# Caesarean section in a primary health facility in Ghana: Clinical indications and feto-maternal outcomes

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## Abstract

There is great concern about the increasing rise in the rate of caesarean section in both developed and developing countries. This study was to ascertain the prevalence and compare outcomes of elective and emergency caesarean sections among women who deliver at the University of Cape Coast Hospital, Ghana. This retrospective study reviewed records of 645 women who delivered through caesarean sections during the period of January 2014 and December 2015. The prevalence of caesarean section was 26.9%. There was a significantly higher rate of adverse fetal outcomes (P=0.016) among babies born through emergency caesarean section. There were 12 (1.9%) women who had caesarean section done based on maternal request. The caesarean section rate found in this study was high. The lack of availability of technology for diagnosing fetal distress found in this study could possibly lead to over diagnosis of fetal distress. Thus availability of such diagnostic technology could reduce the high caesarean section rate. The high numbers of women requesting caesarean section without medical indication should be investigated and the motivation factors identified so as to curb the practice.

## Introduction

Ever since 1881, when the first modern caesarean section was performed by German gynecologist Ferdinard Adolf Kehrer,[1] caesarean section (CS) has greatly improved obstetric care throughout the world.[2] Caesarean section rates have risen worldwide both in developed and developing countries over a variety of reasons.[3] Caesarean section is usually performed when a mother's or baby's life is at risk if there is a vaginal delivery. Therefore the decision to perform a CS should be based on the best way to save the lives of the mother and child. However, in recent times, factors that influence decisions to perform CS have included psychosocial factors such as anxiety about vaginal delivery, and even a mother's wish to have a CS without any obstetric indication.[4] There are two sub types of CS depending on the urgency of the operation. Elective CS is when a caesarean section is performed following advanced planning,[5] usually the decision to perform the surgery is made more than 24 h before delivery.[6] On the other hand an emergency CS is any caesarean section that is not planned or scheduled. In this case the decision is made within 24 h of delivery as a result of deteriorating maternal or fetal health. Even though CS is a life saving procedure, it is a major surgery and is associated with both immediate and long-term maternal and perinatal risks.[7] According to a recent survey involving 150 countries,[8] 18.6% of all births occurring worldwide are through CS, ranging from 6% to 27% in the least to the most developed regions respectively. Latin America and the Caribbean region is ranked first with 40.5%, followed by Northern America (32.3%), Oceania (31.1%), Europe (25%) and Asia (19.2%). Africa has an average CS rate of 7.3% with a range of 1.4% to 51.8%. Northern Africa has the highest rate of 27.8% with Western Africa recording an average of 3% and a range of 1.4-11.4%. In Ghana studies have shown that 13% of all women with a live birth deliver by CS.[9] However, this rate varies among the different regions of the country and also among different health facilities.[9,10] Many studies both ecologic and hospital based have been conducted worldwide to determine CS rates. Ecologic studies involve comparisons and analysis of entire populations,[3,8,9] whilst hospital based studies make use of patients in specific health care facilities.[11-13] In line with a World Health Organization (WHO) recommendation that says that at the level of facilities,[14] it is essential to monitor the rates of CS we undertook this hospital based study in a region considered one of the poorest in Ghana,[15] using a quasi government primary health care facility where emergency obstetric care is provided. The aim of the study was to ascertain the prevalence of CS among women who delivered at the facility and the common indications of the surgery as well as the immediate feto-maternal outcomes of the procedure. With the paucity of published data on indications and outcomes of CS in Ghanaian health facilities, this study will contribute to the ongoing worldwide debate on the possible reasons for the increasing rate of CS in resource poor countries like Ghana.

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## Materials and Methods

This study was a retrospective study consisting of 645 women who gave birth by caesarean section.

The study was conducted at the University of Cape Coast Hospital, Ghana, a primary health care hospital that serves a steady population of staff of the University Of Cape Coast and their dependants, students of the university as well as communities surrounding the university. It also serves as a referral hospital for several health centers and polyclinics in Cape Coast. All deliveries are attended by midwives and doctors. In this study maternal adverse outcomes were defined as complications of delivery to mother observed within the first 24 h following delivery and included blood transfusions, hysterectomy, intensive care unit admission, eclampsia and death. An adverse neonatal outcome included respiratory complications that needed oxygen resuscitation, injury to baby, admission to neonatal intensive care unit, stillbirth and feeding difficulties.

