

# Who indicates Caesarean section in Romania? A cross-sectional survey in tertiary level maternity on childbirth patients and doctors' profiles

Anca Angela Simionescu (✉ [asimion2002@yahoo.com](mailto:asimion2002@yahoo.com))

Carol Davila University of Medicine and Pharmacy Filantropia Hospital <https://orcid.org/0000-0002-9334-0199>

Alexandra Horobet

Academia de Studii Economice din Bucuresti

Erika Marin

Academia de Studii Economice din Bucuresti

Lucian Belascu

Universitatea Lucian Blaga din Sibiu

---

## Research article

**Keywords:** cesarean section, vaginal birth, health policies, pain, labor, Romania

**Posted Date:** September 3rd, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-39240/v2>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

*Background.* Cesarean section (C-section) rate in Romania is the second-highest in the European Union (44.1% in 2017), and the number of C-sections performed in the country has increased in the past decades. Given how common C-section is now, it is important to gain insight into the practice and perceptions of patients and doctors in countries with high C-section rates. The objectives are 1) to compare the preferred modes of birth among women; 2) to draw a profile of patients and doctors in whose case the actual birth method is different from the preferred method; and 3) to analyze the way Romanian women want to give birth.

*Methods.* We conduct a statistical analysis based on an observational, analytical, and cross-sectional survey on 117 singleton pregnant women more than 36 weeks in spontaneous labor in tertiary level maternity in Romania. Various statistical tests have been used to indicate statistical significance.

*Results.* We calculate an increase of almost 58% in actual childbirth mode against preferred childbirth by C-sections, rather difficult to justify based only on medical emergencies. There are 22 patients with non-concordant C-section indications between preferred and actual mode of birth, 7 of them (31.8%) preferred natural birth and 15 (68.2%) preferred C-section. The profiles of patients with concordant and non-concordant delivery modes are different and indicate a statistically significant difference between the preference for delivery and actual birth method. Patients who preferred vaginal birth, but gave birth by C-section, are mature and more educated women, in the middle to high-income category, mostly attended by consultant doctors and specialists. Doctors' profiles show that specialists and consultants attend the largest share of non-concordant births, while residents and young senior doctors attend mostly vaginal births.

*Conclusions.* We emphasize health system particularities in Romania as triggers of high C-section rates that favor women's preferences against C-section medical indication. Improving patients' confidence in the health care system, built on competence and fitted hierarchical team position may lead to choosing the optimal way of birth for childbirth safety and pain control.

## Background

Evidence from database registries shows a considerable increase in birth rates by cesarean section (C-section) use especially in urban areas of the middle and high-income countries, reaching a rate of up to 50% of deliveries in several countries [1-3]. In 2014, Romania has reported a C-section rate of 47.2%, an almost 10 times increase compared to 1990 (4.9%). The rate declined slightly in 2017 to 44.1%, but is the second-highest in the EU after Cyprus (54.8%). The number of C-sections in Romania increased by 32.1% between 2009 and 2017, or by 44.11% when reported to 100,000 inhabitants [4-5].

Although WHO does not any longer recommend an ideal rate for C-sections, the range of 10-15% at the population level is used pragmatically for international monitoring aiming at ensuring maternal and perinatal health benefits and reduce potential harms [2,6]. Given how common C-section is now, it could

be of much importance to understand this phenomenon in countries with high C-section rates in the European Union. Hence, we argue that the large number of C-sections in Romania is due to the health system particularities, such that the obstetrician is in the service of the patient 24/7, and a health care provider might indicate C-sections beyond the women's needs. Moreover, the approval of the Head of department is required before any C-section is performed in hospitals. At the same time, there is no evidence that C-sections have improved maternal and fetal mortality and morbidity. Aside from higher costs, C-sections could lead to severe iatrogenic maternal medical complications, especially in the event of subsequent surgical intervention (placenta accreta spectrum disorders, blood transfusion, damage to adjacent organs, and symptomatic isthmocele) [7-11]. The C-section could lead to an increase in neonatal respiratory distress and tachypnea [12,13], and long-term childhood outcomes, i.e. asthma [14,15]. Moreover, the increasing trend in performing elective C-sections could put a strain on hospitals' material and human resources.

Betrán et al. identify two categories of interventions to reduce unnecessary C-sections: clinical (obstetrical) interventions and non-clinical interventions that could overlap each other [6]. Non-clinical interventions target the psychosocial level of women and childbirth education, but also guidelines for health-care professionals and second-opinion on C-sections. At health-care organizations level, they refer to implementing strategies aiming at midwives-provided care, health-care resources redistribution, and long-term strategic planning [16].

We offer for the first time insights into the practice and perceptions of patients and doctors in Romania towards delivery mode and on health system particularities that lead to increased numbers of (first) C-section. The objectives of this study are 1) to compare the preferred modes of birth among women who deliver in a tertiary maternity hospital; 2) to draw a profile of patients and doctors in whose case the actual birth method is different from the preferred method; and 3) to analyze the way Romanian women want to give birth and offer possible explanations when the actual birth method is different from the preferred method.

## Methods

We conducted an observational, analytical, and cross-sectional non-anonymous survey based on a questionnaire distributed in a tertiary level maternity hospital in Bucharest, Romania, in February 2014, in the framework of a research grant (Grant no. 20062, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania, 2014-2016) [Additional file: Distributed questionnaire]. Data on delivery methods in Romania is very scarce, and the possibility to collect information on patients and their choices of delivery modes was an appreciable opportunity. The questionnaire was discussed with a few doctors from the maternity and further validated. The final number of respondents, 117, offers a level of confidence of 95% and an error margin of 9% in relation to all births in Romania in 2014.

The questionnaire was distributed to all full-term pregnant women when admitted in the hospital for giving birth, during the entire month of February 2014, at first contact with a health care provider.

Inclusion criteria were more than 36-weeks gestational age, singleton pregnancy, expecting a child without assessed congenital anomalies, and understanding written Romanian. Until 2018, at birth, the attending physician (available 24/7) was called, disregarding of the work schedule. Starting with 2019, and especially after the public debate's resolution initiated by the Health and Family Commission of the Romanian Parliament on 27 November 2019 was adopted by many public hospitals, the delivery in the hospital takes place with the attending physician during working hours (8 am - 3 pm), and with doctors from the night shift team outside those hours.

Participation was voluntary, participants having the freedom to refuse to answer a question; the study was approved by the Hospital's Commission of Ethics.

The questionnaire has two main parts and 29 questions. Before birth, patients admitted to the maternity answered the first part of the survey (16 questions). The same patients answered the second part of the questionnaire before discharge from hospital (13 questions).

The first part of the questionnaire had the following structure: 6 demographic questions, 6 questions about patients' behavior during pregnancy monitoring (laboratory tests, ultrasound screening, and attendance to parenting classes), 4 questions about patients' preferred delivery method (for the index pregnancy), C-section indications, and the choice of epidural anesthesia.

The second part of the questionnaire has 13 birth experience questions regarding the actual delivery mode, newborn's weight and Apgar score, the use of epidural anesthesia, childbirth or postpartum complications, patients' assessments of their birth experience and pain during labor, and medical personnel performance. The "preferred" method of delivery in the questionnaire refers to what the patient wants before entering labor and reaching the labor ward. The "actual" delivery method refers to how delivery happened and must reflect the medically recommended method.

A 1 to 10 scale was used to assess birth experience and pain during labor (1 – worst; 10 - best), as well as doctors' (obstetrician and anesthetist) and midwives' performance (1-worst; 10 – best). We have transformed patients' assessments into Very good to Not satisfactory categories, as follows: 9 and 10 for Very good, 7 and 8 for Good, 5 and 6 for Satisfactory, and 1 to 4 for Not Satisfactory.

The original questionnaire was developed in Romanian and is the first time this type of investigation is being conducted in a Romanian health-care facility. We have also used medical data from the hospital's birth registries on the level of doctors that attended the patients, time spent by patients in the labor room, time of birth, and obstetrical indications of C-section. Patients' responses and the information from birth registries were stocked in a Tibco Statistica 13.3 database.

