in the relative contribution of group 1 to the overall caesarean section rate.

Conclusion: Uruguay is no exception to the increasing caesarean section trend, even in groups of women who have lower risk of requiring caesarean section. The implementation of interventions aimed at reducing caesarean section in the groups with lower obstetric risk in Uruguay is warranted.

Background

The Caesarean section (CS) or C-section is a life-saving procedure when performed timely, appropriately and following precise medical indications, and is the most common major surgical intervention in many countries (1). Its prevalence has steadily increased all over the globe, particularly in middle and high-income countries, Latin America and the Caribbean (LAC) being the regions with the highest rates (40,5%) (2). There are significant inequities in low- and middle-income countries, as CS rates are five times as frequent among the wealthiest quintile (median 19,1%, interquartile range (IQR) 10,6–33,8) of the population versus the poorest quintile (4,1%, 1,9–12,0) (3,4). However, a significant proportion of healthy women undergo CS unnecessarily, despite the increased risk of serious maternal outcomes of the

procedure, and the recommendation to perform it only when the benefits anticipated are clear and offset the increased cost and additional risk associated with the operation (5). Multiple factors account for that increase (6–9). According to a systematic review, health professionals' beliefs would be the main determinant of the performance of a CS (perception that the procedure is devoid of risk, lack of cooperation and trust among professionals, ideas about women's preferences). Factors related to the health system also play a role (fear of litigation, medical remuneration structures, policies and existence of clinical practice guidelines), and to the profile of professionals (convenience, age, gender, status and skills of the professional in charge) (7). Women's preferences are also reported as decisive, with the most recent studies citing issues such as autonomy and lack of perception of risk (8,10). The idea that an in-depth understanding of these determinants at the clinical level requires the use of a classification system for CS led the WHO to conduct a systematic review of the systems used to classify CS in 2011 (11,12). It concluded that the Robson classification proposed in 2001 was the most appropriate to systematically evaluate and compare CS rates over time, as well as to account for local and international needs (11,13–15). Monitoring the frequency of CS by Robson groups allows a proper evaluation of clinical practice, by considering the frequency at which the indication of the procedure is really warranted (13,16). This classification considers the obstetric characteristics of women (parity, previous CS, gestational age, onset of labour, fetal presentation and number of fetuses) and provides information on the use of CS.

In 2008 Uruguay implemented a law creating a national health insurance that allows clients to choose freely among public providers (public) or individual non-profit institutions that provide health care services through an insurance regimen (private). Three per cent of the population pays a full-coverage private insurance that offers a comprehensive basket of benefits in exchange for a premium fee; these schemes are mainly aimed at high-income sectors. Most of the population benefits from individual non-profit institutions (58%) that provide full coverage of obstetric care (17).

In Uruguay there has been a progressive increase in the CS rate, with figures going from 35.5% (2009) to 46.3% (2014), although percentages differ between regions and institutions (18,19). In view of this increase, in 2017 the Uruguayan Ministry of Health developed the main guidelines for a strategy aimed at reducing preventable CS, based on Robson categories 1, 2, 3 and 4, considered the lowest risk groups (20,21).

Uruguay monitors obstetric care through the Perinatal Information System (SIP, for its acronym in Spanish) (22). This system issues automatic reports for the monitoring of obstetric and neonatal events. In 2017, this system registered 98,7% of births in the country (23), making it possible to automatically categorize women based on Robson's classification system.

The purpose of this study was to describe the evolution of CS rates by Robson groups in Uruguay in the last eleven years (2008–2018) using the national SIP database.

Methods

This research was based on the SIP National Database. SIP is the result of technical consensus among hundreds of professionals in the Region regularly convened by the Latin American Center for Perinatology, Women's and Reproductive Health (CLAP/WR) for review. It is one of the tools Pan-American Health Organization (PAHO) offers to improve the quality of care of mothers and newborns. Among other objectives it includes clinical care and epidemiological monitoring of data.