### Data collection

All medical records of women who delivered by CS between 1st January 2014 and 31st December 2015 were reviewed to obtain the primary indication for CS, maternal characteristics such as age, parity, gravidity, educational level and occupation. Other information extracted included birth weight, type of delivery (emergency or elective) and immediate feto-maternal outcomes of the deliveries.

The study included all deliveries conducted at the hospital within the study period after 28 weeks of gestation. It also included women of all ages.

### Statistical analyses

Completed data was processed using SPSS version 20. Descriptive measures such as mean, standard deviation, frequencies and percentages were used to describe the various variables under study when appropriate. For quantitative data, Student's *t*-test was used to compare the sample means whilst Pearson's chi square test ($\chi^2$) was used to compare categorical data. Characteristics with significant differences between groups by the $\chi^2$ test and *t*-test were included in a logistic regression analysis to predict their independent associations within the group. Statistical significance was set at P<0.05.

### Ethical consideration

Ethical clearance was obtained from the Institutional Review Board of University of Cape Coast (UCCIRB).

## Results

There were a total of 2397 deliveries during the study period. Out of these, 1752 (73.1%) were vaginal deliveries and 645 (26.9%) were caesarean sections. Of the total caesarean section deliveries of 335 (51.9%) were emergency caesarean sections whilst 310 (48.1%) were electives. Ten (0.42%) of all the deliveries were by means of vacuum extraction. There were no forceps deliveries during the study period. The youngest mother was 14 years old and the oldest being 45 years old. The mean age of the 2397 mothers who delivered during the study period was 29.13±5.20 years. However with regards to the women who had CS, their mean age was 29.94±5.09 years. The mean birth weight among the babies delivered through CS was 3.20±0.69 kg. There was a low birth weight rate of 9.2% with 3.8% of the babies weighing more than 4.0 kg. Women who delivered through elective CS showed significantly higher mean age (P<0.001), mean gravidity (P=0.003), mean parity (P=0.024), and mean birth weight (P<0.001) compared to women who delivered through emergency CS. Table 1 shows the demographic characteristics of the pregnant women who delivered by cesarean section during the study period.

Table 2 also gives the summary of the obstetric and fetal characteristics according to the type of CS.

The overall leading indication for CS was previous caesarean section (23.10%), followed by big baby (17.21%) and failure in progress (13.18%). In the emergency CS group, failure in progress (25.37%), and fetal distress (20.60%) were the most frequent indications whilst previous caesarean section (37.74%), and big baby (27.10%) were the leading indications in the elective CS group. Table 3 shows the leading indications of both elective and emergency caesarean sections among the study population.

A logistic regression analysis showed that the likelihood of a woman undergoing emergency CS was higher in the <19 year (AOR 5.18) and (20-34) year age groups (AOR 1.48) compared to >34 year age group. Also women with first pregnancy were found to be at an increased risk (AOR 1.52) of undergoing emergency CS compared to women who had more than 4 children (Table 4).

There were 13 adverse maternal outcomes (20.16 per 1000 CS deliveries). Out of the 335 emergency CS deliveries, there were 8 adverse maternal outcomes (23.88 per 1000) whilst elective CS deliveries recorded 5 adverse maternal outcomes out of 310 cases (16.13 per 1000 CS deliveries). There was however, no significant difference in the rate of adverse maternal outcomes following emergency CS as compared to elective CS ($\chi^2$=0.49, P=0.484). The commonest adverse maternal outcome recorded was blood transfusion (10, 1.55%). The rest were bladder injury (6, 0.93%), post partum haemorrhage (4, 0.62%), death (2, 0. 31%), eclampsia (1, 0.16%), hysterectomy (2, 0.31%), and intensive care unit (ICU) admission (2, 0.31%). Of the 30 adverse fetal outcomes (46.51 per 1000 deliveries), 22 occurred after emergency CS (65.67 per 1000), whilst 8 adverse fetal outcomes were