In the hospital, doctors conducted labor assisted by midwives in supporting families during labor and the postpartum period. The obstetrician monitors the fetal status and labor progression, cares for and assists women in labor, and performs C-section. Obstetricians write partographs and other medical observations. Midwives take patient samples, pulses, temperatures and blood pressures, monitor and administer

medication, injections, and intravenous infusions during labor, and monitor the fetus by cardiotocography. The first quick examination of the newborn is performed in the delivery room by the neonatologist who notes the Apgar score at 1 and 5 minutes.

We conduct the statistical analysis using the Tibco Statistica 13.3 software. Firstly, we perform descriptive statistics of the responses; for qualitative variables, we present frequencies in absolute and relative form, and for quantitative variables (scores of patients' assessments), data is shown in terms of mean and standard deviation. We compared preferred and actual modes of delivery using the Chi-square and V-square tests. At the same time, we tested the t-test for independent samples differences in mean scores for statistical significance. Then, we use Mc-Nemar Non-parametric significance tests for two dependent samples (known as the symmetry McNemar chi-square test) for the analysis of the matched samples presenting the choice of pregnant women before delivery and the actual method of birth (the after effect). A p-value of less than 0.05 ( $p < 0.05$ ) indicates statistical significance.

## Results

There were a total of 168 deliveries in the hospital in February 2014, of which 51 women delivered spontaneously, 10 had instrumental delivery (forceps in 8 cases and vacuum in 2 cases), and 107 went through C-section. The final number of women who consented to participate in our survey was 117 (69.64%). Their demographic characteristics are presented in Table 1. The majority of respondents were between 26 and 35 years of age (63.3%), worked in the private sector, either as employees or business owners (69.3%), and were graduates of higher education (67.5%). 63.9% of them were in the middle-income category (64.1%) at the time of the survey, married (81.2%), and lived in urban areas (79.5%).

### 3.1. Preferred versus actual mode of delivery

Parenting classes were pursued by 22.2% ( $n=26$ ) of respondents, 95.7% ( $n=112$ ) mentioned having undergone laboratory tests, and 92.3% ( $n=108$ ) mentioned a full ultrasound screening. In the third trimester of pregnancy, for all women, a birth plan was established with the doctor. Patients may state their delivery options, including C-section on request. The C-section on request is not reimbursed by the National Health Insurance House in Romania, and it cannot be specified in the partograph.

On the day of labor ward admission, 70.1% ( $n=82$ ) of women preferred vaginal birth, 28.2% ( $n=33$ ) preferred C-section and two women (1.7%) did not respond to this question. Younger and more educated women, mostly living in urban areas and in the low to middle-income categories, showed a higher preference for vaginal birth (Table 2).

Out of the 117 respondents, 55.6% ( $n=65$ ) had vaginal births and 44.4% ( $n=52$ ) had C-sections (Table 3 and Figure 1). For 19 cases, the preferred way of delivery was different from the actual mode of delivery. None of the women who chose C-section had undergone vaginal birth.

The non-parametric significance tests show that the initial preferences of women for vaginal birth versus C-section were significantly different, and the highest preference was for a vaginal birth – Chi-square test value=60.61,  $p<0.05$ ). The V-square test, which corrects for sample size and uncertainty, confirms the results of the Chi-square test (value=59.64,  $p<0.05$ ) The McNemar Chi-square test shows a significant difference (value=9.81,  $p<0.05$ ) between the preference for a delivery method and the actual birth method.

Concerning the patients' understood indication for C-section, the profile of the 41 respondents is the following: 83.7% were aged below 35 years, lived in urban areas, had lower to middle income, and were more educated (76.7% were graduates of tertiary education). Out of them, 16 (39%) preferred natural birth, and 25 (60.9%) preferred C-section. Of the 16 women that preferred natural birth and stated an indication for C-section, 3 (18.7%) gave birth by vaginal way, and 13 (81.3%) gave birth by C-section. All women that preferred C-section and declared an indication for C-section gave birth this way.

C-section on request was preferred by 6.8% (n=8) of women. They were aged below 35 years, were graduates of higher education, and 6 out 8 had middle to high income and lived in urban areas. Five out of 8 were married, two were in a partnership, and all were giving birth to their first child. Seven out of these 8 women stated they did not have an indication for C-section, and 1 declared an indication. For all 8 women, C-section indications were not concordant when patients' and doctors' indications in medical records were compared.

Scarred uterus is the most frequent indication for C-section (30.76 % of C-sections) and all breech presentations were delivered by C-section, although some patients would have preferred a natural birth. Taking out the indications for scarred uterus and breech presentation, there were 22 primiparas with non-concordant C-section indications between preferred and actual mode of birth, 7 of them (31.8%) preferred natural birth and 15 (68.2%) preferred C-section. The most frequent non-concordant C-section indications when patients' and medical records were compared were: placenta praevia, oligohydramnios < 39 weeks and failed induction of labor.

Almost half of women that preferred vaginal birth (49=59.8%) and 48.5% of women that preferred C-section chose epidural anesthesia. Most women that preferred vaginal birth also preferred epidural anesthesia - 59.5% (n=49); 38 of them (77.6%) had vaginal birth, while 11 (22.4%) had C-section. Eighteen out of 33 women (54.5%) that preferred C-section were primipara, and all of them gave birth by C-section.

The professional doctor's degree is an essential factor from the perspective of preferred versus actual type of birth. There were 58 (49.6%) patients attended by consultants, 29 (24.8%) attended by specialists, 18 (15.4%) by young senior doctors, and the remaining 12 (10.3%) by residents. Differences between preferred versus actual birth modes of delivery occurred for consultants (8 cases), specialists (7 cases), and young senior doctors (2 cases).

The time spent in the labor room was between 30 minutes (13 women = 11.2%) to more than 24 hours (1 woman = 0.9%). We used a cut-off of 5 hours to divide the patients; 46.1% of our respondents spent more than 5 hours in the labor room, while 53% of them spent less than 5 hours.

Fifty-two women (44.4%) gave birth during working hours (DW) (8 a.m. – 3 p.m.), 39 births (33.3%) occurred during the evening shift (AOD - 3 to 10 p.m.) and 26 births (22.2%) during the night shift (AON - 10 p.m. to 8 a.m.). There were more C-sections than vaginal births performed DW, but more vaginal births than C-sections were performed after working hours. The concordant births (preferred versus preferred) took place mostly AOD for vaginal births (25), but DW for C-sections (23) – Figure 2.

### *3.2. Modes of delivery and patients' birth perception*

Respondents had a good and very good assessment on giving birth in the hospital assessed on a 0-10 scale– 64.1% (n=75) offered a grade of 9 or 10 out of 10 (Very good), and 17.9 % (n=21) graded giving birth by a 7 or 8 (Good). Only 3 patients (2.6%) offered a non-satisfactory grade (below 5 out of 10). Similarly, 41 patients (35.0%) rate the pain felt during birth as having very low intensity (Very good), and 26 (22.2%) rated the pain as having low intensity (Good). Still, 18 patients (15.4%) appreciated the pain as having very high intensity (Not satisfactory), and 14 considered it intense (12.0%) and graded it as Satisfactory.

The two assessments are highly correlated – see Table 4, as most patients that rated the birth with Very good and Good also evaluated the pain on high satisfaction note (63=53.8%). Mean scores for birth assessment are different ( $p \leq 0.05$ ) for Very good and Satisfactory, as well as between Good and Satisfactory birth pain assessments.

Both birth and birth pain assessments are linked to the preferred and actual modes of delivery. 81.7% of women that preferred vaginal birth and 81.8% of women that preferred C-section rated birth with Very good and Good. Proportions are very similar when we consider the actual mode of delivery. Patients that preferred C-section rated higher their birth experience than women preferring vaginal birth – mean score 9.206 (SD=1.633) versus 8.743 (SD=1.843),  $p > 0.05$ . Similar results are obtained based on patients' actual mode of delivery.

Patients distinguish clearly between birth pain alone and their overall birth experience; they rate pain on the lower part of the scale, although birth experience is evaluated on a higher note. Patients' mean scores for their birth pain depending on their preferred mode of delivery are 7.535 (SD=2.756) for vaginal birth and 6.111 (SD=3.745) for C-section; thus, patients that would have chosen C-section assessed lower their birth pain ( $p < 0.05$ ). The mean scores based on the actual mode of delivery are 7.625 (SD=2.666) for vaginal birth and 6.511 (SD=3.501) for C-section ( $p > 0.05$ ).

