



## INDICATIONS FOR AND MEDICAL-SOCIAL ASPECTS OF CAESAREAN SECTION

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### ABSTRACT

The aim of this research is to study the main medical-social aspects and indications when performing CS. For this purpose, we conducted a retrospective epidemiological study. We used a documentary method.

A total of 467 deliveries through CS were covered. The group of women in the age group from 30 to 34 yrs., incl., is the largest one. 233 women in the sample have at least one born child, 178 of them have undergone at least one previous CS. In 453 cases, the pregnancy is a singleton one, while in 14 cases, the pregnancy is a twin one. There is a stated refusal of attempted vaginal delivery and insistence of the woman for delivery through CS in the cases of 32 pregnant women in the sample. They do not differ in age versus the rest of the cohort, yet higher education level is observed in their cases. We did not find any statistically significant difference in the period of postoperative stay in the group of women who stated a refusal.

CS is usually indicated by a few factors. The leading indication for surgical intervention in this study is the presence of an already performed CS. This indication is almost always accompanied by at least one more indication, as most often it is low pelvic score, established labour or presence of pain in the region of the surgical cicatrix. The presence of eye pathology and evidence of a narrow pelvis are independent reasons for CS.

**Keywords:** caesarean section, indications, repeated caesarean section, caesarean section for non-medical reasons,

### INTRODUCTION

The CS rate is high worldwide, as there are significant differences at the national and regional level [1]. Performing CS is a life saving procedure for the mother and the fetus when there is a significant medical risk related to vaginal delivery (VD). The main indication worldwide is the presence of a previous CS [2]. Many obstetric complications, such as dystocia, fetal distress, pregnancy-induced hypertension, are recognized as completely justified reasons for performing CS [3]. Sometimes, CS is performed for non-medical reasons – by the mother's wish.

Despite the doubtless advantages when there are various complications, CS is also related to certain risks. The changes related to the bacterial colonization of the newborn's gastrointestinal tract have the potential to contribute to long-term consequences for the offspring's health, such as immune system disorders and allergies. Besides, children born through CS develop respiratory and neurological disorders (e.g. autism spectrum disorders), type 1 diabetes mellitus or obesity more often [4].

Compared to VD, CS is related to a higher risk of complications for the woman. The main complications are postoperative infection, complications during subsequent pregnancies such as uterine rupture, abnormalities in placenta attachment and development, ectopic pregnancy and stillbirth [5].

The World Health Organization (WHO) experts claim that the global trend is alarming. In Bulgaria, the situation is even more alarming, as our country is among the ones with the highest rates of surgical deliveries in Europe pursuant to the Euro-Persitat organization [6].

### AIM

Studying the main medical-social aspects and indications in performing Caesarean section.

### MATERIALS AND METHODS

The observational study performed is epidemiological, medical-social, and retrospective in nature. Analysis of 467 cases of deliveries through CS was made. The documentary method was used – the primary medical-sociological information was derived from Sheet "History of pregnancy and delivery" and Sheet "History of the newborn". A

card for recording the analyzed data was created, as 1 card includes information about the mother, the newborn and his/her twin, if there is one. The study was conducted in *St. George UMHAT EAD* – the city of Plovdiv. The Sheets “History of pregnancy and delivery” and “History of the newborn” were randomly selected from the hospital records. The cases with incomplete information about the newborn and the outcome of the hospital stay were excluded from the analysis. The cases studied were distributed in years, as follows:

- 302 cases in 2021 (64.67% of the total number);
- 165 cases in 2022 (35.33% of the total number).

The researchers themselves conducted the study. IBM SPSS v.23.0 statistical software was used for data processing, Excel 2016 and IBM SPSS v.23.0 was used for generating graphical images and tables.