We included the records of all women giving birth in Uruguay (pregnancies > 22 weeks and weighs > 500 g) with available valid data on the form of termination of childbirth recorded in the SIP database. The period studied starts on the first year where coverage reached $\geq 80\%$ of the Live Birth Certificate (LBC) issued in the country (Table 1).

Women were characterized based on the data available from births registered in SIP for the period of analysis.

CS rates were calculated by Robson groups for each of the years included, disaggregated by care sector (public/private) and by geographical area (Capital City/Non-Capital). Women that lacked data on any of the variables needed to be categorized according to Robson's classification (parity, previous CS, multiple or singleton pregnancy, weeks of gestation, presentation and onset of labour) were not excluded but classified under the "unclassifiable" category. Statistical significance was assessed using a trend curve, and an $\alpha = 0.05$ value was considered.

The software used for data processing and statistical analysis was open source R (version 3.6.1) (24).

All methods were performed in accordance with the Declarations of Helsinki ethical principles. The data used in our study was anonymized.

Results

The births included were those registered with SIP between 2008 and 2018, as 2008 was the first year in which Uruguay entered more than 80% of the LBCs in the SIP. The overall CS rate was also calculated on the basis of the LBCs and SIP records. The largest difference is 3.7% in favor of a higher rate of CS according to LBCs, and it was observed in 2008 (Table 1) (Figure S1 – Supplementary Material).

The country capital (Montevideo) recorded 9.2% more births than the rest of the country (average for the whole period). The greatest difference (14.2%) was seen in 2008 and the lowest (4.4%) in 2009. The private sector [collective health care institutions (IAMC, for its acronym in Spanish) and private insurances] recorded an average coverage of 15.2% more births in SIP compared to the public sector for the entire period. The difference was smallest (4.4%) in 2009 and highest (20.2%) in 2015. Women's mean age, parity, and Body Mass Index (BMI) increased slightly between 2008 and 2018, as did the proportion of women with prior CS ($p < 0.001$). Table 1 presents the demographics by year, geographical area (Montevideo and Non-Capital), care sector, and maternal history.

Table 2 shows the yearly proportion of CS at the country level by Robson groups.

Among the groups at lower risk of CS (1 to 4), the highest rates of CS over the period were seen in women in group 2B, followed by those in group 4B (Fig. 1). Women in groups 2B, 3 and 4 (A and B) had a significant increase in the number of CS in those 11 years (Table 2). A significant growth was also observed in groups 5, 8, and 10 (Table 2).

The frequency of births by Robson groups over the 11 years, shows a tendency toward an increased relative share of groups 2A, 4A, and 5 became apparent (Fig. 1).

Table 3 shows the proportion of national CS by Robson's groups by year, care sector and geographical area of birth. The analysis by care sector showed that the private sector had higher rates of CS for all groups throughout the period, except for women in group 9, as in some years of the period the public sector showed higher rates (Figure S2 – Supplementary Material). Women in group 5 are the ones with the largest gap between both sectors for the entire period, with a difference close to 21% for 2018 (85.4% in the private sector and 64.8% in the public sector). These are followed by women in group 10, and the difference remained throughout the period, reaching 15.6% (54.2% in private centers versus 38.6% in public centers) in 2018 (Table 3). Women in group 3 are the only ones with CS rates below 15% for the entire period in the private sector and below 8% for the public sector (Figure S2 – Supplementary Material). The variations in CS rates over the years in both sectors, showed significant increases over the period in groups 3, 4B and 8. There is also a significant increase in the public sector for group 10 (Table 3), while in the private sector the significant increase in the rate was observed in group 4A.

In the by-birthplace analysis, there are no differences between the lower risk groups, but the Non-Capital had lower CS rates in groups 9 and 10 compared to the capital (Figure S3- Supplementary Material). Considering the variations over the 11 years by place of birth, the capital city showed a significant increase in the lowest risk groups 2B and 4B, and the Non-Capital in groups 1, 3 and 4A (Table 3). With respect to the other groups in the Robson classification, group 5 showed a significant increase only in the Non-Capital, and groups 8 and 10 also showed a significant increase across the country.