Also, the concordance between modes of delivery (preferred versus actual) plays a role in patients' assessment of their birth and birth pain. The percentage of patients that gave birth by their desired mode and rated their birth experience Good and Very good is 82.8%, against only 75% for patients that gave birth by C-section but would have preferred vaginal birth. 57.6% of patients whose modes of delivery are concordant rated birth pain as Good and Very good, compared to 56.3% of patients that gave birth by C-section but stated a preference for vaginal birth. Women with concordant modes of delivery have a slightly lower average score than women that gave birth by the other mode - 8.855 (SD=1.693) to 9.000

(SD=2.449), not statistically different -, but birth pain scores are identical for both categories: for vaginal birth 7.143 (SD=3.10) and C-section 7.143 (SD=3.25).

The epidural anesthesia during labor changes patients' perception of birth significantly, but not of birth pain. The average birth score of patients with epidural anesthesia was 9.22 (SD=1.15) and the average score of patients without anesthesia was 8.35 (SD=2.30) - both in the Good category ( $p \leq 0.05$ ). However, the average score for birth pain of patients without epidural anesthesia is higher than the score patients without anesthesia (7.57 (SD=2.94) against 6.79 (SD=3.08)).

Most women that spent less than 5 hours in the labor room - 83% (n=39) – rate their birth as Very good compared to 61.4% (n=35) women that spent more than 5 hours in the room. Less time spent in the labor room leads to a better assessment of birth experience - 9.15 (SD=1.73) against 8.63 (SD=1.80) -, but a longer time spent in the labor room means a better score for birth pain - 7.73 (SD=2.74) against 6.57 (SD=3.29).

The relationship between birth assessment and birth time is shown in Figure 3. Women that gave birth DW rated higher their birth (74.4% rate birth as Very good), followed by women that gave birth AOD (69.4%), and patients that gave birth AON (68.2%). The highest percentage of women that were not satisfied with their births is also found for births DW (10.6%). Birth pain ranking is maintained for very satisfied patients: births AOD (47.1%), births DW (38.4%), and births AON (32%). If we include Good assessments of birth and birth pain, women that gave birth AON were the most satisfied by their birth experience followed by patients that gave birth AOD, and patients that were giving birth DW. Birth pain was best perceived by women giving birth AOD, followed by women giving birth AON and women giving birth DW. The largest proportion of unsatisfied women by their birth pain is found for patients that gave birth DW. The average scores of patients' assessment of their birth and birth pain depending on the time of birth indicate that women rate the highest births AON (9.04) compared to births during daytime (8.83 is the score for DW and AOD). Birth pain is best rated for AOD (7.73), followed by AON (7.33) and DW (6.59).

Doctors' professional categories, birth experience, and birth pain scores are compared in Figure 4. Young senior doctors and residents received the best scores for birth – 9.00 (SD=1.46) and 9.08 (SD=1.08) - and birth pain – 8.06 (SD=1.98) and 7.82 (SD=2.32). Specialist doctors had the lowest mean score for birth – 8.80 (SD=1.86), but only a slightly higher mean score for birth pain compared to consultants – 7.04 (SD=3.17) against 6.72 (SD=3.48).

### *3.3. Relationship between patients and medical personnel in the delivery room*

Patients rated the obstetricians highly – mean score 9.93 (SD=0.35). Anesthetists were appreciated with a mean score of 9.69 (SD=0.80). In the case of midwives, 88.9% were very good rated, 6% were rated good, and one patient rated the midwife as satisfactory – mean score 9.73 (SD=0.76). The scores are significantly different ( $p \leq 0.05$ ) between obstetricians and anesthetists, as well as between obstetricians

and midwives. The patient that offered lower ratings for the obstetrician delivered by vaginal birth, as desired, and rated the birth with an 8 and birth pain with a 7.

Patients that preferred C-section offered higher mean scores for the medical personnel, compared to patients that preferred vaginal birth ( $p>0.05$ ) – 9.97 (SD=0.400) against 9.91 (SD=0.18) for obstetricians, 9.69 (SD=0.99) against 9.69 (SD=0.68) for anaesthetists, and 9.75 (SD=0.67) versus 9.72 (SD=0.80) for midwives. Similarly, patients that gave birth by C-section scored higher the medical personnel than patients that had a vaginal birth ( $p>0.05$ ) – 9.98 (SD=0.45) against 9.88 (0.14) for obstetricians, 9.76 (SD=0.84) against 9.59 (SD=0.74) for anaesthetists, and 9.76 (SD=0.68) versus 9.71 (SD=0.82) for midwives. Although non-concordant birth patients assessed higher the obstetricians compared to concordant birth patients, concordance is not a discriminatory factor for medical personal assessment.

#### *3.4. Patients' profiles regarding preferred versus the actual way of birth*

Patients with concordant vaginal births are younger, in the middle to low-income category, less educated, but have undergone all recommended screening during their pregnancies (Table 5). They were attended mostly by consultants and preferred epidural anesthesia. They assessed birth experience as Good to Very good and birth pain as Good.

Patients with C-section as preferred and actual mode of delivery (concordant) are in an elder group, with middle income mostly, and educated. They had laboratory tests, and all of them underwent a full ultrasound screening. They were attended mostly by consultants, but also specialists, and were the group with the lowest preference for epidural anesthesia. They highly assessed their birth but rated birth pain as Satisfactory only.

The patients with non-concordant modes of delivery (they preferred vaginal birth, but gave birth by C-section) were mature women (mostly aged between 26 and 35 years old), in the middle to high-income category, more educated than the ones in the previous two groups (88.2% of them were graduates of tertiary education). Although almost all had laboratory tests during their pregnancies, 17.6% did not have a full ultrasound screening. Most preferred epidural anesthesia, and assessed their birth as Good to Very good and their birth pain as Good.

#### *3.5. Doctors' professional degree and birth characteristics*

Resident and young senior doctors tend to be somewhat similar in profile – Table 6. They both attended younger patients, in the middle to the low-income category, which have undergone full sets of laboratory tests during pregnancy. Their birth is mostly vaginal and concordant, and they received Good to Very good assessment for deliveries and birth pain.

Specialists and consultant doctors also share characteristics. The women they attended were more mature, in the middle to high-income category, mostly with higher education and with full prenatal test screenings. These doctors attended the largest share of non-concordant births. Their patients assessed in somewhat similar manner birth experiences and birth pain (Good to Very good for both types of doctors

in case of birth; birth pain is considered Good to Very good for specialists, but only Good for primary doctors).

## Discussion

In our study, 28.2% of women expressed their preference for C-section, and 70.1% preferred a vaginal birth. After birth, the percentage of C-sections increased to 44.4%, showing a difference between actual versus preferred mode of delivery of 16.2 percentage points (57.4%) in favor of C-section. This may be considered difficult to justify based on medical emergencies during the birth process. The preference for C-section in our sample seems higher than shown in other studies. A systematic review and meta-analysis of 38 studies on C-section rates in the middle- and high-income countries found that only 16% of women expressed a preference for C-section. A higher preference for C-section was reported in women with a previous C-section (29.4%), and those living in a middle-income country (22.1%) [17].

Patients' profiles depending on their preferred and actual modes of delivery, on the one hand, and on the obstetrician that attended their birth, on the other hand, are highly relevant for a proper understanding of the patients' relationship with health-care personnel, but also between pain and choice of delivery method. Patients that have preferred and delivered by the vaginal way are younger, in the middle to the low-income category, less educated, but have undergone prenatal screening. They were attended mostly by experienced consultants and preferred epidural anesthesia. Except for patients with scarred uterus indication, patients that have preferred and delivered by C-section were younger (68.4% below 30, and 31.6% below 25), with middle income, more educated, lived in urban areas, were married or in a partnership, and had a full prenatal screening. They were attended by consultant and specialist doctors and had the lowest preference for the epidural. They highly assessed their birth but rated birth pain as Satisfactory only. One patient (from 15) choose TOLAC (trial of labor after C-section) but undergone C-section due to cephalofetal pelvic disproportion at full dilatation. Patients that have chosen vaginal birth and gave birth by C-section were in the 26-35 years group, in the middle to the high-income category, and more educated. Most of them (13 out of 16) were primipara, and spent more than 5 hours in the labour ward (11 out of 16). They preferred to a higher extent epidural anaesthesia and noted Good to Very good birth and Good their birth pain. Fear of pain seems to be a critical factor in choosing the preferred birth method, given that women preferring C-section have a lower and statistically significant assessment of their birth pain than women preferring vaginal birth. The first women also offered higher assessments of obstetricians and anaesthetists, which might be linked to their fear of birth pain.