Statistical methods:

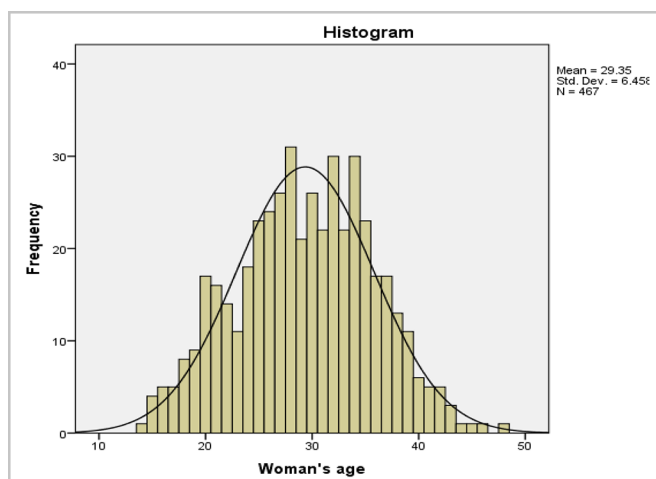
- Descriptive statistics – for quantitative data processing;
- Kolmogorov–Smirnov and Shapiro–Wilk tests for checking data distribution normality;
- Alternative analysis – quantitative dichotomous data summarizing – relative frequency assessment in %;
- Mann-Whitney method for statistical significance checking;

The critical value of significance used is  $\alpha = 0.05$ .

## RESULTS

The average age of the women in the sample presented is 29.35 ( $\pm 6.458$ ). The minimal age in the sample is 14 yrs., and the maximal age is 48 yrs. The share of women in the age group from 30 to 34 yrs., incl., is the largest one – 28.27%, followed by the age group from 25 to 29 yrs., incl. with a share of 26.98%. Third by rate are the patients in the age group from 35 to 39 yrs., incl., with a share of 17.34%. 6.64% of the patients in our sample are in the age group of 15 to 19 years. The share of women aged 45 to 49 is small - 0.64%. There is one patient under the age of 15 years. and she constitutes 0.21% of the sample. The distribution of the patients by age is graphically shown in Figure 1.

**Fig. 1.** A histogram of the distribution by age.



The following signs of the social-demographic characteristics of pregnant women are taken into consideration: education, citizenship, marital status, employment and health insurance status. The share of women with higher education is the largest one – 40.26%, while 35.76% are with higher education, 11.99% are in primary education, 6.21% are in elementary education, and approximately 5 % have not completed any educational level. 99.79% of the participants in our study are Bulgarian citizens, and only one woman is a foreigner, constituting 0.21% of the cases. The share of patients in our study who are living in cities, which are administrative centres of provinces, is the largest one – 50.32%, followed by patients living in villages – 26.77%, and patients living in small towns – 22.91%. The share of unmarried women is predominant – 64.03%, followed by the married ones – 34.69%, and the divorced ones – 1.28%. The employment analysis shows a share of 78.16% of employed women, 20.77% of unemployed women, and 1.07% of students. 81.80% of the women in our sample have continuous health insurance rights, 6.42% are uninsured, and for 11.78%, there is no data available in the hospital records.

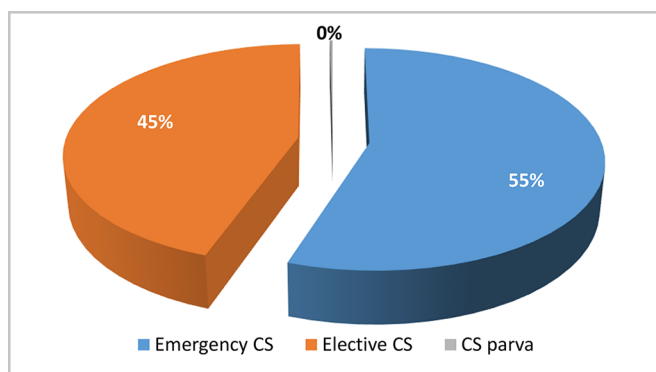
The data analysis shows that 233 (47.75%) of the women in the study already have children, with the largest share of mothers with one child—82.20%. In 178 cases (37.90%), the patients have undergone at least one previous CS. Their average age is 30.74 years. ( $\pm 5.79$ ), while the average age of first-time mothers is 28.50 years. ( $\pm 6.70$ ). Our study found the presence of a statistically significant difference between the mean values of women’s age who have already undergone at least one previous CS and the ones who have not ( $p < 0.001$ ).