**Table 1. Association between demographic characteristics of pregnant women and type of Caesarean section (cs).**

| Maternal characteristics | Elective cs Total (n=310) | Emergency cs Total (n=335) | Total n(%) | | $\chi^2$, P-value |
|---|---|---|---|---|---|
| Age group | | | | | 7.103, 0.029** |
| <19 | 2 | 8 | 10 | (1.55) | |
| 20-34 | 238 | 273 | 511 | (79.22) | |
| >34 | 70 | 54 | 124 | (19.23) | |
| Mean age of mothers | 30.70±4.79 | 29.24±5.26 | | | 3.64*, <0.001** |
| Occupation | | | | | 8.542, 0.201 |
| Agriculture | 2 | 9 | 11 | (1.70) | |
| Professional | 116 | 110 | 226 | (35.04) | |
| Trader | 83 | 84 | 167 | (25.89) | |
| Skilled manual | 72 | 81 | 153 | (23.72) | |
| Student | 17 | 16 | 33 | (5.12) | |
| Unemployed | 13 | 25 | 38 | (5.89) | |
| Unskilled | 7 | 10 | 17 | (2.64) | |
| Education | | | | | 3.41, 0.0268** |
| Non-formal | 3 | 6 | 9 | (1.39) | |
| Primary | 68 | 93 | 161 | (24.96) | |
| Secondary | 109 | 107 | 216 | (33.49) | |
| Tertiary | 130 | 129 | 259 | (40.16) | |

$\chi^2$, Chi-square test; *Student's t-test; **statistically significant difference.

recorded following 310 elective CS deliveries (25.80 per 1000). There was therefore a significantly higher rate of adverse fetal outcomes (($\chi^2$=5.77, P=0.016) among emergency CS compared to elective CS newborns. The need for ICU admission was the most frequent adverse fetal outcome (1.9%), followed by fresh stillbirth (1.2%), macerated still birth (1.1%) and injury to baby (0.05%). A logistic regression revealed that an elective CS was 2.64 times more likely to result in a normal outcome for the baby than emergency CS.

## Discussion

The caesarean section rate of 26.9% found in this study is similar to the findings of other studies conducted at health facilities in other parts of the world.[2,12] The rate is however lower than the rate of 35% that was found in a study conducted at Korle Bu Teaching Hospital Ghana which is a tertiary level hospital.[13] The national caesarean rate in Ghana is 13%.[9] The high rate of CS in this study could be due to the fact that the hospital serves as a referral center for other hospitals, clinics and maternity homes and thus may receive complicated pregnancies or women who are referred because they may need CS. Another reason for the high rate of CS in this study could be the rare use of instrumental delivery. Only 0.42% of all deliveries were through vacuum extraction and there were no forceps deliveries during the study period. This practice has been found in a previous study.[13] There is therefore the need to train and increase skills of doctors in instrumental delivery. This will probably decrease the use of CS as a means of delivery at the University of Cape Coast hospital. The rate of emergency CS (51.9%) found in this study is similar to findings in other parts of the world,[5,16] but lower than the findings at Korle Bu Teaching Hospital which recorded an emergency CS rate of 70%.[13] This may be due to the fact that Korle Bu Teaching Hospital is the biggest referral hospital in the southern part of Ghana and thus is expected to receive more obstetric emergencies.

The mean age of the 2397 mothers who delivered during the study period was 29.13±5.20 years. Women who had undergone elective CS had a significantly higher mean age (P<0.001) than those who had emergency CS. This was probably because 77.10% of the women who delivered through elective CS were multigravida and were mostly (99.34%) aged more than 19 years. The mean age at first birth among the women who delivered through CS in this study was 27.69 years. This finding is comparable to a previous study in Ghana that found the mean age for nulliparas to be 27.3 years,[13] but higher than the median age at first birth in Ghana which is 21.4 years.[9] This could indicate that older nulliparas tend to undergo more CS probably due to more difficult labours.

Among the total number of 2397 deliveries in this study, there was a low birth weight rate of 9.2%, similar to the national figure of 10%,[9] and higher than the rate of 7.7% found in a previous study.[17] The mean birth weight of babies born through CS was 3.2±0.09 kg which is consistent with the findings of other previous studies,[13,18] that investigated weight of babies delivered through CS. There was however a significant difference (P<0.001) in birth weights of babies born through elective CS (3.32±0.59 kg) compared to those delivered through emergency CS (3.09±0.75 kg). This could be a reflection of good antenatal care as many large babies were noticed before their mothers went into labour and were subsequently scheduled for elective CS. It is therefore not surprising that 17.21% of all CS done had big baby as the main indication. Many previous studies have demonstrated that large babies are at increased risk of obstructed labour that lead to CS because of risk of vaginal tear, perianal damage and maternal bleeding.[19]

