# Frequency and Factors Associated with Cesarean Section in a Tertiary Care Hospital of Southern Punjab, Pakistan

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## Abstract

**Background:** There is a large variation in the frequency of cesarean section in different countries and in different regions of the same country. To reduce the country-wide disparity in this mode of delivery, WHO has set in an optimal range of 10–15%. In Pakistan, the rate of cesarean sections has increased over time. Rising rate of cesarean section may be associated with maternal age, antenatal care, parity, fetal lie and presentation, comorbidities, previous cesarean section, maternal choice, and clinical management policies.

**Objective:** To determine the frequency and factors related to the cesarean section in females in a Tertiary Care Hospital in Southern Punjab of Pakistan.

**Methodology**: It was a descriptive cross-sectional study, conducted from 1st March 2020 to 31st December 2020. Two hundred and five females fulfilling the inclusion criteria were enrolled applying the statistical formula. A predesigned questionnaire was applied to collect data at a Tertiary Care Hospital, Bahawalpur. The data were analyzed by using SPSS version 24.

**Results:** The mean age of the respondents was 25.3±4.4 years; 45.4% of females belonged to the upper-middle class and 95.6% were housewives. The mean number of antenatal visits was 3.4±1. Overall, 72.7% of females had cesarean section deliveries. The risk factors associated with cesarean section were: previous cesarean section 34.6%, fetal distress 13.7%, cephalo-pelvic disproportion 12.7%, oligo-hydramnios 10.7%, low lying placenta 8.3%, abnormal lie presentation 6.8%, and failure to progress in labor 5.9%.

**Conclusion:** The frequency of cesarean section was high. Major factors associated with cesarean section were previous cesarean section, education level, fetal distress, cephalo-pelvic disproportion, and oligo-hydramnios.

**Keywords**: Cesarean section, Frequency, Risk factors, Education

**Article Citation:** Islam R, Yaqoob M, Qureshi EMA, Hanif A, Rana MS, Gilani SA, Asghar S, Altaf F, Islam S, Islam A, Vehra S. Frequency and Factors Associated with Cesarean Section in a Tertiary Care Hospital of Southern Punjab, Pakistan. JSZMC 2021;12(4):3-9.

**DOI:** https://doi.org/10.47883/jszmc.v11i04.180



## Introduction

The high rate of cesarean section has become a great challenge in both developed and developing countries. The health care professionals present at the facility should be well aware of the urgency and indication for opting for a cesarean section as it carries a high burden on the economy of the health care system and families.[1] The increasing rate of cesarean section is mainly due to advancement in medical care, safe surgery, social and cultural changes.[1] According to World Health Organization (WHO), the recommended rate of cesarean section in any region should not exceed 10-15%.[2] Goal 5 of Millennium Development Goal (MDG) and Goal 3 of Sustainable Developmental Goal (SDG) account for about 75% of the reduction in maternal mortality mainly due to safe delivery.[3] The decision to perform a cesarean section for every pregnant mother varies from case to case.[2] Cesarean sections are thought to decrease maternal mortality and infant mortality but the evidence is still not justified.[4]

The medical reasons responsible for cesarean section are maternal age, obesity, abnormal presentation, antenatal care, parity, cord prolapse, fetal lie and presentation, dystocia, fetal distress, failure to the progress of labor, weight of baby, comorbidities, previous cesarean section, and clinical management policies.[5-7] Non-medical factors associated with cesarean sections are financial incentive of doctors, time convenience of doctor, high tolerance to surgery, patient's preference, social status, presence of private hospitals, unethical practice of doctors, education, occupation, and income of the patient.[8]

Cesarean section is usually performed when there is a health risk to mother and baby and vaginal delivery would put the mother and/or baby's life at risk. In recent times it has also been performed on the mother's request.[9,10] Obstetricians have divided cesarean section into emergency cesarean section

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and elective cesarean section.[9] Many cesarean sections performed in developing countries are due to emergencies like fetal distress and dystocia.[11-13] Increase in cesarean section rate in developed countries is more related to the history of previous cesarean section than any other clinical reason.[14]

Pakistan has also seen a rise in the rate of cesarean section. According to the Pakistan Demographic and Health Survey (PDHS), in 1990-1991, the rate was 2.7% and in 2018 it rose to 20%. The demand of cesarean section varies among educated and uneducated, and upper and lower socioeconomic classes in Pakistan.[15] Germany has a 16.4% rise in cesarean section in almost 21 years and accordingly only 10% had a medical indication for cesarean section.[1] Other countries exceeding the preferable range are Brazil with the highest rate of cesarean section, i.e. 50%, Iran 42%, Italy 38%, 37.8% in Mexico, and 37.6% in the Republic of Korea.[16] Similarly in Bangladesh the rate of cesarean deliveries raised from 2% to 31% over 18 years (2000-2018). In India, from 1992 to 2018, an increase in the rate of cesarean was reported from 3% to 27%, and in Nepal, there was a 20% increase in the rate of cesarean section delivery from 2000 to 2018. In Pakistan, the rate of cesarean sections increased from 3.2% (1990) to 20% (2018).[17,18]