The distribution by months of pregnancy as of the time of performing CS shows that 89.72% (419 cases) are patients in lunar month 10, 6.42% (30 women) are in lunar month 9, 2.36% are in lunar month 8, and 1.50% are in lunar month 7. In 97.22% (453 cases), the pregnancy is a singleton one, and in 2.78% (14 cases total), the pregnancy is a twin one. Pregnancies with three or more fetuses are not included in our sample. Respectively, the total number of born children is 481.

97.00% of the pregnancies are spontaneous, and 3.00% (19 cases) are achieved through methods of assisted reproduction technology (ART).

Figure 2 graphically shows the outcome of the current pregnancy, as only one pregnancy ended through section caesarean parva (0.21%).

**Fig. 2.** Outcome of pregnancy.



The statistical data on the hospital stay shows mean values of days in the hospital of 5.63 ( $\pm 2.229$ ; min 1 day; max 28 days). The mean time of postoperative stay is 4.69 days ( $\pm 1.836$ ; min 1 day; max 22 days). The share of patients who remained in a healthcare facility for 5 days total is the largest one in our sample – 267 cases or 57.11%, followed by a stay of 4 days – 14.78%, and a stay of 6 days – 11.53%. The analysis of the postoperative stay shows that 324 women, or 69.38%, have remained in hospital for 4 days, which meets the requirement for minimal days of hospital stay set in Clinical Pathway No 5.2 “Delivery through Caesarean section”.

The main focus of our study is the data on the indications which led to CS. The analysis of the information about the indications shows that there are two in most of the patients, yet there could be up to 5 indications (in 8 cases). There are only 60 cases in our study with 1 indication. The most common reasons for CS are shown in Table 1, as due to their great variety, we have pointed out 30 of them, which are the most common. All of them are observed in more than 2% of the cases reviewed.

Previous CS is the indication with the largest share – 37.04%. Despite being the indication with the highest relative frequency, it is rarely observed alone – in 13 women only. This indication is almost always combined with at least one more, as most often it is low pelvic score values, established labour or presence of pain in the region

**Table 1.** Most common indications for CS.

	Indication	Number	% of all indications	% of cases
1	Previous Caesarean section	173	15.60%	37.04%
2	Low (unfavourable) pelvic score	119	10.73%	25.48%
3	Established labour	60	5.41%	12.85%
4	Pregnancy on estimated due date (always with another indication)	55	4.96%	11.78%
5	Spontaneous (preterm) rupture of the amniotic sac	53	4.78%	11.35%
6	Moderate preeclampsia	46	4.15%	9.85%
7	Breech presentation of fetus	38	3.43%	8.14%
8	Asphyxia of fetus	31	2.80%	6.64%

of the surgical cicatrix. The presence of eye pathology and the evidence of a narrow pelvis are considered independent indications for CS, with the largest share in our sample.

There is a stated refusal of attempted vaginal delivery and insistence of the woman for delivery through CS in a total of 6.85% ( $n=32$ ) in our sample. We assessed the statistically significant difference between the ages of the women who refused VD and the rest of the women in our sample. The absence of difference in the age of the two analyzed groups was confirmed ( $p=0.258$ ). We found no statistically significant difference in the period of postoperative stay in the group of women who stated a refusal of VD ( $p=0.927$ ).

We analyzed the educational degree of the women in the sample and the refusal of VD. For this purpose, we united the patients into 2 groups – the ones with high and higher education in the first group and the ones with primary or lower educational level in the second group. The rate of stated refusals of VD in the first group is 8.30% ( $n=29$ ), while in the second group, it is 2.80% ( $n=3$ ),  $OR=3.11$ ; 95% CI 0.930 – 10.429. Although our sample is relatively small, we could make the conclusion that there is a higher chance of stating a refusal of natural delivery in the group of women with higher levels of education.