When stratifying by both sector of care and birthplace over the period, the private sector in Montevideo presented the highest rates in the groups with the lowest risk of CS 1, 2A, 3 and 4A, followed by the private sector in the Non-Capital. Meanwhile, the public sector of Montevideo presented the lowest rates for the 4 groups with the lowest risk of CS (Figure S4- Supplementary Material).

Among the group of women who could not be categorized under a Robson group, there was a significant increase in the frequency of CS in the Non-Capital.

The analysis of the relative contribution to the overall CS rate showed that group 5 was the one with the highest contribution, and it kept growing steadily over these years, while there was a decrease in the relative contribution of group 1 to the overall CS rate (Table 4).

Neonatal outcomes were analyzed for the groups with the highest contribution of CS (1 to 5) (Figures S6, S7 and S8- Supplementary Material). No significant differences were observed in 5-minute Apgar scores

< 7 over these years; however, there were differences in neonatal death rates at hospital discharge in groups 1, 3 and 5; and in antepartum deaths in group 4A.

As we looked into the size of the obstetric population in the various groups that showed a significant increase of the CS rates (2B, 3, 4A and 4B) over the years, we saw a trend toward growth among the women who made up these groups.

Discussion

Globally, CS rates are increasing, even in groups of women who would *a priori* have a lower risk of requiring CS (5,25). The percentage of births that occur through CS in LAC reaches 40.5% (2). Our study shows that Uruguay is no exception to this trend, and that over the years the medicalization of childbirth has increased following the model of other LAC countries (4).

The analysis of age, parity, BMI and previous CS in this study reveals there was an increase in these potential risk factors throughout the period. The analysis by Robson groups, which allows to adjust for parity and previous CS, enabled us to rule out two potential explanations. We believe that the increase in age and BMI in women are not enough to explain the increase in CS at least in the groups at lower risk of receiving a CS. Groups 6 to 9, which include nulliparous and multiparous patients with singletons in breech or transverse presentation or twins with CS rates typically over 90% actually contribute less than 6% each in 2018. The high rates in groups 6, 7 and 9 reflect the adoption of the recommendation that emerged from the systematic review on breech labour (26,27). Yet, the evidence available (28) does not justify the high rates of CS observed in women with multiple pregnancies, including women with previous uterine scars (group 8). On the other hand, there is no justification for the significant contribution to the overall rate of groups 1, 2A, 2B, 3 and 4B for 2018, considering their low risk.

Group 5 had the highest relative contribution in 2018 and was the group with the largest increase in terms of relative contribution over the years (Table 4). This shows that the increase generated over time in the groups of nulliparas at lower risk has led to an increase in the number of patients with caesarean scar, a simple explanation of the consequent increase in the overall rate of CS, largely concentrated among women in group 5.

The results of this study are comparable with those obtained by another high-income country. A recent study in Canada found that the group with the highest contribution to the overall CS rate was group 5 (29). Our study also shows the increased representation of group 5, and while in 2018 this group accounted for approximately 20% of the obstetric population (Fig. 1), one-third of all the women undergoing a CS were in this group.

Earlier studies have reported excessive interventions in high-income countries, particularly in the private sector, calling the phenomenon “too much, too soon” (30), reflecting weak enforcement capacity and low compliance to evidence-based practices. The overuse of unnecessary CS in low-risk women cannot be associated with the improvements observed in neonatal outcomes since perinatal interventions with an

impact on neonatal health have been incorporated over time. The analysis of the proportions of CS in the groups with the lowest risk of receiving a CS by sector of care, reveals differences to the detriment of women in the private sector. In the last year, these differences ranged between 14.6% and 11.1% (for groups 1 and 2 respectively). Although this study did not incorporate information prior to 2008, we see that from that year on there was a slight trend towards an increase in the number of births taking place in the private sector, a phenomenon that can be explained by the changes in the health care system, even when the overall number of births decreased slightly in the country as a whole. Considering that in the private sector the criteria for indicating CS to patients with the same obstetric risk is “laxer”, the migration of users from the public to the private sector would have increased the number of potential CS recipients.