Doctors' profiles show that specialists and consultants attended the largest share of non-concordant births, while residents and young senior doctors attended mostly vaginal births. There are no significant differences in the time spent in the labor room among doctors' categories, except residents that had the highest share of births beyond 5 hours (58.3%). But patients do not seem to differentiate their assessment of birth and birth pain depending on the type of doctor that attended their delivery. We found a negative correlation between the time spent in the labor room and birth pain assessment. Less than 5 hours spent in the labor room are correlated with Very good scores for birth and birth pain.

A study from Sweden shows that patient's satisfaction is not influenced by the delivery method. The patients would have preferred to be involved in the decision of delivery method – given the fact that in Sweden, the doctor decides the delivery method and informs the patient [18]. In our study, patients' mean scores for their birth experience depending on their preferred mode of delivery is 8.74 (SD=1.84) for vaginal birth and 9.21 (SD=1.63), which means that patients that would have chosen C-section assess better their birth. At the same time, the mean scores based on the actual mode of delivery are 8.68 (SD=1.71) for vaginal birth and 9.13 (SD=1.84) for C-section birth.

To the best of our knowledge, this is the first survey about the preferred versus actual mode of birth in a Romanian public hospital. There seems to be a degree of awareness and mature consciousness and preparedness towards the excess of C-section in Romania, as proven by some recent political actions. In 2019, the Commissions for Public Health and Human Rights, Equal Opportunities, Cults, and Minorities of the Romanian Parliament organized a debate on public strategies and policies for supporting natural birth and management of Cesareans in Romania [19]. The debate ended with a statement that encourages giving birth by vaginal delivery, which adds to the consolidation of indications for C-section at the level of the Romanian Gynecological Society. Other countries' example [20] – proves that interventions focused only on the medical side were not successful.

Of course, an essential role is played in Romania by local culture, the tribute of communism and lack of education, but also by social and financial context. Before 1990, abortions were prohibited in Romania by the communist regime, jointly with contraceptives and sex education. Despite the decree prohibiting abortion abolition in 1990, the lack of sexual education remains a critical issue in the Romanian society [21] and is reflected in the adolescent mothers' phenomenon in the country []. The average total monthly income of Romanian households increased by 80.3% between 2006 and 2014, and it almost further doubled in 2019, signalling higher access of the population to more sophisticated healthcare procedures. This is coupled with an increase in the average age of mothers at first birth from 22.3 years in 1990 to 26 years in 2010 and 27.4 years in 2018 [22]. Moreover, the private sector offers alternatives for the entire range of medical services and units. In 2014, 30.6% of Romanian hospitals were under private ownership, compared to 1990, when all 423 hospitals were public. The increase in hospital beds in the private sector was also impressive – 97.2 times between 1999 and 2014 [23]. As a result, women giving birth are not reluctant in paying for the C-section bill either in a public or private hospital, although the costs are not meagre. In public hospitals, a C-section cost approximately 1,200 euros in 2019, but more in private hospitals (even up to 3,000 euros, depending on the package the customer buys[1]), which is a significant payment given an average monthly income per person of around 400 euros. Therefore, it is not surprising to find that the percentage of women giving birth in some Romanian clinics and hospitals reached 80% [23].

**Strengths and limitations.** The strengths of this preliminary study are a homogenous population, given that the same obstetrician who supervised pregnancy delivered the baby as well. This represents an optimal doctor-patient communication situation during pregnancy. The sample size represents a limitation due, in fact, to the available data and the general lack of official data on C-sections and birth

process in Romania. The 30% non-response rate to the questionnaire is also a limitation, which adds to the lack of information in terms of the difference between the women who responded and the 30% who did not. The C-section rate in February 2014 in the unit was 64%, but only 44% of the 117 women interviewed underwent a C-section; as a result, women who had a C-section are underrepresented in the sample. For these reasons, our findings cannot be generalized to all women giving birth in Romania. Nevertheless, we offer first-time insight into Romanian women's preferences for their mode of delivery and sketch a profile of both patients and doctors involved in the process. Moreover, since Central and Eastern European countries face a similar conjecture as Romania in terms of C-section rate (particularly Bulgaria, Poland, and Hungary, with C-section rates close to 40% in 2017) [24], we believe that our preliminary study results may represent food for thought for the entire region. A significant decline in the C-section rate would mean the mitigation of a risk factor with complications that are difficult to manage and, in some medical units, with severe consequences for patients.

## Conclusions

Our work aims at raising awareness about the high rate of C-sections in Romania by outlining the profile of patients and doctor's behind the choice of C-section as a mode of delivery. We show that despite the preference of vaginal birth before the onset of labor, the existence of a difference between the preferred versus actual birth method, may be explained by patients' perception on C-section as a better and fast procedure, with a lower degree of pain and safer for the fetus. Moreover, the Romanian health system particularities regarding birth have consolidated a higher weight of patients' voice in the decision regarding the mode of delivery, beyond medical indications.

The worldwide growth in C-sections has to be stopped. We hope that readers of this study will recognize that simplistic approaches to decrease the C-sections rate are not possible. We demonstrate the need for an in-depth analysis of good medical practice at hospital and country-level in Romania, possibly in the form of a European audit on maternal care. Improving patients' confidence in the health care system, built on competence and fitted hierarchical team position, may lead to choosing the optimal way of birth for childbirth safety and pain control. Also, a lower number of C-sections represents an important step towards decreasing worldwide complications of subsequent birth.

Not the less, questions are remaining that need to be addressed as further research directions. Among them, the critical ones refer to the reliability and accuracy of information sources that pregnant women access before deciding on their mode of delivery, the link between sexual education and the choice of the delivery mode, and the desired communication patterns between doctors and patients during pregnancy. One important further research direction should address doctors' motivations towards performing more C-sections than medically needed and the proper public policy measures to encourage natural births in Romania and similar countries.

## Declarations

**Ethics approval and consent to participate.** Data for this study was collected in 2014, within a research grant that was approved by the Carol Davila University of Medicine and Pharmacy, Bucharest-Romania and maternity management. Participation in the study was voluntary.

**Consent for publication :** Not applicable .

**Availability of data and materials:** Datasets used for analysis in the current study are available from the corresponding author on request.

**Competing interests :** The authors declare no competing interests.

**Funding:** This research received no external funding.

**Authors' contributions.** Conceptualization, Anca Angela Simionescu, Alexandra Horobet and Lucian Belascu; Data curation, Alexandra Horobet and Erika Marin; Formal analysis, Anca Angela Simionescu, Alexandra Horobet, Erika Marin and Lucian Belascu; Investigation, Anca Angela Simionescu, Alexandra Horobet and Erika Marin; Methodology, Alexandra Horobet and Erika Marin; Project administration, Anca Angela Simionescu; Resources, Anca Angela Simionescu and Lucian Belascu; Software, Alexandra Horobet and Erika Marin; Supervision, Anca Angela Simionescu; Validation, Lucian Belascu; Writing – original draft, Anca Angela Simionescu and Lucian Belascu; Writing – review & editing, Anca Angela Simionescu, Alexandra Horobet, Erika Marin and Lucian Belascu. All authors have read and agreed to the published version of the manuscript.

**Acknowledgments:** We would like to express our deepest appreciation for the time and invaluable comments and suggestions received from professor Ana Pilar Betrán, leading WHO expert on caesarean sections, regarding our manuscript. The current version reflects the engaging insight that professor Betrán offered to us.

**Consent for publication.** Not applicable.

## Abbreviations

C-section : cesarean section

EU: the European Union

WHO: World Health Organization

DW-working hours, between 8a.m. to 3p.m.

AOD-evening shift , between 3p.m. to 10 p.m.

AON-night shift , between 10 p.m. to 8a.m.