Provision of good antenatal care and prenatal education leads to less chance of cesarean section.[19] Risk of cesarean section is four times more in nulliparous women with the exception of age, less than 20 or more than 40 years. An increase in maternal age may be linked to the increased likelihood of obesity, multiple gestations, hypertension during pregnancy, diabetes mellitus, gestational diabetes, and other medical diseases leading to increased risk of mortality and morbidity.[20] Fetal lie and presentation can change the mode of delivery, especially in nulliparous women. Cesarean section is found to be significantly associated with occiput posterior fetal head position.[21] Working women have a two to three times increased chance of undergoing cesarean section as compared to unemployed women.[22] The objective of the present study was to determine the frequency and factors related to the cesarean section in females in a Tertiary Care Hospital in Southern Punjab.

## Methodology

A questionnaire-based cross-sectional investigation was carried out on the pregnant females of Jubilee Female Hospital, Bahawalpur, Pakistan. The duration of the study was from 1st March 2020 to 31st December 2020. The Jubilee Female Hospital, Bahawalpur is a tertiary care hospital in the private sector in South Punjab. After taking approval from the hospital ethical committee the pregnant females were enrolled in the study. Sample size calculated for survey at 95% confidence interval, 5% margin of error, and anticipated population proportion of 15.8%[7] was 205.

The eligible females were drawn by non-probability convenience sampling technique. Data was collected by questioning the participants and from their medical records. The data were analyzed by using SPSS version-24. Quantitative data (age, height, weight, antenatal visits, and hemoglobin level) was presented in mean and standard deviation (SD) whereas qualitative data (mode of delivery) was presented in frequencies and percentages. Chi-square was applied to check the association between mode of delivery and tentative risk factors. P-value $\leq 0.05$ was taken as significant.

## Results

Out of 205 females, 149 (72.7%) underwent cesarean section, while the remaining 56 (27.3%) had a vaginal delivery. Females who were operated for cesarean section, 49% had an emergency cesarean section, 23.7% had elective surgery and 27.3% had a spontaneous vaginal delivery or vaginal delivery with Episiotomy. (Figure-I)

**Figure-I: Frequency distribution of Females according to Mode of Delivery**

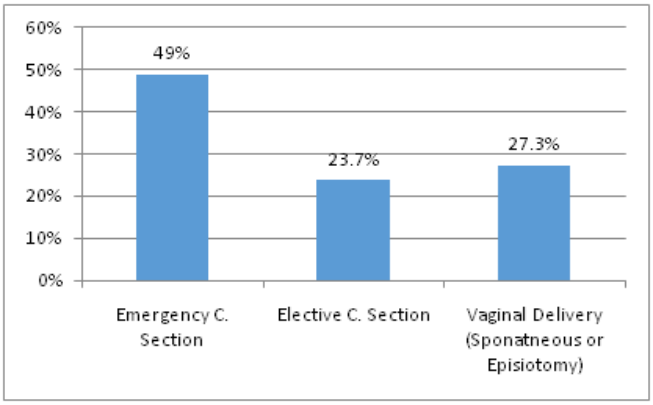

Table-I shows the frequency of the reasons to perform cesarean sections in the study population. According to this table, the most common reason of cesarean section was previous cesarean section 71 (34%), followed by fetal distress 28 (13.7%). Grade 1 meconium, grand multipara with the unstable lie, and intrauterine growth retardation were less common indications for cesarean section. Tables-II and III demonstrate the analysis showing the association of different non-medical factors and medical conditions with cesarean section delivery.

**Table-I: Reasons to perform Cesarean Sections in the Study Population**

| Variables | Frequency | Percent |
|---|---|---|
| Previous Cesarean section | 71 | 34.6 |
| Fetal distress | 28 | 13.7 |
| Cephalo-pelvic disproportion | 26 | 12.7 |
| Oligohydramnios | 22 | 10.7 |
| Post-date pregnancy | 19 | 9.3 |
| Low lying placenta | 17 | 8.3 |
| Abnormal lie presentation | 14 | 6.8 |
| Pregnancy-induced hypertension | 12 | 5.9 |
| Failure to progress (labor) | 12 | 5.9 |
| Premature membrane rupture | 7 | 3.4 |
| Breech presentation | 6 | 2.9 |
| Intra-uterine growth retardation | 3 | 1.5 |
| Grandmultipara with unstable lie | 2 | 1 |
| Umbilical cord prolapsed | 2 | 1 |
| Grade I meconium | 1 | 0.5 |
| Poor bishop | 8 | 3.9 |
| Precious pregnancy | 4 | 2.0 |
| Decrease fetal movement | 8 | 3.9 |

Table-II shows that there is the substantial risk (p=0.013) of higher education with a cesarean section in the study population.