Regarding the time of delivery, our data shows that the largest share includes deliveries in g.w. 38 – 38.78%, followed by deliveries in g.w. 39 – 16.27%, and in g.w. 37 – 14.35%. The total percentage of deliveries between g.w. 25 and 32, incl., is 3.15% (15 cases) in this study. The average birth weight of the children born from a singleton pregnancy is 3092.85 g. ( $\pm 584.272$ ; min 690 g.; max 4550 g.). Our study did not find any statistically significant difference in the mean values of newborns’ weight in the group of women who refused VD and the ones who did not state a refusal ( $p=0.108$ ). The analysis of the newborns in the sample shows a share of 90.40% of clinically healthy children discharged from the hospital and 7.52% with an improvement in their health status. The mortality rate is 0.21% or 1 child, and the rest of the children are discharged from the hospital or moved to another Clinic without any change in their health status.

9	Firm refusal of attempted vaginal delivery	30	2.71%	6.42%
10	Pain in the surgical cicatrix (from previous CS)	29	2.61%	6.21%
11	Clinical (US) evidence of fetal macrosomia / CPD	26	2.34%	5.57%
12	Prolonged pregnancy	24	2.16%	5.14%
13	Pregnancy achieved through IVF	19	1.71%	4.07%
14	Unsuccessful labour induction (first or second)	19	1.71%	4.07%
15	Preterm pregnancy (immature fetus)	18	1.62%	3.85%
16	Non-progressive labour	18	1.62%	3.85%
17	Oligohydramnios	17	1.53%	3.64%
18	Absence of conditions of fast delivery per vias naturalis	17	1.53%	3.64%
19	Eye condition (with specialist's advice for CS)	15	1.35%	3.21%
20	First-time mother	15	1.35%	3.21%
21	Unfavourable obstetric medical history	15	1.35%	3.21%
22	Twin pregnancy	14	1.26%	3.00%
23	Subjective complaints of the patient (in case of pathology)	14	1.26%	3.00%
24	Narrow pelvis (pelvis angusta)	14	1.26%	3.00%
25	Severe preeclampsia	13	1.17%	2.78%
26	Older first-time mother	12	1.08%	2.57%
27	Eye pathology (without specialist's advice)	11	0.99%	2.36%
28	Diabetes (poorly managed)	11	0.99%	2.36%
29	Low-lying placenta (placenta praevia)	10	0.90%	2.14%
30	Intrauterine growth retardation (IUGR)	10	0.90%	2.14%

A smaller share of indications for surgery includes the following: “evidence of alterations in the Doppler velocimetry”, “absence of effect from Oxytocin stimulation”, “alterations in the fetal monitoring”, or “fetal distress”, “primary/secondary inadequate contractions”, “abruptio placentae”, “oblique or atypical (face, cephalic) presentation”, “pregnancy after primary/secondary infertility”, “genital

warts” and “presence of other extragenital pathology”.

The information about the health status at the time of admission shows that 61.24% of the women do not have any diagnosed comorbidities. The rest of the women have at least one registered extragenital disease or condition, which is considered a deviation. The most common of them are shown in Table 2.

**Table 2.** Most common comorbidities of the women in the sample.

	Comorbidities	Number	% of all diseases	% of the cases
1	Hypothyroidism (Hashimoto's thyroiditis)	25	10.08%	13.81%
2	Thrombophilia	24	9.68%	13.26%
3	Myopia	17	6.85%	9.39%
4	Arterial hypertension (not pregnancy-induced)	16	6.45%	8.84%
5	SARS CoV 2 infection (during the pregnancy)	14	5.65%	7.73%
6	Other eye pathology (other than astigmatism and myopia)	11	4.44%	6.08%
7	Insulin resistance (metabolic syndrome)	10	4.03%	5.52%

The information about the complications shows that intra- and postoperative complications have occurred in 14.99% (70 women) of the sample. The most common complications include, among others, puerperal endometritis in 18 women, hypotension in 11 women

and rupture of old uterine cicatrix in 9 women. The complications which occurred in the group of women who stated a refusal of VD are 6.25%, but due to the small number of these women in the study, we cannot make any justified conclusions.

