Factors associated with longer hospital stay following Caesarean section birth at a tertiary hospital in Eastern Uganda

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Abstract

Background.

Caesarean Section(C/S) is a lifesaving procedure for both the mother and the baby but it is associated with various post-operative complications and longer hospital stays. Prolonged Hospitalization after a Caesarean section can be stressful for both the healthcare providers and the mothers while also risking them acquiring hospital acquired infections. Factors related to longer hospital stays among mothers delivered by C/S have not been well explored. This study aimed to determine the factors associated with longer (> 4 days) hospital stay following Caesarean birth at Mbale Regional Referral Hospital.

Methods

This was a retrospective cross-sectional study carried out at Mbale Regional Referral Hospital (MRRH) between December 2023 and May 2024 accessed in June 2024. A total of 536 patient files of women who underwent Caesarean section were randomly selected and reviewed. Data on social demographics, obstetric characteristics and other surgical details including outcomes was extracted and recorded using an online data collection tool. Descriptive analysis to summarise the data and logistic regression to identify factors associated with longer hospital stays were done, and P-values < 0.05 significance level at a 95% confidence interval were considered.

Results

The mean hospital stay was 4.02 days (SD ± 2.87). Nearly half of the women (47.6%) were referred from other health facilities with most caesarean sections (70.9%) sanctioned by junior house officers. Preoperative prophylactic antibiotics were administered in 85.4% and spinal anaesthesia was used in 98.5% of the C-sections. In multivariable analysis, lack of a complete blood count, vaginal preparation, intravenous fluids before surgery and a patient undergoing general anesthesia were significantly related to longer hospital stays.

Conclusion

Multiple factors are associated with longer hospital stays at Mbale Regional Referral Hospital. Improvement of evidence-based practices such as the intravenous fluids, vaginal preparation and basic laboratory investigations before surgery and use of spinal anesthesia can help to reduce hospital stay and its associated risks.

BACKGROUND

Cesarean section refers to the delivery of a fetus through surgical incisions made through the abdominal wall and the uterine wall (1). It is the commonest major operation with a global rate of about 21% and this is on the rising trend (2). It is usually done to save the mother and /or baby especially in instances of emergency Caesarean sections(C/Ss) (3). While it can be a life-saving event when indicated due to specific obstetric or medical conditions, it is also associated with multiple complications and other risks (1). These complications and risks have resulted in longer hospital stay(4); more than the recommended 3–4 days for any non-

complicated C/S (5). Some of these complications include an increased risk of postpartum haemorrhage, puerperal sepsis, venous thromboembolism and long hospital stay and in the long run, there is an increased risk of abnormal placentation, uterine rupture and repeat surgeries (6),(7), (8).

Globally, caesarean section rates have increased overtime from 7% in the 90s to about 21% currently (9). This rate is greater than the WHO-accepted caesarean section rate at 15% for the general population (9) The seemingly high global rate of caesarean sections overshadows the very small overall prevalence in sub-Saharan Africa where emergency C/Ss are about only 5% and electives at 3% (10). This is far less than the expected 15% (10). In Uganda, the overall population-based C/S rate is about 10% which is far below the recommended 15% that is required to improve perinatal outcomes (11). At Mbale Regional Referral Hospital, C/S rates are at 25% (12). This high rate is attributed to many factors including many referrals from lower-level facilities, lack of equipment for assisted vaginal delivery and limited capacity to monitor mothers with high-risk pregnancies (12)

From the health management Information system records at Mbale Regional Referral Hospital, the situation regarding the complications of C/S has not been any different. This has resulted in longer hospital stays more than the recommended 3–4 days(13)These complications have resulted in longer hospital stays due to a lack of evidence-based care practices that are meant to significantly improve patient outcomes just as it has been seen in other studies globally (14). The hospital still has no other tool to support providers to offer evidence-based care to mothers undergoing caesarean section apart from the safe surgical checklist which is in the operating theatre. The danger of this is that the “generic surgical safety checklists are insufficient for cesarean delivery because each cesarean delivery involves 2 patients (the mother and the fetus or newborn), each with separate care teams and health and safety considerations” (15).