There are multiple factors that affect and explain the high rates of CS, including economic, logistic, related to the culture of the women and their families, professionals views, organization of the health care system, and funding structures or incentives (9,31,32). The Uruguay's health system is organized in such a way that only a minority and privileged sector of clients are able to choose the doctor that will take care of their delivery, leaving the great majority of births in the hands of the obstetricians on duty. Thus, we would not anticipate financial incentives for on-call obstetricians to expedite births. Some studies have reported the lack of skills to conduct a vaginal birth (33–35), perception of CS as beneficial (33,36), the belief that women prefer a CS or the perception that women are not capable of having a vaginal birth (37–39) as reason for the high rates of CS. However, according to a recent review, only a minority of women from different countries and situations stated a preference for CS as a mode of delivery (40). Many studies have even reported that women claimed they lacked autonomy over birth-related decisions. Several women said they had initially rejected the option of a CS, only to be eventually convinced to undergo CS by the doctor in charge at the time (41–46). In Uruguay, it would be important to review and strengthen the implementation of existing clinical guidelines on the management of induction of labor and scheduling of caesarean delivery. In addition, the provision of comprehensive health education and counseling during antenatal care should be a priority, as recommended by WHO (47).

Strengths and limitations

Our analysis has some limitations. Due to SIP coding constraints, we were unable to discriminate clients covered by private health insurance who account for about 3%, of the total number. It is likely that some differences observed in the private sector will further deepen in this population.

This is the first trend analysis in Uruguay at national level using the Robson classification with high coverage of birth due to the well-established SIP as a standard for data collection during pregnancy and birth. Thanks to the nationwide implementation of the system, combined with the universalization of institutional childbirth it is possible to obtain national indicators by subsectors and geographies comparable over time; this is highly beneficial for clinical practice, research, audits, management and evaluation of health care services. This software allows to alert about situations that differ from what would be expected, so as to anticipate the risk of CS, and obtain indicators by Robson groups in real time. The monitoring of CS rates by Robson groups is a strategy that allows health decisions to be made,

ensuring the comparability of information. It is important to allocate human and budgetary resources to maintain and improve the systematization and entry of registries into the system, to allow the continuity of epidemiological surveillance of perinatal and maternal health in the countries of the region.

Conclusions

The results obtained in this study support the view that the implementation of interventions aimed at reducing CS in the groups with lower obstetric risk in Uruguay is warranted; these are the groups currently responsible for the steady increase of patients presenting with a previous scar in the uterus, and the ensuing unjustifiable increase in the rates of CS over the years. Strategies for successful implementation of clinical and non-clinical interventions to reduce CS where overuse is common are urgently needed. We suggest the design of multifaceted context-specific interventions, oriented to all “stakeholders”, implementing formative research that address the concerns, limitations and strengths of each situation following a broad discussion with professionals and with the active participation of women. Things need to be changed to reduce unnecessary risks and expenses, and essentially, to reposition women and their families as the key players at childbirth.

Abbreviations

CS: cesarean section

SIP: Perinatal Information System

WHO: World Health Organization

LAC: Latin America and the Caribbean

IQR: Interquartile Range

CLAP/WR: Latin American Center for Perinatology, Women's and Reproductive Health

PAHO: Pan-American Health Organization

LBC: Live Birth Certificate

BMI: Body Mass Index

Declarations

Ethics approval and consent to participate

As the study is based on the data from a national database, the PAHO ethics review committee declared that this study was exempted from review. The data used in our study was anonymized.

Consent for publication

Not applicable

Availability of data and materials

Data cannot be shared publicly because of confidential issues. Data are available from the Department of Vital Statistics, Ministry of Health of Uruguay. Institutional Data Access (contact Adriana Misa_ amisa@msp.gub.uy), for researchers who meet the criteria for access to confidential data.

Competing interests

The authors have declared that no competing interests exist.

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Authors' contributions

BDM and CS conceived the proposal; VC and MC performed the analysis; BDM, CS, VC and MC discussed the results; MC wrote the paper; VC prepared the tables, APB and SS reviewed the manuscript and made valuable suggestions.