The dominant indication for CS among the study population was previous CS (23.10%), followed by big baby (17.21%), failure in progress (13.21%) and fetal distress (10.70%). These findings are similar to what was found in previous studies in Ghana,[12] and in the developed world where approximately 30% of CS are repeat and 10% are performed due to fetal distress.[20,21]

Among the women who had CS with previous CS as the main indication, 78.5% went through elective CS. This implies that 21.5% of these women may have had emergency CS after attempted vaginal delivery. This rate of attempted vaginal birth after CS (VBAC) is lower than what was found in a previous study in Ghana.[16] Even though a systematic review revealed that VBAC is a reasonable and safe choice for many women with a previous history of CS, there exist practical challenges in low resource countries like Ghana where the present study was conducted. The challenges include the unavailability of optimal intra-



**Table 2. Relationship between obstetric and fetal characteristics and type of Caesarean section (cs).**

| Characteristics | Elective cs Total (n=310) | Emergency cs Total (n=335) | Total n(%) | | $\chi^2$, P-value |
|---|---|---|---|---|---|
| Birth weight (kg) | | | | | |
| <2.5 | 17 | 51 | 68 | 10.55 | 16.30, <0.001** |
| 2.5-4.0 | 266 | 260 | 526 | 81.55 | |
| >4.0 | 27 | 24 | 51 | 7.90 | |
| Gestational age (weeks) | | | | | |
| <37 | 4 | 31 | 35 | 5.42 | 20.09, <0.001** |
| 37-42 | 282 | 283 | 565 | 87.60 | |
| >42 | 24 | 21 | 45 | 6.98 | |
| Parity | | | | | 7.43, 0.024** |
| 0 | 108 | 152 | 260 | 40.31 | |
| 1-4 | 193 | 175 | 368 | 57.05 | |
| ≥5 | 9 | 8 | 17 | 2.64 | |
| Maternal outcome | | | | | |
| Normal | 305 | 327 | 632 | 97.98 | 0.49, 0.484 |
| Adverse | 5 | 8 | 13 | 2.02 | |
| Fetal outcome | | | | | |
| Normal | 302 | 313 | 615 | 95.35 | 5.770, 0.016** |
| Adverse | 8 | 22 | 30 | 4.65 | |

$\chi^2$, Chi-square test; *Student's t-test; **statistically significant difference.

partum maternal and fetal monitoring and lack of adequate preparedness for emergency delivery if urgently needed.[22] Another challenge is the fact that there is no demonstrable and reliable indicator that always correctly identifies and predicts women with previous history of CS who will successfully deliver vaginally.

Fetal distress accounted for 10.7% of all CS done. This could be due to the lack of instruments and technology that are used for accurate diagnosis. Therefore clinicians rely on simple measurements like meconium stained liquor and fetal tachycardia to make a diagnosis of fetal distress. This practice will cause more women to get the diagnosis of fetal distress.

An interesting finding was that 12 (1.9%) of all caesarean sections were performed because of maternal request. This is higher than a maternal request rate of 0.2% found in a previous study in Ghana,[12] but lower than in the United Kingdom and Northern Europe where around 6% to 8% of all primary CS were performed at the request of the mother alone.[22] Since such surgeries are performed with no medical or obstetric indication, it must be discouraged in light of the numerous complications associated with CS.[3]

There are well documented adverse health outcomes associated with CS.[23] In the present study, there was an incidence rate of 20.16 per 1000 CS births for adverse maternal outcomes. There was however no significant difference (P=0.424) between adverse maternal outcomes among women who had elective and emergency caesarean sections, even though the incidence of adverse outcomes was higher (23.8 *versus* 16.1 per 1000 CS) among the emergency CS women compared to the elective CS women. Other studies have however shown that emergency CS is associated with significant rate of morbidity and mortality to the mother compared to elective CS.[24] There were two maternal deaths following CS during the study period. One woman died after emergency CS as a result of eclampsia whilst the other woman died of complications of sickle cell disease following an elective CS. These deaths result in a mortality rate of 0.3%. This figure is high as compared to the findings of a large study conducted by the World Health Organization (WHO) to investigate pregnancy outcomes that found an absolute risk of death of 0.04% for elective CS and 0.06% for emergency CS.[25] The high mortality rate found in this study could be attributed to its relatively smaller sample size.