## DISCUSSION:

A proportion of CS amounting to 49.05% in 2021 and 53.01% in 2022 is reported in *St. George UMHAT* for the above stated period of time. Unfortunately, there is no official summarized statistics of the birth rate as per the type of delivery in our country. The data published by the National Statistical Institute gives accessible information about the births but not about the method of delivery [7]. We could not find any available data on the clinical pathways paid by the NHIF according to the way of delivery on its website. This data incompleteness is reported for various periods of time by other authors, too [8, 9]. The rates of CS and the trends in Europe also show significant differences [9]. Our targeted search of data comparability for the stated years – 2021 and 2022 was unsuccessful. Nevertheless, the studies available on the net show the following results – the data for 2018 reported by Ana Pilar Betran et al. shows an approximate share of 25.0% for Eastern Europe (95% CI 18.7 - 31.3) and a wide range in the sample from 17.9 to 46.9% [10]. Detailed data is included in a study by Amyx M et al.[9] for the period from 2015 to 2019. According to them, the highest rates are reported in Cyprus (55.9-52.2%), Italy (35.8-33.4%), Luxembourg (31.8-29.5%), Northern Italy (29.5-32.2%) and Scotland (32.0-34.9%). In a document from 2023, Visser GHA et al. [11] state that the share in our country is around 45%.

Robson's Ten Group Classification System is not yet implemented in our country, although its use is recommended by WHO with a view to standardization and facilitation of classification of data regarding the CS performed [9]. This classification offers distribution of all women who are giving birth through CS in 10 groups, which are mutually exclusive. According to Jiandani et al., group 5, which includes women with previous CS, with a singleton pregnancy  $\geq 37$  weeks, is mainly responsible for the increase in the total rate of CS. Studies conducted in other large countries – Australia, Canada and Brazil, show similar results, as there is evidence of repeatability of CS up to 96,6% [12]. Our data on indication "Previously undergone CS" in 37.04% of the sample cases corresponds to the high repeatability in performing CS. Analogically, in a study by Ashmita Jawa, Swati Garg et al., previous CS is stated as a main indication with a share of 23.90%, followed by fetal distress with a share of around 16.06% [13]. It is of note that the number of some of the indications for CS – 11.66%, reported in this study, is close to the number reported in our sample – 12.63% of hypertensive disorders during pregnancy (total % of severe and moderate preeclampsia). The authors report a rate of cephalopelvic disproportion (CPD) of 5.93% against 5.57%

in our sample. For the purposes of our study, CPD is combined in one group with clinical and ultrasound evidence of fetal macrosomia.

In our sample, 32 women gave birth under the age of 20. These are high-risk pregnancies as the rates of preterm births, SGA newborns, increased postnatal mortality are higher in teenage mothers [14]. 59.38% or 19 of the youngest women group in our sample are pregnant for the first time, 11 are pregnant for a second time, and 2 are pregnant for a third time. 8 women have one born child, and 5 have a medical history of at least one abortion. This CS is a repeated one for 6 women in this group. We can define the data on pregnancies and deliveries in this age as worrying. The emphasis on regulating the demographic processes is a key element of conscious social development, as the elements of family planning and sexual education of the population are also included here [15].

In their study, Reischer et al. find out that factors such as previous diabetes and hypertensive disorders are independent risk factors for CS [16]. In our sample, diabetes is present in 2.36%, moderate preeclampsia is present in 9.85%, and severe preeclampsia is present in 2.78%. Due to the absence of a control group in our study, we cannot make a comparison with the shares of affected women who have given birth through vaginal delivery.

## CONCLUSION:

A main indication for CS in our study is the presence of previous CS. Nevertheless, the indications are usually multiple and multifactor. Previous CS is almost always combined with at least one more indication, mainly low pelvic score, established labour or presence of pain in the region of the surgical cicatrix. The presence of eye pathology and evidence of a narrow pelvis are reported as independent reasons for CS in our sample.

There is a stated refusal of attempted VD in a small share of women. There is no statistical difference in age between these women and the rest of the women, but they have higher educational level.

## Abbreviations:

**CS** - caesarean section

**VD** - vaginal delivery

**UMHAT** - University Multiprofile Hospital for Active Treatment

**g.w.** - gestational week

**IFV** - in vitro fertilisation

**NHIF** - National Health Insurance Fund

**WHO** - World Health Organisation

**SGA** - small for gestational age

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