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Original Research Article

Caesarean delivery: rate, indications and pregnancy outcome at Suntreso government hospital; an analytical cross-sectional study

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ABSTRACT

Introduction: Globally, caesarean section (CS) rates are increasing, revealing disparities across regions and socioeconomic groups, becoming a challenge due to its overuse or underuse with direct consequences on maternal and neonatal health. Despite this, the factors contributing to these trends and disparities remain insufficiently documented. This study determined the rate, associated indications and maternal and neonatal outcomes of caesarean section deliveries at the Suntreso Government Hospital, Ghana.
Methods: This retrospective study encompassed the entire number of women who gave birth within the study time period spanning from 1st January, 2021 to 31st December, 2021.
Results: Caesarean section rate over the study period was 33.1%. Previous caesarean section, fetal distress and severe oligohydramnios were the 3 commonest indications for CS. There were 13 adverse maternal outcomes. Maternal deaths after CS were 2 out of 1057 cases. About 91% of patients stayed in the hospital for longer than three days post-surgery. 41% of babies delivered were admitted to the Neonatal Intensive Care Unit (NICU) for various reasons. Pre-eclampsia/eclampsia, antepartum hemorrhage and fetal distress were some indications of caesarean section with significant association with adverse maternal and neonatal outcome.
Conclusion: Caesarean section rates were higher than the WHO standard. A repeat CS delivery was the commonest indication. CS should be performed when clinicians anticipate a better outcome for both mother and neonate.

Keywords: Caesarean section, Indications, Outcomes, Maternal, Neonatal

INTRODUCTION

CS have become the most frequently performed surgical procedure in the field of obstetrics.[1] These procedures are undertaken when the health and safety of either the baby, the mother, or both will be compromised during vaginal delivery. Caesarean sections can be performed as an emergency measure when a vaginal birth poses a challenge, or they may be planned as an elective caesarean section.[2] The World Health Organization (WHO) has consistently stressed that the rate of caesarean section deliveries in any given population should not exceed 15%.[3] Nevertheless, the global rate of caesarean sections has been on the rise, now accounting for more than 1 in 5 (21%) of all childbirths.[4] The exact reasons behind these upward trends are yet to be fully understood. Reasons for performing CS can be categorized into maternal and fetal factors. Maternal indications for CS are usually a medical or obstetric condition that may necessitate a caesarean delivery for a better pregnancy outcome. These indications include previous caesarean delivery, antepartum haemorrhage, uncontrolled hypertension, and poor progress of labour5. Fetal indications include fetal distress,

abnormal fetal presentation, cephalopelvic disproportion and significant congenital anomalies.[5] While the primary objective of caesarean delivery is to prevent complications that may occur with a vaginal delivery, it's important to note that this major surgical procedure significantly impacts the mother and the baby. Previous research has indicated that maternal mortality rates can increase by up to three times with caesarean section delivery.[1] Additionally, the incidence of maternal complications is two to five times higher in caesarean section cases compared to vaginal delivery.[1] These complications include a heightened risk of post-partum haemorrhage, hysterectomy, infection, deep vein thrombosis, extended hospital stays, and increased risk during future pregnancies. Studies have produced conflicting findings regarding the impact of rising caesarean section rates on reducing neonatal complications, such as neonatal intensive care unit admissions, respiratory problems, and the separation of mother and baby with its associated consequences.[6] Access to caesarean sections is a fundamental aspect of effective essential and emergency obstetric care, and it has been prioritized by many low- and middle-income countries to achieve Sustainable Development Goal (SDG), focusing on the reduction of maternal and infant mortality and morbidity.[3] However, in recent decades, there have been a notable rise in caesarean section rates in numerous high- and middle-income countries, surpassing the United Nations' recommended threshold of 15%.[7]

Following the UN convention in 1985, experts convened by the World Health Organization (WHO) recommended that the caesarean section rate should fall within the range of 10% to 15%.[8] However, the optimal rate of caesarean sections continues to be a subject of debate in various countries with different income levels, leading to varying population-level rates, ranging from 1% in Niger to 56% in the Dominican Republic.[9,10] The current regional projections indicate that approximately one in every five women across the globe gives birth through caesarean section.[9] According to the 2017 Ghana Maternal Health Survey, 16% of deliveries conducted in healthcare facilities involved caesarean section procedures.[11] Nevertheless, this rate differs among distinct regions within the country and across various healthcare facilities.[12]