**Table-II: Chi-square test showing association between Mode of Delivery and different Variables**

| Variables | Category | Mode of delivery | | p-value |
|---|---|---|---|---|
| | | Cesarean | Vaginal | |
| Education | Illiterate | 37(18.1%) | 10 (4.8%) | 0.013 |
| | Literate | 112(54.6%) | 46 (22.5%) | |
| Age at first child | ≤20 | 69 (33.7%) | 22 (10.7%) | 0.858 |
| | >20 | 80 (39%) | 34 (16.6%) | |
| Antenatal visits | ≤4 | 126(61.5%) | 50 (24.4%) | 0.281 |
| | >4 | 23 (11.2%) | 6 (2.9%) | |
| Family type | Nuclear | 39 (19%) | 11 (5.4%) | 0.332 |
| | Combined | 110(53.7%) | 45 (21.9%) | |
| Gestational age at first visit | <12 wks | 48 (23.4%) | 19 (9.3%) | 0.328 |
| | ≥12 wks | 101(49.3%) | 37 (18.0%) | |

Table-III shows association of different medical reasons with cesarean section. Association is significant in Cephalo-pelvic disproportion (p-value 0 .001), fetal distress (p-value 0.000), failure to progress (p-value 0.029), previous Cesarean section (p-value 0.000), Pregnancy induced hypertension (p-value 0 .029), abnormal Lie presentation (p-value 0.017), Post Date Pregnancy (p-value 0.005) and Low Lying Placenta (p-value 0.008)

**Table-III: Chi-square test showing association between Deliveries by Cesarean Section with different Medical Conditions**

| Medical condition | $\chi^2$ test value | P-value |
|---|---|---|
| Cephalo-pelvic disproportion | 11.191 | .001* |
| Fetal distress | 12.188 | .000* |
| Failure to progress | 4.790 | .029* |
| Umbilical cord prolapsed | .759 | .384 |
| Previous Cesarean section | 40.823 | .000 |
| Pregnancy-induced hypertension | 4.790 | .029* |
| Grand multipara with unstable Lie | 1.270 | .530 |
| Breech presentation | 2.323 | .127 |
| Abnormal Lie presentation | 5.647 | .017* |
| Gestational age at time of delivery (Weeks) | 35.441 | .675 |
| Intrauterine Growth Retardation | 1.144 | .285 |
| Severe Oliogohydraminos | 3.129 | .077 |
| Poly-hydraminos | .379 | .539 |
| Post Date Pregnancy | 7.877 | .005* |
| Premature rupture of Membrane | 2.724 | .099 |
| Low Lying Placenta | 6.967 | .008* |
| Grade I meconium | .378 | .539 |
| Grade II Meconium | 1.144 | .285 |
| Poor Bishop | 3.129 | .077 |
| Precious Pregnancy | 1.533 | .216 |
| Decreased Fetal Movement | 1.144 | .285 |
| Nil Liquor | .378 | .539 |

* Significant association (p-value less than 0.05)

Table-IV showed a Logistic regression analysis of variables associated with the cesarean section. According to this table, Odd ratio was significant in age (1.047), family type (1.161), and birth weight (4.440).

| Variable | ? | S.E. | Wald | df | P-value | Odds Ratio EXP (B) | 95.0% C.I. for EXP(B) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower | Upper |
| **Age** | 0.046 | 0.051 | 0.838 | 1 | 0.360 | 1.047** | 0.949 | 1.156 |
| **Education** | -0.031 | 0.039 | 0.630 | 1 | 0.427 | 0.970 | 0.899 | 1.046 |
| **Occupation** | -0.556 | 0.890 | 0.390 | 1 | 0.532 | 0.574 | 0.100 | 3.280 |
| **Family type** | 0.150 | 0.424 | 0.124 | 1 | 0.724 | 1.161** | 0.506 | 2.667 |
| **Age at first child** | 0.022 | 0.070 | 0.096 | 1 | 0.756 | 1.022** | 0.890 | 1.173 |
| **Antenatal visits** | -0.467 | 0.204 | 5.240 | 1 | 0.022* | 0.627 | 0.420 | 0.935 |
| **Gestational age at first visit** | -0.064 | 0.032 | 3.932 | 1 | 0.047 | 0.938 | 0.881 | 0.999 |
| **Gestational age at delivery** | -0.010 | 0.033 | 0.099 | 1 | 0.753 | 0.990 | 0.927 | 1.056 |
| **Birth weight** | 1.491 | 0.367 | 16.498 | 1 | 0.000* | 4.440** | 2.163 | 9.115 |
| **BMI** | -0.041 | 0.084 | 0.239 | 1 | 0.625 | 0.960 | 0.813 | 1.132 |