Just like in other places, various factors influence longer hospital stays in hospitals for mothers who have delivered by the caesarean section (16). Long hospital stays are a result of maternal and newborn complications that require additional interventions on top of routine care provided. Some factors associated with longer hospital stays include pre-eclampsia/eclampsia, postoperative complications, birth weight 2.0–2.5 kg, multiple births and increasing maternal age in a study carried out in sub-Saharan Africa(17). Longer hospital stays increase the cost of health care in terms of health care commodities used and interventions administered but also increase the risk of contracting hospital-acquired infections.

The causes of long hospital stays at Mbale Regional Referral Hospital, following caesarean section are not known. Therefore, this study was meant to assess the factors associated with longer hospital stays following caesarean section birth at Mbale Regional Referral Hospital. This information will be used to develop a checklist for use at caesarean section with the aim of shortening the hospital stay for mothers and newborns.

MATERIALS AND METHODS

Study Design and setting

This study employed a retrospective quantitative study methods approach. This method was used to determine the factors associated with longer hospital stays following caesarean section birth. This study was done by reviewing files of mothers who had undergone caesarean sections from December 2023 to May 2024 accessed in June 2024. Social demographics together with obstetric characteristics were also extracted from the files. The results were integrated into the discussion section. The study was done at Mbale Regional Referral Hospital

(MRRH), a public tertiary hospital located in Eastern Uganda. This Hospital Usually conducts about 10000 deliveries annually, 35% of which are caesarean deliveries (18). Most of these mothers are referred from peripheral facilities due to anticipated complications; some are self-referred patients while others are non-referral admissions. The mothers usually to undergo a caesarean delivery are usually sanctioned by Junior House officers, senior house officers, Medical officers or specialists. All these health workers working on the patients are within the hospital area and sanction the mothers due to varying clinical indications.

Study Population and Sampling

This study included only files of mothers who were to undergo caesarean section delivery from December 2023 to May 2024 accessed in June 2024. Some were referred mothers while others were non-referred. The sampling method employed was a random selection of the files of mothers who had had a caesarean section between December 2023 and May 2024. In this study 536 patient files were selected and used for the study.

Sample size calculation.

In this study, sample size was calculated using (Leslie kish Formulan1965)(19), Where, $n = \frac{z^2 * pq}{(d)^2}$ hence the figure representing as follows;

n = desired sample size. Z = standard normal deviation, which is equal to 1.96 corresponding to 95% confidence interval p = 0.35 and q= (1-0.35) = 0.65 and d = the standard error d = 0.04.

The sample size was also based on the study that was carried out at MRRH in 2019 where the rate of caesarean deliveries was at 35% (18).

Substituting into the formula is as follows.

$n = \frac{(1.96)^2 \times 0.35 \times 0.65}{(0.04)^2}$ =546 patient files.

In this study, 546 patient files were selected but out of these, 10 files did not meet the criteria of being included into the study because they had missing information.

Study Variables.

The independent variables(exposure variables) considered in this study included decision to delivery time, type of cadre sanctioning the C/S, indication of the C/S, use of preoperative antibiotics, type of anaesthesia, cadre of the main surgeon, vaginal preparation and preoperative intravenous fluids. These were measured by identifying their presence or absence on the study checklist that was being utilized while filling in patient details in the study. The primary dependent variable (outcome variable) was the duration of stay in the facility after caesarean section. This was measured in several days from the time of the caesarean section to the time of discharge. For analysis, it was categorized into short hospital stays (≤ 4 days) and longer hospital stays (> 4 days). Other outcome variables were the presence of surgical site infection and the need for repeat surgery.

Data collection method.

The data was collected using a retrospective review of patient files. The data was collected in two steps. In the first step, relevant patient files were identified and later data was collected by research assistants, who were trained midwives and the supervisor of a specialist obstetrician.