However, a study in 2010 reported a caesarean section rate of 35% at the Korle Bu Teaching Hospital in Accra.[13] This high incidence is not surprising, considering that this hospital serves as a referral centre and is the largest public hospital in Ghana.[14] Disparities exist in healthcare utilisation, including the availability of caesarean section interventions.[2] Globally, health inequities and the lack of appropriate treatment for disadvantaged groups remain sources of contention among demographers, healthcare practitioners, and researchers.[15] As a result, various global programs, like the SDGs, focus on reducing health disparities. While the use of caesarean sections has grown to significant proportions globally, access to caesarean sections continue to differ between high- and low-income nations. Disparities in caesarean section rates also exist between urban and rural areas and among different socioeconomic groups.[16] This variation is evident in Ghana, where the utilisation of caesarean sections differs between women in northern and southern Ghana.[17] While it is over-utilised among the richer south, it is less accessible in the less privileged population of the north. However, little is known about the variables influencing caesarean section deliveries in Ghana and their association with pregnancy outcome. Therefore, this study focuses on factors that determine caesarean section deliveries in Ghana and their associations with pregnancy outcome. Some districts in the Ashanti region (region of the study area) have reported rates that exceed the World Health Organization's recommended threshold. For instance, between 2011 and 2016, approximately 22% to 26% of all births in the Ashanti Region were delivered through caesarean sections18. Based on this high rate, the study focusses on indications for caesarean deliveries and to evaluate both maternal and neonatal outcome.

Understanding the circumstances under which caesarean deliveries are performed in certain hospitals is paramount. This knowledge is essential for implementing interventions to reduce unnecessary caesarean sections while ensuring improved access to the procedure for those who genuinely need it. By doing so, we can prevent maternal deaths resulting from inadequate access to emergency caesarean sections and also mitigate the maternal and neonatal risks associated with increased CS rates. Reducing unnecessary caesarean deliveries also reduces the financial and human resource burden on the healthcare. This will eventually re-focus the few available resources to meet the needs of women who actually need surgical interventions during delivery process.

METHODS

Study type

An analytical cross-sectional study design was used. Hospital records of all women who delivered at the hospital from 1st January 2021 to 31st December 2021 were collected and used for the study.

Study place

The study took place at the Suntreso Government Hospital in Kumasi, Ghana. Established in 1963, the Suntreso Government Hospital is in the North-Suntreso area of Kumasi (Ashanti Region of Ghana). The hospital operates under Ghana Health Service as a district hospital. It has many specialty departments and serves the Kumasi sub-Metropolitan area. Notably, the Obstetrics and Gynaecology and the Sexually Transmitted Infection departments became operational. The remaining departments encompass the Out-patient department (OPD), In-patient department (IPD), Dental, Ear, Nose and Throat (DENT) department, Surgery department, Mother

and Baby Unit (MBU), Public health department, pharmacy department, Diagnostic department, and the Administration and Finance department. Currently, the hospital boasts of a dedicated staff of 1,049, including 3 obstetricians, 2 family physicians, 2 surgeons, 1 paediatrician, 27 medical officers and 12 Physician Assistants (PAs).

Study period

The data were accessed over a study period spanning from 8th January, 2023 to 10th April, 2023. The data collected included maternal age, gestational age, parity, maternal comorbidities, indications for caesarean section, and maternal and neonatal outcomes.

Selection criteria

Records of women who underwent caesarean sections at Suntreso Governmental Hospital in 2021 were included in the study. Those who had to be referred to a tertiary institution due to complications and those with incomplete data were excluded from the study.

Study procedure

The study made use of secondary data sources. Data collected included maternal age, gestational age, parity, maternal comorbidities, indications for caesarean section and maternal and neonatal outcomes. The data collection form comprising a checklist was used for data presented in the patient's files. The checklist was divided into sections A to F. Section A captured the demographical details of couples. Sections B to F viewed medical information on patients who had caesarean sections. The data collection form was piloted before the study to ensure it is comprehensive and easy to use. The data was collected by two trained research assistants who worked independently to review the medical records and collect the required data. The independent variables included indications for caesarean section and maternal characteristics such as parity, gestational age, and socioeconomic status. The dependent variables were mainly pregnancy outcomes. Maternal outcomes included maternal morbidity, maternal mortality and length of hospital stay post-surgery. Neonatal outcomes included were neonatal morbidity (e.g., respiratory distress syndrome, neonatal intensive care unit admissions) and mortality. The data was processed with maximum care to avoid errors. The hard copy of the data was kept with the health facility, while the soft copy was assessed with a password under cloud storage accessible by only the lead researcher and IRB chairman.