SD-standard deviation

## References

1. Boerma T, Ronsmans C, Melesse DY, Barros AJD, Barros FC, Juan L, et al. Global epidemiology of use and disparities in caesarean sections. *Lancet*. 2018;392(10155):1341-1348. . doi:10.1016/S0140-6736(18)31928-7.
2. Betrán AP, Ye J, Moller A-B, Zhang J, Gülmezoglu AM, Torloni MR. The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. *Plos One*. 2016b;11(2). :e0148343.doi:10.1371/journal.pone.0148343.
3. Visser GHA, Ayres-de-Campos D, Barnea ER, de Bernis L, Di Renzo GC, Vidarte MFE, et al. FIGO position paper: how to stop the caesarean section epidemic. *Lancet*. 2018;392(10155):1286-1287. doi:10.1016/S0140-6736(18)32113-5.
4. Simionescu, AA, Marin, E. Caesarean Birth in Romania: Safe Motherhood between Ethical, Medical and Statistical Arguments. *Maedica (Bucharest)*. 2017;12:5–12..
5. Eurostat Database, <https://ec.europa.eu/eurostat> Accessed on February 2020.
6. Betrán AP, Torloni MR, Zhang JJ, Gülmezoglu AM; WHO Working Group on Caesarean Section. WHO Statement on Caesarean Section Rates. *BJOG.A commentary*. 2016;123(5):667-670. doi:10.1111/1471-0528.13526.
7. Jauniaux E, Chantraine F, Silver RM, Langhoff-Roos J; FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO consensus guidelines on placenta accreta spectrum disorders: Epidemiology. *Int J Gynaecol Obstet*. 2018;140(3):265-273. doi:10.1002/ijgo.12407.
8. Silver RM, Barbour KD. Placenta accreta spectrum: accreta, increta, and percreta. *Obstet Gynecol Clin North Am*. 2015;42(2):381-402. doi:10.1016/j.ogc.2015.01.014.
9. Visconti F, Quaresima P, Rania E, Palumbo AR, Micieli M, Zulo F, et al. Difficult caesarean section: A literature review. *Eur J Obstet Gynecol Reprod Biol*. 2020;246:72-78. doi:10.1016/j.ejogrb.2019.12.026.
10. Tower AM, Frishman GN. Cesarean scar defects: an underrecognized cause of abnormal uterine bleeding and other gynecologic complications. *J Minim Invasive Gynecol*. 2013;20(5):562-572. doi:10.1016/j.jmig.2013.03.008 .
11. Vervoort AJ, Van der Voet LF, Witmer M, Thurok AL, Radder CM, van Kesteren PJ, et al. The HysNiche trial: hysteroscopic resection of uterine caesarean scar defect (niche) in patients with abnormal bleeding, a randomised controlled trial. *BMC Womens Health*. 2015;15:103. Published 2015 Nov 12. doi:10.1186/s12905-015-0260-8 .
12. Kupari M, Talola N, Luukkaala T, Tihtonen K. Does an increased cesarean section rate improve neonatal outcome in term pregnancies?. *Arch Gynecol Obstet*. 2016;294(1):41-46. doi:10.1007/s00404-015-3942-4 .

13. Li Y, Zhang C, Zhang D. Cesarean section and the risk of neonatal respiratory distress syndrome: a meta-analysis. *Arch Gynecol Obstet*. 2019;300(3):503-517. doi:10.1007/s00404-019-05208-7.
14. Tribe RM, Taylor PD, Kelly NM, Rees D, Sandall J, Kennedy HP. Parturition and the perinatal period: can mode of delivery impact on the future health of the neonate? *J Physiol*. 2018;596(23):5709-5722. doi:10.1113/JP275429.
15. Keag OE, Norman JE, Stock SJ. Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis. *PLOS Med*. 2018;15(1). doi:10.1371/journal.pmed.1002494.
16. Opiyo N, Kingdon C, Oladapo OT, Souza JPVogel JP, Bonet M, et al. Non-clinical interventions to reduce unnecessary caesarean sections: WHO recommendations. *Bull World Health Organ*.2020;98(1):66-68. doi:10.2471/BLT.19.236729.
17. Mazzoni A, Althabe F, Liu NH, Bonotti AM, Gibbons L, Sánchez AJ ,et al. Women’s preference for caesarean section: a systematic review and meta-analysis of observational studies. *BJOG*. 2011;118(4):391-399. doi:10.1111/j.1471-0528.2010.02793.x.
18. Karlström A, Nystedt A, Hildingsson I. A comparative study of the experience of childbirth between women who preferred and had a caesarean section and women who preferred and had a vaginal birth. *Sex Reprod Healthc*. 2011;2(3):93-99. doi:10.1016/j.srhc.2011.03.002.
19. Ro Health Review. Botnariu: România este pe primul loc în Europa în privința proporției nașterilor prin cezariană din totalul nașterilor din țară, 27.11.2019, <https://rohealthreview.ro/botnariu-romania-este-pe-primul-loc-in-europa-in-privinta-proportiei-nasterilor-prin-cezariana-din-totalul-nasterilor-din-tara/>. Accessed on June 10, 2020.
20. Montilla P, Merzagora F, Scolaro E, Requejo J,Ricciardi W, Meli E, et al. Lessons from a multidisciplinary partnership involving women parliamentarians to address the overuse of caesarean section in Italy. *BMJ Global Health*. 2020;5(2). doi:10.1136/bmjgh-2019-002025 .
21. Leidig M. Romania still faces high abortion rate 16 years after fall of Ceausescu. *BMJ* 2005;331(7524):1043. doi:10.1136/bmj.331.7524.1043-a.
22. National Institute of Statistics. Tempo database. <https://insse. www.insse.ro>
23. National Institute of Statistics. Social trends, 2019, [https://insse.ro/cms/sites/default/files/field/publicatii/social\\_trends\\_in\\_2020\\_0.pdf](https://insse.ro/cms/sites/default/files/field/publicatii/social_trends_in_2020_0.pdf). Accessed on June 10, 2020.
24. European Commission. Large differences in share of caesarean births, <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191217-1>. Accessed on August 20, 2020.

## Tables

**Table 1. Demographic characteristics of survey respondents**

Characteristics of respondents	Number of answers and percentage (n=117)
<b>Age</b>	
16-25 years	25 (21.4%)
26-30 years	47 (40.2%)
31-35 years	27 (23.1%)
36-40 years	15 (12.8%)
>40 years	2 (1.7%)
No answer	1 (0.8%)
<b>Workplace</b>	
Government employee	21 (17.9%)
Business owner	3 (2.6%)
Private employee	78 (66.7%)
Unemployed	13 (11.1%)
No answer	2 (1.7%)
<b>Graduated educational level</b>	
Tertiary education	79 (67.5%)
Secondary education	27 (23.1%)
Primary education	7 (6.0%)
Professional school	3 (2.6%)
No answer	1 (0.8%)
<b>Income (per month)<sup>1</sup></b>	
Below 1.000 lei (Low income)	23 (19.7%)
1,000 – 5,000 lei (Middle income)	75 (64.1%)
5,000 – 10,000 lei (Upper middle income)	6 (5.1%)
>10.000 lei (High income)	2 (1.7%)
No answer	11 (9.4%)
<b>Marital status</b>	
Married	95 (81.2%)
Single	7 (6.0%)
In a partnership	13 (11.1%)
No answer	2 (1.7%)
<b>Residence</b>	
Urban	93 (79.5%)
Rural	24 (20.5%)

*The majority of respondents were between 26 and 35 years of age (63.3%), work in the private sector, either as employees or business owners (69.3%) and are graduates of higher education (67.5%). 63.9% of them are in the middle-income category (64.1%) at the time of the survey, are married (81.2%), and live in urban areas (79.5%).*

<sup>1</sup> Income classes were calculated on the gross and net earnings per person in Romania in 2014 (<https://insse.ro/cms/en/content/earnings-1938-annual-series-0>)