Data analysis

All data was checked appropriately after collection to ensure authenticity and completeness. Data was first entered into Microsoft Excel and later imported into STATA for analysis. Descriptive statistics which were used were frequencies and percentages for categorical data and means and medians for continuous data. Logistical regression was carried out to determine the factors associated with longer hospital stays following caesarean section birth at Mbale Regional Referral Hospital. Bivariate and multivariate analysis was also used to control for confounders. The significance of the investigated variables was determined when the p-values were less than 0.05 at 95% confidence intervals.

Ethical approval

Ethical approval was obtained from Mbale Regional Referral Hospital Research Ethics Committee reference number MRRH-2023-300. The study was done according the Declaration of Helsinki. Codes of patients were used instead of using their real names to protect the identity of participants.

RESULTS

Sociodemographic characteristics of the participants

A total of 536 patient files of women who underwent Caesarean section at Mbale Regional Referral Hospital were reviewed. The average hospital stay was 4.02 days (SD ± 2.87). Most participants were aged 18–25 years (48.3%), followed by those aged 26–34 years (35.1%). Only 7.1% were below 18 years old, while 9.5% were aged 35 years and above. Nearly half of the women (47.6%) were referred from other health facilities. Most caesarean sections (70.9%) were sanctioned by junior house officers, followed by senior house officers (18.8%), and specialists (8.4%). Informed consent for the procedure was recorded in 97.2% of cases. Prophylactic antibiotics were given before surgery in 85.4%, and a complete blood count was done in 77.1% of patients. Blood grouping was performed in 72.8% of cases. The predominant type of anaesthesia used was spinal (98.5%), and the most common lead surgeon was a consultant (42.4%), followed by SHOs (36%) and JHOs (21.1%). The results are summarized in **Table 1** below.

Table 1. Social demographic and Hospital stay

	Hospital stay after Caesarean section birth		
	4 days or <	More than 4 days	Total
	n=424(%)	n=112(%)	n=536(%)
Age(years)			
1. Below 18	32 (7.5%)	6 (5.4%)	38 (7.1%)
2. 18–25	207 (48.8%)	52 (46.4%)	259 (48.3%)
3. 26–34	145 (34.2%)	43 (38.4%)	188 (35.1%)
4. 35 and above	40 (9.4%)	11 (9.8%)	51 (9.5%)
Referred in?			
1. Yes	210 (49.5%)	45 (40.2%)	255 (47.6%)
2. No	214 (50.5%)	67 (59.8%)	281 (52.4%)
Type of cadre sanctioning C/S			
1. JHO	303 (71.5%)	77 (68.8%)	380 (70.9%)
2. SHO	80 (18.9%)	21 (18.8%)	101 (18.8%)
3. MO	4 (0.9%)	0 (0.0%)	4 (0.7%)
4. Specialist	31 (7.3%)	14 (12.5%)	45 (8.4%)
5. Others	6 (1.4%)	0 (0.0%)	6 (1.1%)
Was informed consent signed?			
1. Yes	413 (97.4%)	108 (96.4%)	521 (97.2%)
2. No	11 (2.6%)	4 (3.6%)	15 (2.8%)
Prophylactic antibiotics given before surgery?			
1. Yes	356 (84.0%)	102 (91.1%)	458 (85.4%)
2. No	68 (16.0%)	10 (8.9%)	78 (14.6%)
Was a complete blood count done?			
1. Yes	316 (74.5%)	97 (86.6%)	413 (77.1%)
2. No	108 (25.5%)	15 (13.4%)	123 (22.9%)
Was blood grouping done?			
1. Yes	302 (71.2%)	88 (78.6%)	390 (72.8%)
2. No	122 (28.8%)	24 (21.4%)	146 (27.2%)
Type of anesthesia used			
1. Spinal	422 (99.5%)	106 (94.6%)	528 (98.5%)