Ethical consideration

Ethical clearance was sought from the Committee on Human Research Publication and Ethics CHRPE, KNUST, before the start of the study. The reference number of approval to start the study is SGH-26/2013. A letter of introduction from the School of Public Health, KNUST, was sent to Suntreso Government Hospital. The data obtained is available only to the researcher. Consent was decided from the health facility on behalf of the patients. The study used secondary data and thus did not come into contact with participants.

Data analysis

Data was analysed using SPSS version 25.0. Descriptive statistics such as frequencies, percentages and means were used to summarise the data. Associations between CS indications and composite adverse maternal and neonatal outcomes were ascertained using logistic regression to generate crude and adjusted odds ratios with 95% confidence interval (95% CI). $p<0.05$ was considered statistically significant.

RESULTS

One thousand fifty-seven individual records were gathered with a checklist about the subject matter. Five-year age groups have been presented on Table 1. Age group with the highest representation was 20–24 years with 310 study participants (Table 1). This was followed by age category 25-29 (261) and 30-34 (203). With a mean age of about 27.45 years (SD±6.32). Nearly one-third (32%) of the participants had education up to JHS level. This was followed by SHS and tertiary level with 30% and 26% respectively. About 25% of study participants worked at the informal sector which includes beauticians, hairdressers, fashion designers, cooks, caterers, and cleaners and artist. Most CS deliveries were at gestational ages of 36 to 40 weeks (Table 1).

Overview of CS cases: total deliveries, CS rate, time of surgery

There was a total of 3,187 deliveries over the study time period. About 67% (2130) were vaginal births whereas 33.1% (1057) were CS deliveries (CS rate was 33.1%). Table 2 indicates that majority of surgeries occurred during day shift of 8 am to 8 pm, with 33% of surgeries occurring between 8:00 a.m. and 12:00 noon. Twenty eight percent of the surgeries were also performed between midday and 6:00 p.m. About 25% of surgical cases between 8 pm and 12 midnight. These were mostly emergency cases.

Co-morbidities

Table 3 shows the prevalence of co-morbidities among the study participants. 132 participants had a co-morbid condition at the time of delivery. This represents 12.5% of CS deliveries.

Type of CS and anaesthesia

The majority of operations were elective (79%) cases. The rest were emergency cases. Spinal anaesthesia was used

more often (59%) during caesarean sections as against general anaesthesia.

Indications for caesarean section

The decision to perform a CS is based on various medical indications. Some of these indications are multiple gestation, breech presentation, fetal distress, and previous CS (Table 4). Majority of caesarean sections were repeat sections accounting for 38.1% of all cases (Table 4). This was followed by fetal distress (13.4%) and severe oligohydramnios (12.4%).

Maternal outcomes

There were 13 adverse outcomes 2 maternal deaths, 1 organ injury, 9 haemorrhage, and 1 infection out of the 1057 CS cases done (Figure 1).

Duration of maternal hospitalization

The majority of patients (91%), had a hospital stay of ≤3 days after the surgery with the remaining 9% spending more than the expected days for further monitoring and treatment.

Neonatal outcomes

Less than half (46%) had good outcome. 41% of the patients were admitted to NICU (Figure 2).

Association between caesarean section indications and adverse maternal and neonatal outcome

From the data, previous caesarean section, pre-eclampsia/eclampsia, antepartum hemorrhage and fetal distress had significant association with composite adverse maternal and neonatal outcome (Table 5). Study participants with previous CS deliveries had 56% less probability of experiencing adverse birth outcomes for both mother and baby (AOR 0.54 (0.41-0.71) p=0.00).

Patients diagnosed with pre-eclampsia/eclampsia had 87% increased probability of adverse maternal and neonatal outcome after delivery (AOR 1.75 (1.12-2.74) p=0.01). Those who had antepartum hemorrhage were 2.44 times more likely to experience adverse maternal and neonatal birth outcomes (AOR 2.48 (1.18-5.21) p=0.02). Those who had CS because of fetal distress had 72% increased likelihood of adverse maternal and neonatal outcome (AOR 1.54 (1.05-2.25) p=0.03).