**Table 2. Respondents' characteristics depending on the mode of delivery choice**

Preferred mode of delivery	Number of respondents (N%)	Age (years)			Residence		Income level			Education		
		< 35	>35	NA <sup>1</sup>	Urban	Rural	<5.000 lei	>5.000 lei	NA <sup>1</sup>	Tertiary	Primary/Secondary	NA <sup>1</sup>
Vaginal birth	82 (70.1%)	70 (70.7%)	11 (64.7%)	1 (100%)	64 (68.8%)	18 (75.0%)	69 (70.4%)	5 (62.5%)	8 (72.7%)	53 (67.1%)	28 (75.7%)	1 (100%)
C-section	33 (28.2%)	27 (27.3%)	6 (35.5%)	0 (0%)	27 (29.0%)	6 (25.0%)	27 (27.6%)	3 (37.5%)	3 (27.3%)	24 (30.4%)	9 (24.3%)	0 (0%)
NA	2 (1.7%)	2 (2.0%)	0 (0%)	0 (0%)	2 (2.2%)	0 (0.0%)	2 (2.0%)	0 (0%)	0 (0%)	2 (2.5%)	0 (0%)	0 (0%)
Total	117 (100%)	99 (100%)	17 (100%)	1 (100%)	93 (100%)	24 (100%)	98 (100%)	8 (100%)	11 (100%)	79 (100%)	37 (100%)	1 (100%)

On the day of labor ward admission, 70.1% (n=82) preferred vaginal birth, 28.2% (n=33) preferred C-section and two women (1.7%) did not respond to this question. Younger and more educated women, mostly living in urban areas and in the low to middle-income categories, show a higher preference for vaginal birth.

<sup>1</sup> NA - no answer

**Table 3. Preferred versus actual mode of delivery of women in our sample**

Preferred mode of delivery	Actual mode of delivery	
	Vaginal birth	Caesarean section
Vaginal birth (82=100%)	65 (79.3%) (p£0.05)	17 (20.7%) (p£0.05)
Caesarean section (33=100%)	0 (p£0.05)	33 (100%) (p£0.05)
NA <sup>1</sup> (2=100%)	0 (p£0.05)	2 (100%) (p£0.05)
Total = 117	65 (55.6%) (p£0.05)	52 (44.4%) (p£0.05)

Out of the 117 respondents, 55.6% (n=65) had vaginal births and 44.4% (n=52) had C-sections. For 19 cases, the preferred way of delivery was different from the actual mode of delivery. None of the women who chose C-section had undergone vaginal birth.

<sup>1</sup> NA - no answer

**Table 4. Means of birth assessment depending on birth pain assessment categories**

Birth pain assessment	Very good	Good	Satisfactory	Not satisfactory
Mean of birth assessment scores	9.725 (p£0.05)	8.846 (p£0.05)	7.416 (p£0.05)	8.555 (p£0.05)
Standard deviation of birth assessment scores	1.320	0.967	2.595	2.678

Most patients that rate birth with Very good and Good, and evaluate birth pain on high satisfaction note (63=53.8%). Mean scores for birth assessment are different (p£0.05) for Very good - Satisfactory and Good - Satisfactory. Both birth and birth pain assessments are linked to the preferred and actual modes of delivery. Note: Very good: 9 and 10; Good - 7 and 8; Satisfactory: 5 and 6; Not satisfactory: 1 to 4. Higher standard deviation indicates a wider range of scores' spread.

**Table 5. Patients' profiles depending on preferred versus actual mode of delivery**

Characteristics	Concordant birth Vaginal birth	Concordant birth Caesarean section	Non-concordant birth Preferred: Vaginal birth Actual: Caesarean section
Age	<b>Younger</b> 67.6% below 30 years 40% in 26-30 age group	<b>Elder</b> 66.7% in 26-35 age group 6.4% in 31-35 age group 18.2% above 36 years	<b>Mature</b> 76.5% in 26-35 age group 52.6% in 26-30 age group
Income	<b>Middle to low income</b> 81.5% <5000 lei 56.9% 1000-5000 lei 24.6% <1000 lei	<b>Middle income</b> 81.8% <5000 lei 63.6% 1000-5000 lei	<b>Middle to high income</b> 88.2% 1000-5000 18.2% <1000 lei
Education	<b>Less educated</b> 58.5% higher education 30.7% high school 9% primary/gymnasium /professional school	<b>Educated</b> 72.7% higher education 9.1% primary/gymnasium/ professional school	<b>More educated</b> 88.2% higher education 5.9% primary/gymnasium
Laboratory tests during pregnancy	<b>Yes</b> 96.9%	<b>Yes</b> 93.9%	<b>Yes</b> 94.1%
Ultrasound screening	<b>Most</b> 90.8% full	<b>Full</b> 100%	<b>Least</b> 82.4% full
Type of obstetrician	<b>Consultant doctor</b> 46% Consultant (highest percentage) 18.4% Specialist 18.4% Young senior 16.9% Resident	<b>Consultant doctor and specialist</b> 60.6% Young senior 27.3% Specialist	<b>Consultant doctor and specialist</b> 47.1% Consultant 41.2% Specialist (highest percentage) 11.8% Young senior
Attendance to parenting classes	<b>Low</b> 21.5% attended	<b>Low</b> 24.4% attended (highest attendance rate)	<b>Low</b> 23.5% attended
Epidural anesthesia	<b>Preferred</b> 58.4%	<b>Less preferred</b> 48.5%	<b>Mostly preferred</b> 64.7%
Birth assessment	<b>Good –Very good</b> 56.9% Very good 26.1% Good 7.7% Not satisfactory (highest percentage)	<b>Very good</b> 75.8% Very good	<b>Good – Very good</b> 64.7% Very good
Birth pain assessment	<b>Good</b> 34.8% Very good 26.1% Good	<b>Satisfactory</b> 30.3% Very good 12.1% Good 27.3% Not satisfactory	<b>Good</b> 35.3% Very good 23.5% Good

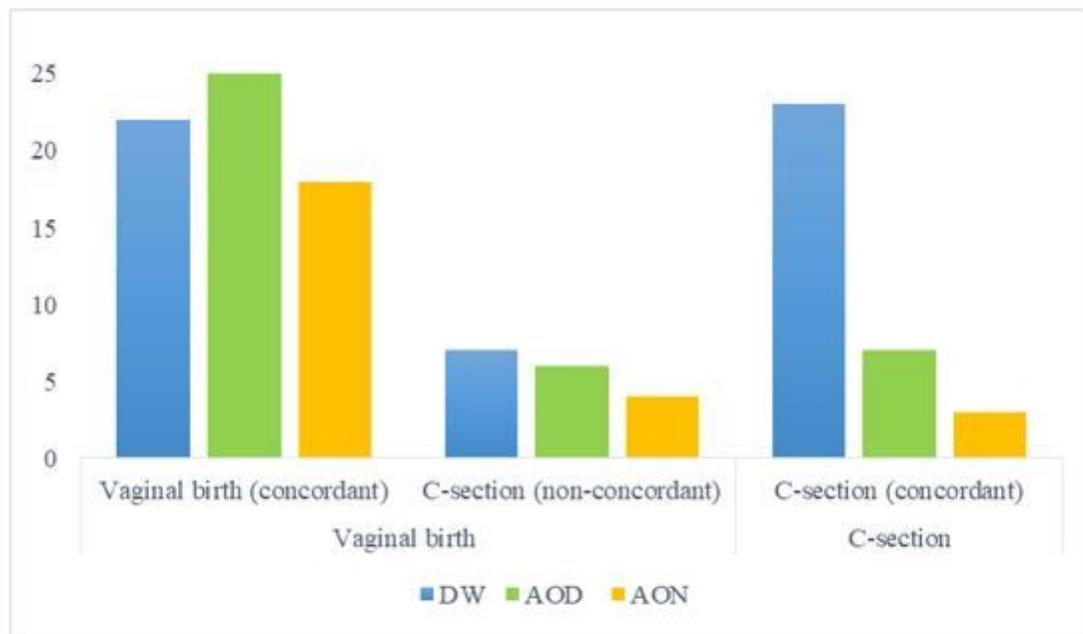
*Patients with concordant vaginal births are younger, in the middle to the low-income category, less educated, but have undergone all recommended screening during their pregnancies. They were attended mostly by consultants and preferred epidural anesthesia. They assessed birth experience as Good to Very good and birth pain as good. Patients with concordant C-section are in an elder group, with middle income mostly, educated. They were attended mostly by consultants and specialists, and are the group with the lowest preference for epidural anesthesia. They highly assess their birth but rate the birth pain as satisfactory only. The patients with non-concordant modes of delivery are mature women (mostly aged between 26 and 35 years old), in the middle to the high-income category, more educated. Most preferred epidural anesthesia, and assessed their birth as Good to Very good and their birth pain as Good. Note: DW - during working hours; AON - after working hours but daytime (3-10 pm); AON - after working hours during night time (10 pm - 8 am); Very good - 9 to 10; Good - 7 to 8; Satisfactory: 5 to 6; Not satisfactory: 1 to 4.*