2. General	2 (0.5%)	6 (5.4%)	8 (1.5%)
Lead surgeon			
1. Consultant	174 (41.0%)	53 (47.3%)	227 (42.4%)
2. MOSG	3 (0.7%)	0 (0.0%)	3 (0.6%)
3. SHO	158 (37.3%)	35 (31.3%)	193 (36.0%)
4. JHO	89 (21.0%)	24 (21.4%)	113 (21.1%)

Indications for Caesarean section among the participants

The most frequent indication for Caesarean section was a previous scar (154 cases), followed by obstructed labour (87), contracted pelvis (51), preeclampsia (46), and fetal distress (44). Less common indications included prolonged labour, macrosomia, fresh scar, and cephalopelvic disproportion. Rare indications such as HELLP syndrome, placenta previa, and uterine rupture were also recorded. This is shown in **Figure 1** below.

Length of hospital stays following Caesarean birth delivery

Out of the 536 women reviewed, 424 (79.1%) had a hospital stay of four days or less, while 112 (20.9%) stayed for more than four days. Among those who stayed longer, most were aged 18–25 years (46.4%) and 26–34 years (38.4%), with fewer in the 35 and above (9.8%) and below 18 (5.4%) categories. Of the women who stayed more than four days, 40.2% were referred, and 59.8% were not referred. Caesarean sections sanctioned by specialists accounted for 12.5% of the prolonged stays, while JHOs sanctioned 68.8%. Informed consent was documented in 96.4% of the prolonged stay group. Prophylactic antibiotics were administered in 91.1%, CBC was done in 86.6%, and blood grouping in 78.6%. General anaesthesia was used in 5.4% of these cases. Among patients with a hospital stay longer than four days; consultants led 47.3% of the surgeries, followed by SHOs (31.3%) and JHOs (21.4%). This is shown in **Table 1** above.

Hospital Stay by Indication for Caesarean Section

Most patients (79.1%) had a hospital stay of ≤4 days, while 20.9% stayed for more than 4 days. A majority of cases across all indications, including previous scar, obstructed labour, and contracted pelvis, were discharged within 4 days. However, longer hospital stays (>4 days) were more frequently observed among patients with preeclampsia, eclampsia, and PPROM. This is shown in **Table 2 shows the variation in hospital stays across different indications for caesarean section.**

Indication for C/section	Hospital stay		Total
	≤4 days n=424(%)	>4 days n=112(%)	N=536
Big Baby (Fetal Macrosomia)	21 (5.0)	4 (3.6)	25 (4.7)
Breech Presentation	3 (0.7)	0 (0.0)	3 (0.6)
Cephalopelvic Disproportion (CPD)	13 (3.1)	3 (2.7)	16 (3.0)
Cervical Dystocia	3 (0.7)	2 (1.8)	5 (0.9)
Contracted Pelvis	41 (9.7)	10 (8.9)	51 (9.5)
Eclampsia	4 (0.9)	7 (6.2)	11 (2.1)
Failed Induction	2 (0.5)	2 (1.8)	4 (0.7)
Fetal Distress	40 (9.4)	4 (3.6)	44 (8.2)
Fresh Scar	19 (4.5)	1 (0.9)	20 (3.7)
HELLP Syndrome	0 (0.0)	1 (0.9)	1 (0.2)
Hydrocephalus	3 (0.7)	1 (0.9)	4 (0.7)
Malpresentation	7 (1.7)	0 (0.0)	7 (1.3)
Obstructed Labour	74 (17.5)	13 (11.6)	87 (16.2)
Placenta Previa	3 (0.7)	0 (0.0)	3 (0.6)
Preeclampsia (PET)	28 (6.6)	18 (16.1)	46 (8.6)
Preterm Premature Rupture of Membranes (PPROM)	2 (0.5)	4 (3.6)	6 (1.1)
Previous Scar	123 (29.0)	31 (27.7)	154 (28.7)
Prolonged Labour	21 (5.0)	7 (6.2)	28 (5.2)
Severe Oligohydramnios	6 (1.4)	1 (0.9)	7 (1.3)
Short Interpregnancy Interval (SIPI)	4 (0.9)	0 (0.0)	4 (0.7)
Twin Pregnancy	4 (0.9)	3 (2.7)	7 (1.3)
Uterine Rupture	3 (0.7)	0 (0.0)	3 (0.6)