Table 1: Demographic characteristics.

Characteristics	Frequency	Percentage
Age (in years)		
15-19	84	8
20-24	310	29
25-29	261	25
30-34	203	19
35-39	188	18
40 and above	11	1
Educational background		
None	80	8
Primary school	47	4
Junior High School	342	32
Senior High School	313	30
Tertiary	275	26
Total	1057	100
Place of residence		
Urban (within Greater Kumasi)	794	75.1
Rural	263	24.9
Total	1057	100.0
Gestational age		
≤ 30+6	8	1
31 to 35+6	80	7
36 to 40+6	824	78
41 to 44+3	145	14
Total	1057	100
Occupation		
Banker/accountants/ revenue officer/sales executive	31	3
Lab scientist/medical counter ass /nurse /pharmacist	27	3
Beautician/apprentice/hairdressing/ fashion designer	210	23

Continued.

Characteristics	Frequency	Percentage
Police officer/ social welfare officer/teacher	102	11
Bus conductor	2	-
Business woman/trader	340	38
Cook/caterer/ cleaner/food vendor	56	6
Farmer	5	1
House wife	90	10
Student	43	5
Total	1057	100

Table 2 Time of surgery.

During day shift	Number of cases	Percentage
8:00 am to 12:00 pm	349	33
12:01 pm to 6:00 pm	301	28
6:01 pm to 8:00 pm	77	7
Total	1057	100
During night shift		
8:01 pm to 12:00 am	261	25
12:01 am to 6:00 am	50	5
6:01 am to 7:59 am	19	2
Total	1057	100

Table 3: Co-morbidities at the time of delivery.

	Frequency	Percentage
HIV/AIDs		
Yes	24	2.3
No	1033	97.7
Total	1057	100.0
Hypertension		
Yes	35	3.3
No	1022	96.7
Total	1057	100.0
Diabetes mellitus		
Yes	25	2.4
No	1032	97.6
Total	1057	100.0
Hepatitis B		
Yes	48	4.5
No	1009	95.5
Total	1057	100.0

Table 4: Indications for caesarean section.

Indications	Frequency	Percentage
Obstructed labour	63	6.0
Previous Caesarean section	403	38.1
Failure of progress	52	4.9
Gestational hypertension	17	1.6
Pre-eclampsia/eclampsia	97	9.2
Ante partum hemorrhage	34	3.2
Bad obstetric history	12	1.1
Maternal request	28	2.6
Malpresentation	112	10.6
Severe oligohydramnios	131	12.4
Post date	108	10.2

Continued.

Indications	Frequency	Percentage
Fetal macrosomia	98	9.3
Failed induction	73	6.9
Fetal distress	142	13.4

Table 5: Multivariate analysis of indicators for caesarean section in relation to composite adverse maternal and neonatal outcomes.

Variables	COR	95%CI	P value	AOR	95%CI	P value
Obstructed labour						
Yes	1.79 Ref	1.06-3.00	0.03	1.67	0.98-2.86	0.06
No						
Previous Caesarean section						
Yes	0.44 Ref	0.34-0.57	0.00	0.54	0.41-0.71	0.00
No						
Failure in progress						
Yes	1.87 Ref	1.06-3.32	0.03	1.78	0.99-3.20	0.05
No						
Pre-eclampsia and eclampsia						
Yes	1.87 Ref	1.22-2.86	0.00	1.75	1.12-2.74	0.01
No						
Antepartum haemorrhage						
Yes	2.44 Ref	1.18-5.06	0.02	2.48	1.18-5.21	0.02
No						
Bad obstetric history						
Yes	0.22 Ref	0.49-1.03	0.05	0.27	0.57-1.25	0.09
No						
Maternal request						
Yes	0.37 Ref	0.16-0.88	0.02	0.43	0.18-1.03	0.06
No						
Fetal distress						
Yes	1.72 Ref	1.20-2.46	0.00	1.54	1.05-2.25	0.03
No						

DISCUSSION

Caesarean section rates

CS rate was 33.1% from the study which is about twice the WHO standards of 10-15% but lower that the 50% from a retrospective study in Asia.[19] This rate however is similar to the CS rate in a study in Nigeria which had 33.3%.[20] CS rate increase alongside urbanization, improvement in surgical outcomes and previous caesarean deliveries.[19] About 79% of the CS cases were elective contrary to a study in Nigeria where the majority were emergency cases.[20]

The difference could be because the study in Nigeria was conducted over many major referral centres and thus had many emergency referrals. The majority of the women who underwent CS deliveries were without any co-morbid condition. About 12.5% of study participants had a co-morbid condition in contrast to 44.2% found in a UK study.[21] The study population in the UK had increased co-morbid conditions due to obesity, advanced maternal age and smoking.[21] This accounts for the differences in co-morbid rates.