**Table 6. Professional degree of doctors' profiles depending on patient and birth characteristics**

Characteristic	Resident	Specialist	Consultant doctor	Young senior doctor
Patient age	<b>Young</b> 83.3% <30 years	<b>Mature</b> 65.5% 26-35 years	<b>Elder</b> 53.4% 26-40; 17.2% 36-40	<b>Young</b> 77.8% <30 years
Patient income	<b>Middle to low</b> 91.7% <5000 lei	<b>Middle</b> 79.3% <5000 lei 58.6% 1000-5000 lei	<b>Middle to high</b> 65.5% 1000-5000 lei 12.1% >5000 lei	<b>Middle to low</b> 94.4% < 5000 lei
Patient education	<b>Tertiary</b> 75% higher education	<b>Secondary and tertiary</b> 58.6% higher education 20.7% high school 20.8% primary/gymnasium /professional school	<b>Tertiary</b> 75.8% higher education	<b>Secondary and tertiary</b> 50% higher education
Laboratory tests	<b>Full</b> 100%	<b>Almost full</b> 96.50%	<b>Almost full</b> 93.10%	<b>Full</b> 100%
Ultrasound screening	<b>Full</b> 100%	<b>Almost full</b> 86.2% full	<b>Almost full</b> 96.6% full	<b>Almost full</b> 83.3%
Preferred versus actual mode of delivery	<b>Vaginal birth and concordant</b> 91.7% vaginal birth (concordant); 8.3% C-section (concordant)	<b>Mostly vaginal birth; concordant and non-concordant</b> 63.2% vaginal birth (concordant); 31.0% C-section (concordant); 24.1% non-concordant	<b>Vaginal birth and C-section; mostly concordant</b> 51.7% vaginal birth (concordant); 34.5% C-section (concordant); 13.8% non-concordant	<b>Mostly vaginal birth; mostly concordant</b> 66.7% vaginal birth (concordant); 16.7% C-section (concordant); 11.1% non-concordant
Indication for C-section	<b>Very low</b> 16.7%	<b>High</b> 51.7%	<b>Low</b> 34.5%	<b>Low</b> 33.3%
Epidural anaesthesia	<b>Recommended</b> 41.7%	<b>Mostly recommended</b> 51.7%	<b>Highly recommended</b> 58.6% Yes	<b>Highly recommended</b> 66.7% Yes
Time spent in labour room	<b>Mostly &gt;5 hours</b> 58.33%	<b>Almost equally</b> 55.1%>5 hours 44.9<5 hours	<b>Almost equally</b> 51.72%>5 hours 48.28%<5 hours	<b>Equally</b> 50% both >5 hours and <5 hours
Time of birth	<b>Mostly DW</b> 58.3% DW 25% AOD 16.7% AON	<b>DW &amp; AOD</b> 37.9% DW 34.5% AOD 27.6% AON	<b>DW &amp; AOD</b> 36.2% AOD 46.6% DW 17.2% AON	<b>DW &amp; AON</b> 27.8% AOD 38.9% DW 33.3% AON
Parental classes	<b>No</b> 33.3% Yes	<b>No</b> 17.2% Yes	<b>No</b> 24.1% Yes	<b>No</b> 16.7% Yes (lowest percentage)
Birth assessment	<b>Very good</b> 100% VG&G 0% S&NS	<b>Good to Very good</b> 79.3% VG&G 65.6% VG 3.4% NS	<b>Good to Very good</b> 77.6% VG&G 60.3% VG 3.4% NS	<b>Very good</b> 72.2% VG 88.9% VG&G 0% NS 5.6% S
Birth pain assessment	<b>Good to Very good</b> 66.7% VG&G 41.7% VG 16.7% NS	<b>Good to Very good</b> 65.5% VG&G 31/0% VG 17.2% NS	<b>Good</b> 48.3% VG&G 32.8% VG 19% NS	<b>Good to Very good</b> 66.7% VG&G; 44.4% VG; 0% NS

*Resident and young senior doctors both attended younger patients, in the middle to the low-income category, which have undergone full sets of laboratory tests during pregnancy. They delivered mostly vaginal and concordant births, and received Good to Very good assessment for deliveries and birth pain. Specialists and consultant doctors attended more mature women, in the middle to high-income category, mostly with higher education and full prenatal test screenings. They attended the largest share of non-concordant births. Their patients assess in a somewhat similar manner birth experiences and birth pain. Note: DW - during working hours; AON - after working hours but daytime (3-10 pm); AON - after working hours during night time (10 pm - 8 am); Very good - 9 to 10; Good - 7 to 8; Satisfactory: 5 to 6; Not satisfactory: 1 to 4.*

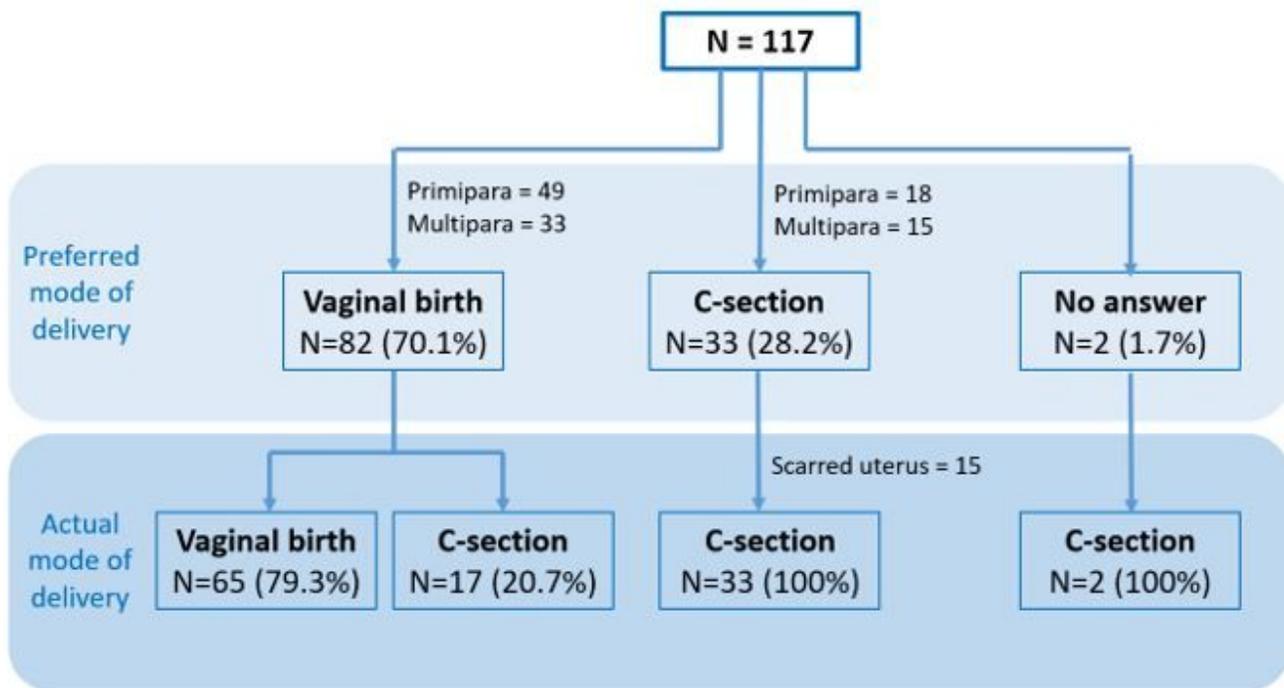
## Figures



*The concordant births (the same mode of delivery preferred by the patient and performed) took place mostly AOD, for vaginal births (25), but DW for C-sections (23). Note: DW – during working hours; AON – after working hours but daytime (3-10 pm); AON – after working hours during night time (10 pm – 8 am)*