Factors associated with a longer hospital stay following caesarean section birth

After adjusting for other variables, not having a complete blood count done had 0.52 times lower odds of a hospital stay lasting more than four days compared to those who had the test done and the result was statistically significant (aOR: 0.52; 95% CI: 0.28-0.98; p = 0.042). Individuals who were not given IV fluids had 2.31 times higher odds of a prolonged hospital stay than those who were given IV fluids before and during the C/section and the result was statistically significant (aOR: 2.31; 95% CI: 1.42-3.76; p = 0.001). Additionally, receiving general anaesthesia had 12 times higher odds of a hospital stay of more than four days compared to

spinal anaesthesia and the result was statistically significant (aOR: 12.00; 95% CI: 2.14-67.46; p = 0.005). The results are summarized below in **Table 3**.

Table 3 shows logistic regression in both bivariate and multivariable analysis for hospital stay.

	> 4 days hospital stay post Caesarean section			
	p-values	**cORs(95% CIs)**	**p-values**	**aORs(95% CIs)**
Age(years)				
>18	*ref*	*ref*		
18–25	0.535	1.34(0.53-3.37)		
26–34	0.337	1.58(0.62-4.03)		
35 and above	0.494	1.47(0.49-4.40)		
Referral status				
No	**0.079**	**1.46(0.96-2.23)**	0.179	1.37(0.87-2.17)
Yes	*ref*	*ref*		
Cadre sanctioning C/S				
JHO	*ref*	*ref*		
SHO	0.907	1.03(0.60-1.78)	0.460	1.25(0.69-2.24)
MO		1.00(0.00-0.00)		1.00(0.00-0.00)
Consultant	**0.097**	**1.78(0.90-3.50)**	0.443	1.35(0.63-2.89)
Informed consent				
No	0.579	1.39(0.43-4.45)		
Yes	*ref*	*ref*		
Antibiotic prophylaxis given				
Yes	*ref*	*ref*	*ref*	*ref*
No *	**0.062**	**0.51(0.26-1.03)**	0.137	0.56(0.26-1.20)
Complete blood count done				
No*	**0.008**	**0.45(0.25-0.81)**	**0.042**	**0.52(0.28-0.98)**
Yes	*ref*	*ref*	*ref*	*ref*
Blood grouping done				
No	**0.122**	**0.68(0.41-1.11)**	0.992	1.00(0.58-1.74)
Yes	*ref*	*ref*	*ref*	*ref*
Hand over to the theatre				
No	**<0.001**	**0.31(0.19-0.51)**	0.052	0.49(0.24-1.01)
Yes	*ref*	*ref*	*ref*	*ref*
IV fluids given				

No*	**0.017**	**1.67(1.09-2.55)**	**0.001**	**2.31(1.42-3.76)**
Yes	*ref*	*ref*	*ref*	*ref*
Vaginal preparation done				
No	**0.002**	**0.51(0.33-0.79)**	**0.050**	**0.61(0.37-1.00)**
Yes	*ref*	*ref*	*ref*	*ref*
Type of anaesthesia given				
General anaesthesia*	**0.003**	**11.94(2.38-60.01)**	**0.005**	**12.00(2.14-67.46)**
Spinal anesthesia	*ref*	*ref*	*ref*	*ref*
Lead surgeon				
Consultant	0.662	1.13(0.65-1.95)		
MOSG		1.00(0.00-0.00)		
SHO	0.507	0.82(0.46-1.47)		
JHO	*ref*	*ref*		
Hand over to ward				
No*	**<0.001**	**0.33(0.19-0.54)**	0.066	0.50(0.24-1.05)
Yes	*ref*	*ref*	*ref*	*ref*
Post-operative antibiotics given				
No	0.601	1.90(0.17-21.15)		
Yes	*ref*	*ref*		
Indication for Postoperative antibiotics				
No	0.729	1.11(0.61-2.03)		
Yes	*ref*	*ref*		