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Tables

Due to technical limitations, table 1 to 4 is only available as a download in the Supplemental Files section.

Figures

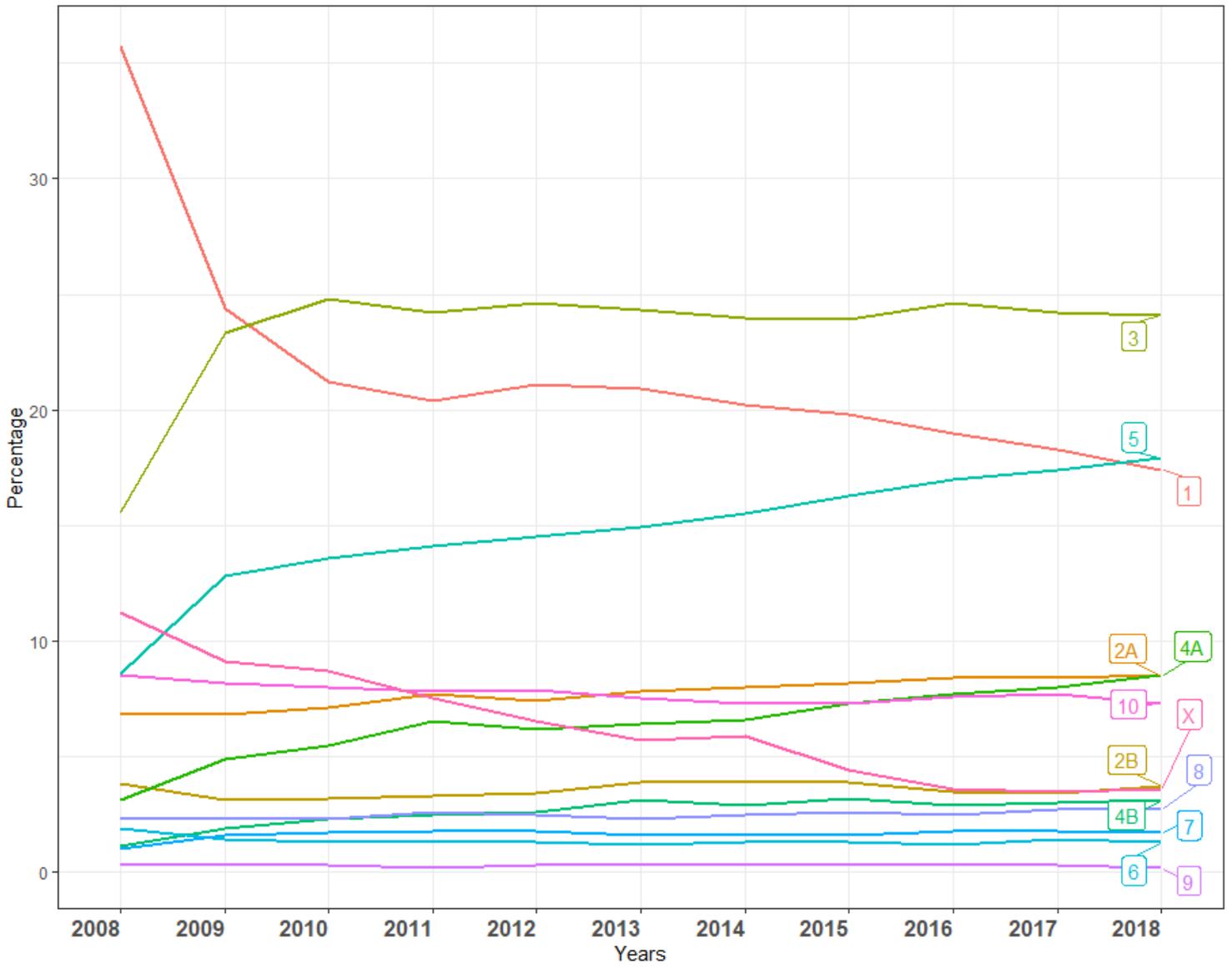


Figure 1

Births by Robson Group. Relative contribution from 2008 to 2018.