### Figure 1

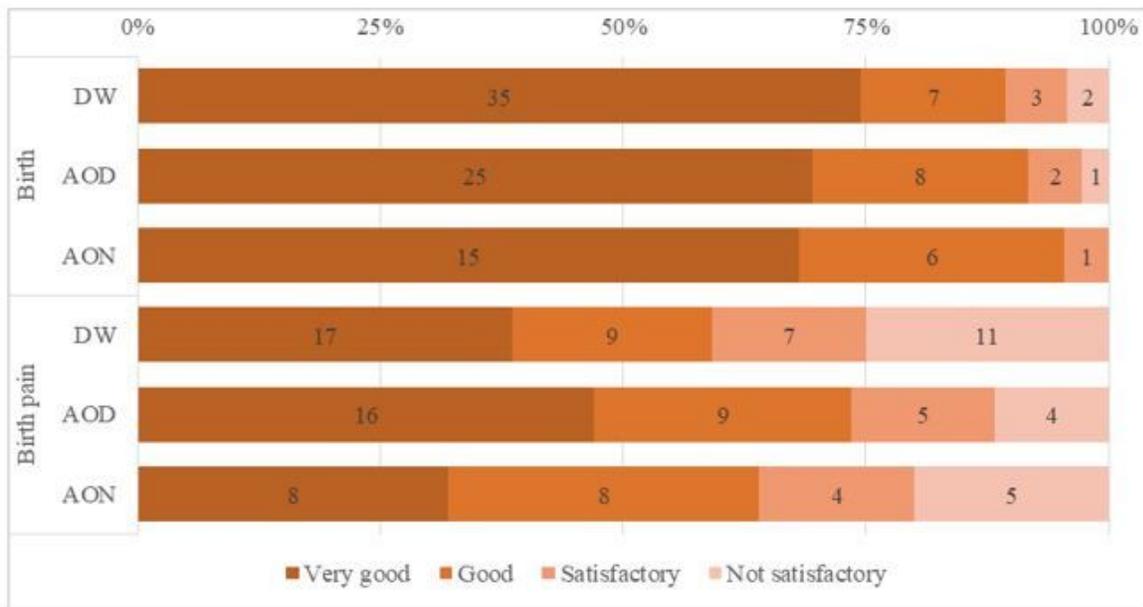
Sample structure based on preferred versus actual mode of delivery. Legend: Out of the 117 respondents, 70.1% (82) preferred vaginal birth and 28.2% (33) preferred C-section. 79.3% (65) of women that preferred vaginal birth had vaginal birth, and 20.7% (17) delivered by C-section. None of the women who choose C-section had undergone vaginal birth.



Out of the 117 respondents, 70.1% (82) preferred vaginal birth and 28.2% (33) preferred C-section. 79.3% (65) of women that preferred vaginal birth had vaginal birth, and 20.7% (17) delivered by C-section. None of the women who choose C-section had undergone vaginal birth.

**Figure 2**

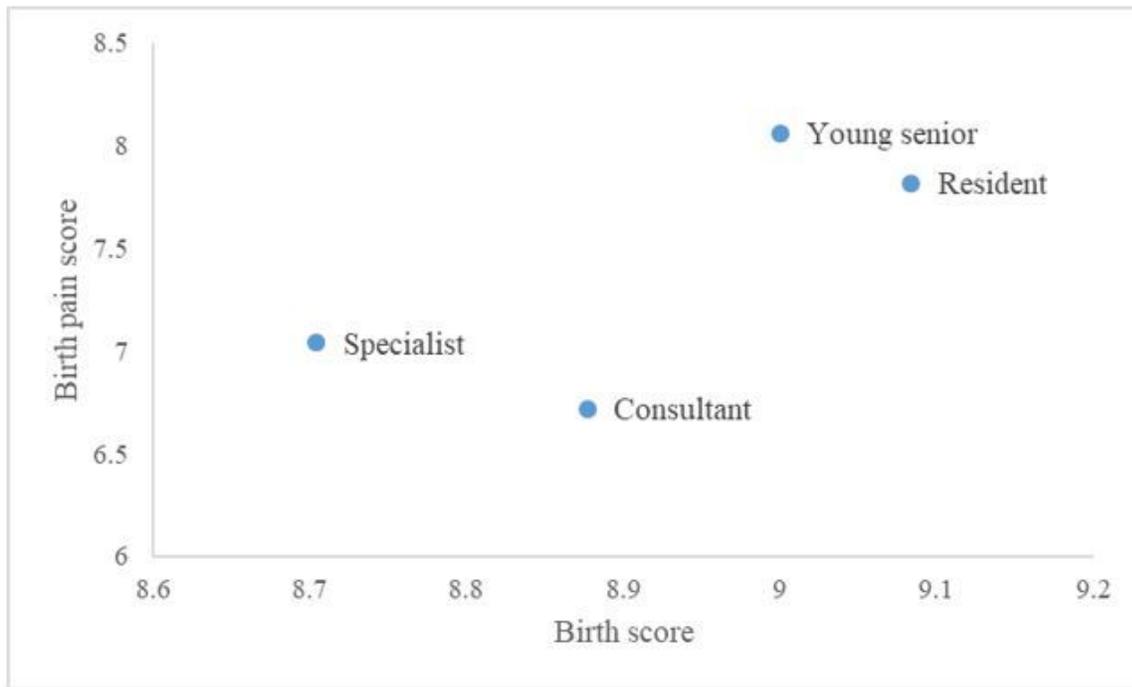
Preferred versus actual mode of delivery and birth times. Legend: The concordant births (the same mode of delivery preferred by the patient and performed) took place mostly AOD, for vaginal births (25), but DW for C-sections (23). Note: DW – during working hours; AON – after working hours but daytime (3-10 pm); AON – after working hours during night time (10 pm – 8 am)



Women that gave birth DW rate higher their birth (74.4% Very good), followed by women that gave birth AOD (69.4%), and patients that gave birth AON (68.2%). The highest percentage of women that are not satisfied with their births is found for births DW (10.6%). Birth pain ranking is maintained for very satisfied patients: births AOD (47.1%), births DW (38.4%), and births AON (32%). Women that gave birth AON were the most satisfied with their birth experience. Birth pain is best perceived by women giving birth AOD, AON, and DW. Women rate the highest births AON (9.04). Birth pain is best rated for AOD (7.73). Note: DW – during working hours; AON – after working hours but daytime (3-10 pm); AON – after working hours during night time (10 pm – 8 am).

### Figure 3

Birth time and birth assessment Legend : Women that gave birth DW rate higher their birth (74.4% Very good), followed by women that gave birth AOD (69.4%), and patients that gave birth AON (68.2%). The highest percentage of women that are not satisfied with their births is found for births DW (10.6%). Birth pain ranking is maintained for very satisfied patients: births AOD (47.1%), births DW (38.4%), and births AON (32%). Women that gave birth AON were the most satisfied with their birth experience. Birth pain is best perceived by women giving birth AOD, AON, and DW. Women rate the highest births AON (9.04). Birth pain is best rated for AOD (7.73). Note: DW – during working hours; AON – after working hours but daytime (3-10 pm); AON – after working hours during night time (10 pm – 8 am).



*Young senior doctors and residents receive the best scores for birth – 9.00 (SD=1.46) and 9.08 ((SD=1.08) - and birth pain – 8.06 (SD=1.98) and 7.82 (SD=2.32). Specialist doctors had the lowest mean score for birth – 8.80 (SD=1.86), but only a slightly higher mean score for birth pain compared to consultants – 7.04 (SD=3.17) against 6.72 (SD=3.48).*

#### Figure 4

Mean scores of birth and birth pain and doctors' professional categories Young senior doctors and residents receive the best scores for birth – 9.00 (SD=1.46) and 9.08 ((SD=1.08) - and birth pain – 8.06 (SD=1.98) and 7.82 (SD=2.32). Specialist doctors had the lowest mean score for birth – 8.80 (SD=1.86), but only a slightly higher mean score for birth pain compared to consultants – 7.04 (SD=3.17) against 6.72 (SD=3.48).

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [BMCPregnancyandChildbirthadditionalfile.docx](#)