DISCUSSION

Length of hospital stay (LoS) is an indicator of the quality of obstetric care and we used long hospital stay as a proxy measure for the quality of caesarean section. The minimum LoS following caesarean section is 24 hours to allow adequate monitoring of the patient however, there is no consensus on the definition of long LoS(20). In this study, we found the average length of hospital stay was 4.02 days, which is higher than 2.5 days in another tertiary in western Uganda (21), 2.7 days in Sudan (4), 2.8 days in Ethiopia (22), Itâ€™s about the same in Italy (4.4 days) (23), but lower than 8.6 days in India (24). The study in India combined both private and public facilities, yet our study was conducted only in public facilities. Private hospitals are influenced by financial incentives or insurance limitations that influence clinical decisions.

We defined prolonged stay as greater than 4 days, however, a study in the USA defined prolonged hospital stay by the 90th percentile which translated to longer than 3 days (25). Another study defined prolonged hospital stay defined as 10 days (26). In our study, 20.9% of patients had a prolonged stay, contrarily Sudan had less than 5.7% pronged stay (4). These results are not directly comparable to other studies which used a different definition of prolonged LoS. However, compared to another local tertiary hospital, our study revealed a long hospital stay.

Patients referred from other facilities were more likely to have a prolonged stay. Being referred is a risk factor for obstetric complications in Uganda given all women referred have a condition that requires higher level care and that there are delays associated with the transport of patients (27). Unlike other studies, where extremes of age were likely to have a prolonged stay (25), our study showed no correlation between patient age and LoS.

Patients who were delivered under spinal anaesthesia were less likely to have a prolonged LoS. This could be because the use of spinal anaesthesia reduces the risks of complications of anaesthesia including atelectasis and aspiration. Patients who had pre-operative IV fluid were less likely to have a prolonged LoS. Good preoperative care improves prognosis. Generally, proper preoperative, perioperative and post-operative care reduces the length of hospital stay as evidenced by Enhanced recovery after surgery (ERAS) trials (21).

Indications for C-section, previous scar, obstructed labour, and contracted pelvis, contrary, another study in Uganda showed prolonged labour and contracted pelvis as the most common indications (21).

Limitation.

This study explored the preoperative and perioperative care however, it didn't explore the postoperative care of the participants, yet it also influences the length of hospital stay following caesarean section.

Conclusion

There is a prolonged length of hospital stay following a caesarean section at MRRH. The hospital should revise its management protocols and exercise an early discharge.

Declarations

Ethics approval and consent to participate.

Ethical approval was obtained from Mbale Regional Referral Hospital Research Ethics Committee reference number MRRH-2023-300. The study was done according the Declaration of Helsinki. Codes of patients were used instead of using their real names to protect the identity of participants.

Consent for publication.

Not applicable

Availability of data and materials.

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests.

The authors declare that they have no competing interests

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Author Contributions:

RT (Ronald Tweheyo),EKK (Enid Kawala Kagoya), JM (Jude Mulowooza) conceived the study and wrote the proposal. EKK, TBM (Brian Tonny Makoko), participated in data collection.
EKK, TR, FK (Frank Kayemba), BJ (Babuya Jonathan), EKK and JM, conducted data analysis.
JM, BJ, TR and FK drafted the original manuscript.
JM, IA (Irene Atuhairwe), PW (Paul Waako), AT (Andrew Twineamatsiko), BA (Brian Agaba), PK(Pontian Kiwanuka) and DK (Dan Kibuule) reviewed and edited the manuscript.
All authors read and approved the final manuscript.