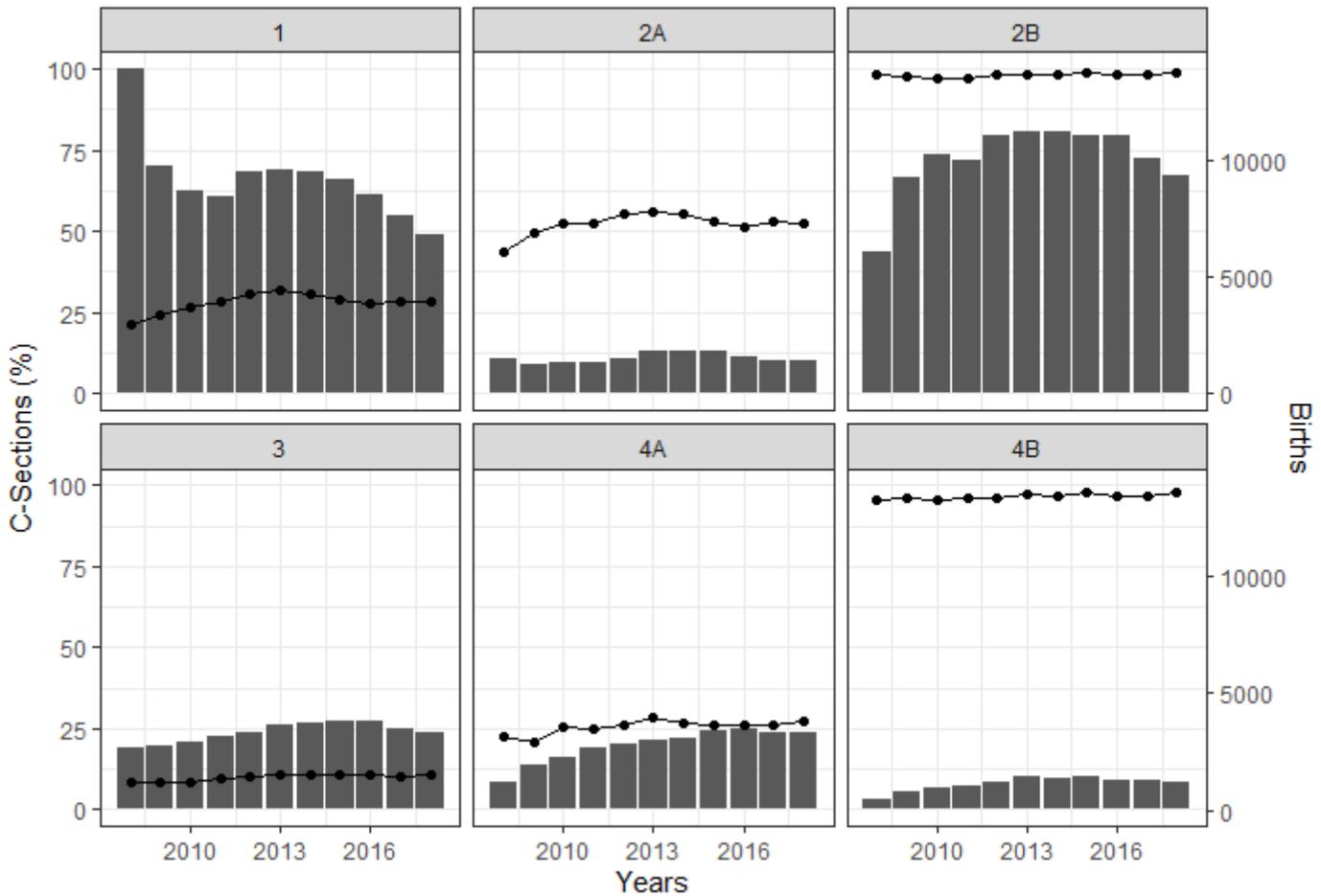


Figure 2

Percentage of C-sections and births by Robson groups between 2008 and 2018.

Supplementary Files

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