* Significant association (p-value less than 0.05)
**OR > 1 means greater odds of association with the exposure and outcome
OR =1 means there is no association between exposure and outcome
OR<1 means there is a lower odds of association between the exposure and outcome

## Discussion

This study which was carried out in southern Punjab highlighted a high rate of cesarean section in the study population. However, the findings of several studies carried out in Pakistan and in other parts of the world presented a different picture. For example, a 6-month study carried out in Combined Military Hospital Abbottabad by Tahir and associates in 2018 concluded that 46.7% of births were carried out by cesarean section.[23] Another study conducted in a Tertiary care hospital of Peshawar revealed the rate of cesarean section as 21.7% and two-third of these cases were emergency cesarean section.[24] An analytical retrospective case-control study, conducted from 2014 to 2018 in Peruvian Hospital, Peru, revealed that cesarean section was performed in one-third cases (329 out of 988 pregnant females).[25] It was concluded that 21.2% of females had elective cesarean section while 12.2% had an emergency cesarean section. A cross-sectional study conducted in Ethiopia documented that rate of cesarean section was 38.3%.[26] In another study carried out in North West Ethiopia showed that the frequency of emergency cesarean section was 67.0%.[27]

The findings of the present study revealed that the level of literacy was strongly associated with cesarean section delivery, about half of literate women underwent cesarean delivery (P = 0.013). In contrast, in China, literate women were 3-4 times more likely to undergo a cesarean section as compared to uneducated women.[28] Findings of this study were also consistent with results from an Ethiopian study where a higher level of education was linked with increased prevalence of cesarean sections (higher education-33.3%, secondary education-32.3%, primary education-15.8%, illiterates-14.8%).[29] Similar results were also portrayed in Mexican study i.e. higher level of education was associated with increased choice for cesarean deliveries; more than 56.7 % of the mothers having graduation degree had cesarean sections in the private facility as compared to 18% in public hospitals.[30] Present study showed that most of the females (almost half of total) belonged to the upper class, followed by the lower middle class, upper-middle class, and lower class. But a study done by Sultana and associates (2017) highlighted that more than half (56%) of the females belonged to the lower class, followed by the middle class (27%) and upper class (17%).[31]

It is pertinent to mention that the top five reasons for cesarean section in the present study were previous cesarean section, followed by fetal distress, cephalo-pelvic disproportion, oligohydramnios, and low lying placenta. A similar study carried out by Kanji and teammates from Karachi (2019) highlighted that the top five reasons for cesarean section were repeated cesarean section (44.2%), failure to progress (12.9%), abnormal lie (9.3%), fetal distress (8.2%), and fetal growth restriction (4.7%).[32] Likewise, Solomon and co-workers from North West Ethiopia (2019) reported that the five most common reasons of conducting cesarean section were Non-

reassuring fetal heart pattern (NRFHP)(17.8%), previous cesarean section scar (15.9%), preeclampsia (12.1%), anomalous fetal presentation (8.4 %) and failed induction of labor (6.5%).[27]

The onset of labor can lead to complications at any time during the course of labor. This may require immediate action in the form of an emergency cesarean section to prevent the death of the mother, infant, or both.[33] Majority of females select cesarean section instead of vaginal delivery because of fear of labor pain and to avoid long labor hours, anxiety for fetal injury, urinary and fecal incontinence, fear of pelvic floor injury and vaginal trauma, previous bad experience of delivery, uneasiness for recurrent gynecologic checkups, anxiety for lack of support from the staff during labor pain and abnormal prenatal examination.[34]

It would be worthwhile to consider the limitations of this study. Firstly, the pregnant females were only selected from one private hospital in Southern Punjab, and secondly the sample size was small, as only 205 pregnant females were included in the study.

## Conclusion

The cesarean section is a common surgical procedure carried out in clinical settings of both developed and developing countries. The present study assessed the frequency and factors associated with cesarean section in a tertiary care hospital of Southern Punjab. It was concluded that the frequency of cesarean section was high and was most common in literate women while the factors associated with cesarean section were previous cesarean section, fetal distress, cephalo-pelvic disproportion, oligohydramnios, and low lying placenta.

**Authors Contribution: RI:** Conception of work and Drafting. **MY:** Design of work and revising. **EQ:** Interpretation of data and revising. **AH:** Analysis of data and drafting. **MSR:** Acquisition and analysis of data and revising. **SAG:** Conception of work and drafting. **SA:** Design of work and drafting. **FA:** Interpretation of data and revising. **SI:** Analysis of data and revising. **AI:** Interpretation of data and drafting. **SV:** Design of word and revising.

All authors critically revised and approve its final version.

**Conflict of Interest**: None
**Sources of Funding:** None

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