Indications for caesarean section

In the study, previous CS was the commonest indication for a caesarean delivery. This was followed by fetal distress and severe oligohydramnios. This is different from a study in Ethiopia where cephalopelvic disproportion and non-reassuring fetal heart rates were the commonest indications for CS22.

Another multi-country study in Africa showed that obstructed labour, malpresentation, previous CS and fetal distress in decreasing rates are the commonest indications for caesarean delivery.[23] A retrospective study in Jordan

showed a previously scarred uterus as the commonest cause of CS delivery.[19] Having a low threshold for CS deliveries leads to more CS deliveries in the future. The fact that majority of our CS deliveries were elective shows that a thorough study of indications with involvement of senior doctors may help reduce the high CS rates.

Maternal and neonatal outcomes

Maternal adverse outcomes were low from the study. Less than 2 percent (1.3%) of the women had complications compared to the 8.1% from a study in Nigeria.[20] However, NICU admissions were 41% which is high compared to a study in Jordan which had 30% NICU admissions after CS19. NICU admissions may however be more linked to indications for delivery rather than the mode of delivery.[19] Neonatal outcome improves with CS delivery.2[4] A study in the United Kingdom did not find any difference in NICU admissions between CS and vaginal deliveries.[25] Vaginal births in a study was associated with better APGAR scores compared to elective CS deliveries.[25] Maternal outcome may be adverse in some circumstances.[24] This depends on the settings where the procedure is carried out. With improved anaesthesia, blood transfusion services and surgical skills, adverse maternal outcomes associated with CS are becoming rare.

It is however universally known that caesarean section as a major surgery is associated with short- and long-term risk or complications, which is high in current and subsequent pregnancies.[26] These complications are significant in settings that lack the facilities to conduct safe surgeries and treat surgical complications.[27]

However, maternal short-term complications are either related to anaesthesia (drug overdose, hypoxia, apnoea, aspiration of gastric content), the operation (haemorrhage, damage to the bladder or bowel), infection (abdominal wall, uterus, urinary tract, chest, and wound), venous thromboembolism, or post-partum cardiac arrest. Long-term complications include uterine rupture in subsequent pregnancy, adhesion formation, placenta previa and accrete, ectopic pregnancies, and infertility.[28]

Associations between caesarean section indications and adverse maternal outcomes

Clients who had a previous CS had less probability of experiencing adverse maternal neonatal outcomes. This could be because most of the cases were delivered as planned CS cases on account of the previously scarred uterus. Such cases therefore had improved peri-operative care. A secondary study by Breslin et al showed that CS deliveries due to previous CS were not associated with adverse neonatal outcome.[29] CS on account of fetal distress and non-reassuring fetal heart were associated with increased adverse outcomes.

This was similar to a retrospective study by Pire-Menard et al in which indications such as non-reassuring fetal heart were associated with adverse neonatal outcome.[30] Antepartum hemorrhage was associated with increased NICU admissions and post-partum hemorrhage in a study.[31]

This is similar to our findings which showed increased adverse birth outcomes after CS delivery for ante partum hemorrhage cases. Pre-eclampsia/eclampsia states showed increased adverse birth outcomes. Studies have shown increased maternal and neonatal morbidities among women with pre-eclampsia/eclampsia.[32,33]

Limitations

There was no comparison between the modes of delivery and their outcomes. A cross-sectional study is not ideal for ascertaining causality. Further studies are needed to establish causality.

CONCLUSION

CS rate is high in the institution of study compared to WHO standard. Previous CS is the most common indication for CS delivery. Adverse maternal outcomes after CS deliveries are comparatively low. Certain indications for CS such as pre-eclampsia/eclampsia, antepartum hemorrhage and fetal distress are significantly associated with adverse birth outcome. Improving peri-operative care and prompt readiness for neonatal resuscitation will likely reduce adverse outcomes for both mother and neonate. Further studies have to look into how to reduce CS rate while still improving outcomes for both mother and neonate.

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