There were 30 adverse fetal outcomes resulting in an incidence rate of 46.5 per 1000 births. The incidence of adverse fetal outcomes was significantly higher among babies born through emergency CS as compared to those born through elective CS (P=0.016). There was a fresh stillbirth rate of 1.2% and this rate was significantly (P=0.03) higher after an emergency CS than elective CS. These findings are consistent with an earlier study,[26] that showed that emergency CS was significantly associated with more adverse fetal out comes than elective CS.

**Table 3. Distribution of main indications for Caesarean sections (cs).**

| Indication | Elective cs (N=310) n(%) | Emergency cs (N=335) n(%) | Total (N=645) n(%) |
|---|---|---|---|
| Previous Caesarean section | 117 (78.5) | 32 (21.5) | 149 (23.10) |
| Big baby | 84 (75.7) | 27 (24.3) | 111(17.21) |
| Failure in progress | 0 | 85 (100) | 85 (13.18) |
| Fetal distress | 0 | 69 (100) | 69 (10.70) |
| Malpresentation | 30 (61.2) | 19 (38.8) | 49 (7.60) |
| Preeclampsia and eclampsia | 11 (22.4) | 40 (77.6) | 51 (7.91) |
| Antepartum haemorrhage | 2 (8.3) | 22 (91.7) | 24 (3.72) |
| Failed induction | 0 | 22 (100) | 22 (3.41) |
| Bad obstetric history | 13 (92.9) | 1 (7.1) | 14 (2.17) |
| Previous myomectomy | 13 (100) | 0 | 13 (2.01) |
| Maternal request | 12 (100) | 0 | 12 (1.86) |
| Others | 28 (58.3) | 18 (41.7) | 46 (7.13) |

**Table 4. Predictors of women undergoing emergency Caesarean sections (cs).**

| Maternal characteristics | Emergency cs (no.) | Multivariate adjusted OR (95%) | P-value |
|---|---|---|---|
| Maternal age | | | |
| <19 | 8 | 5.18 (1.06-25.42) | 0.042 |
| 20-34 | 273 | 1.48 (1.00-2.21) | 0.049 |
| >34 | 54 | Reference | |
| Parity | | | |
| 0 | 152 | 1.52 (0.59-4.24) | 0.361 |
| 1-4 | 175 | 1.02 (0.39-2.70) | 0.171 |
| >4 | 8 | Reference | |
| Gravidity | | | |
| 1 | 120 | 2.05 (1.30-3.25) | 0.002 |
| 2 | 98 | 1.23 (0.78-1.93) | 0.375 |
| 3 | 61 | 1.00 (0.61-1.63) | 0.997 |
| >3 | 56 | Reference | |
| Gestational age | | | |
| Term | 282 | 1.15 (0.62-2.11) | 0.659 |
| Preterm | 31 | 8.86 (2.68-29.25) | <0.001 |
| Post term | 21 | Reference | |
| Birth weight | | | |
| <2.5 | 51 | 3.37 (1.55-7.34) | 0.002 |
| 2.5-4 | 260 | 1.10 (0.62-1.96) | 0.746 |
| >4 | 24 | Reference | |

## Limitations

This was a retrospective study and therefore only available data was used in the study. For example, there was no data on co-morbid diagnosis of both mother and fetus and their severity and therefore not factored into the analysis. These co-morbid conditions could affect both maternal and fetal outcomes of the surgery. This study was conducted in one setting and thus findings cannot be generalized to represent other health facilities in Ghana. Also adverse outcomes of the surgeries may not necessarily be as a result of the procedure as other co-founders like effect of labour on emergency CS were not evaluated in this study.

## Conclusions

Our study has demonstrated a high CS rate among women who delivered at the University of Cape Coast Hospital. Even

though WHO does not encourage health facilities to strive to achieve a specific CS rate,[14] CS should be performed only when medically indicated. To lower the incidence of CS in the study population, we recommend that clinicians should be trained in instrumental deliveries, performance of external cephalic version and vaginal breech deliveries. Also the high diagnosis of previous CS as an indication of CS can be reduced by carefully selecting cases for trial of labour. Monitoring of labour with cardiotocograph could reduce the incidence of CS due to possible over diagnosis of fetal distress. The high number of women who requested for CS in the absence of any maternal and fetal indications must be investigated to determine the factors that influence such decisions so as to halt any further increase in the numbers of women who make such requests.

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