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Figures

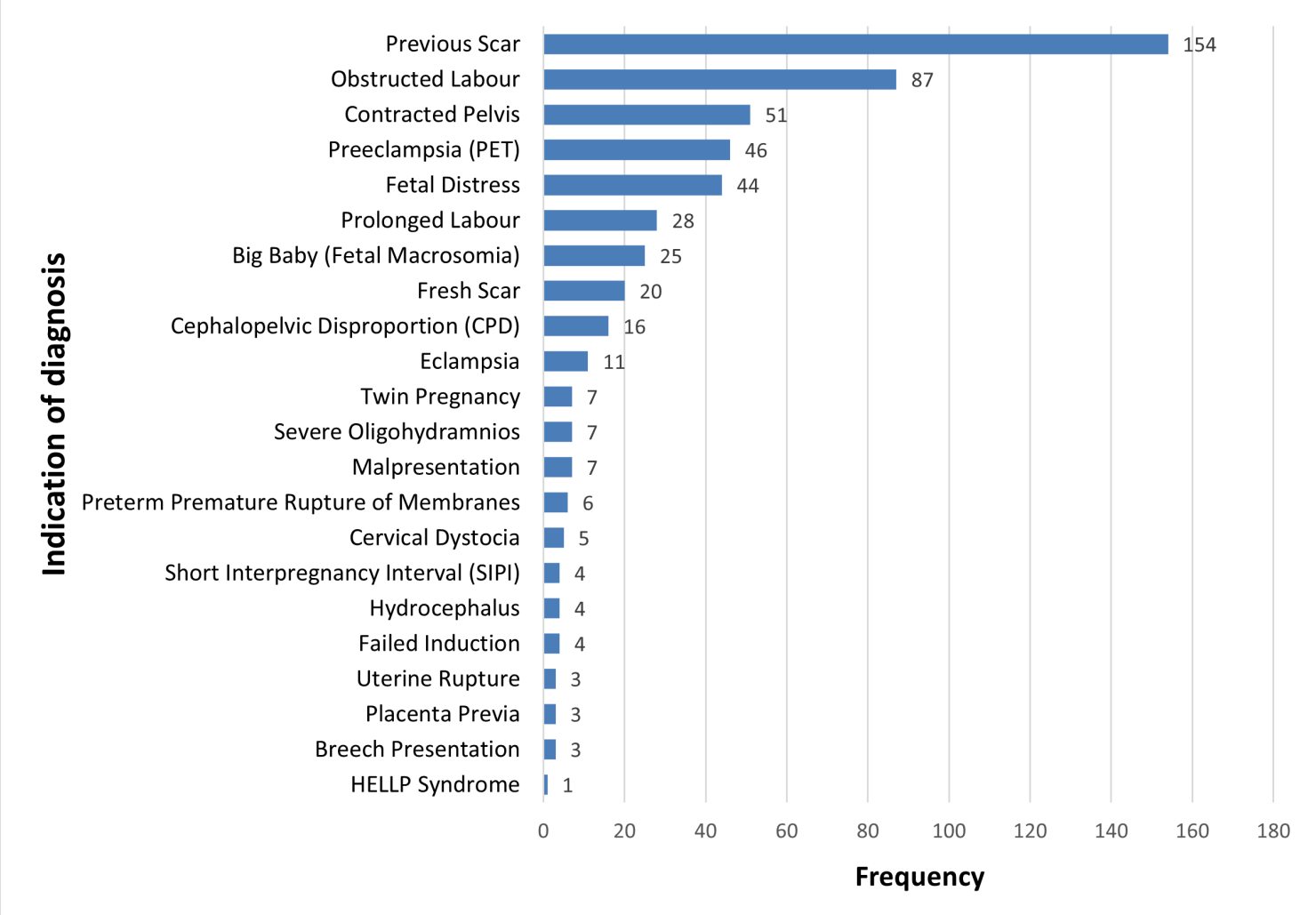

Figure 1

shows indications for Caesarean Section among Study Participants.