High proportion of caesarean section at a rural hospital in south western Uganda: A cross sectional study

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Abstract

**Background:** Globally, overall prevalence of caesarean section (CS) is estimated at 18.6%, with 27% in high-income countries and 6% in low- and middle-income countries. There is an increase in trends of CS in Uganda from 8.5% in 2012 to 11% in 2016. There have been no studies done to account for the high rates of CS in a rural hospital in Uganda. This study determined the proportion and factors associated with CS delivery at a rural hospital in south western Uganda.

**Methods:** This was a cross sectional study of 321 immediate postnatal women in a rural hospital in south western Uganda. A structured questionnaire and data abstract forms were used to collect information on proportion and factors associated with CS. Eligible participants were enrolled consecutively. Logistic regression analysis was done to identify the factors associated with CS taking into account potential confounders.

**Results:** This study recruited 321 women with mean age of 25.8 ±6.086 years, mean parity 2.6 ±1.673 and mean antenatal care visits of 4.27 ±1.197. The proportion of CS in this study was 38.3% (123/321). Of these, 110 (89.4%) were emergencies and 27(10.6%) electives. Only 8.4% of the respondents were referrals. The commonest indications of CS were fetal distress (28.5%), history of previous CS (18.7%) and poor progress of labour (11.4%). No factors were significantly associated with CS in this study.

**Conclusion:** There is a high proportion of CS in a rural hospital in Uganda and this is three times higher than the WHO recommended CS rates. Majority of CS are emergencies due to fetal distress and poor progress of labour. There is a need for additional studies exploring the reasons for the much higher than expected CS rates.

Background

Caesarean section is a life-saving procedure that is important in preventing poor obstetric outcomes for the woman & fetus (1, 2). There is, however, a growing concern of increasing CS delivery rates and this rise has become a major public health concern (3). Globally, the prevalence of CS is estimated at 18.6%, with 27% in high income countries, 6% in low and middle income countries and 7.3% in Africa (4). In Uganda, the overall rate of CS for live births at facilities was 9.9%, increasing from 8.5% in 2012 to 11% in 2016 (5). The World Health Organisation (WHO) recommends CS rates of 10-15% to achieve optimum maternal and neonatal benefits and CS rates less than 10% may indicate inadequate utilization of CS services among women who need them, while more than 15% of CS rates suggests an injudicious use of CS especially without medically indicated reasons (2).

In 2017, the study rural hospital had a total of 2,229 deliveries, to which 675 (30.2%) were CS deliveries (Hospital Records, 2018). The indications for CS deliveries are well documented in the literature including fetal, maternal and placental factors (6-9). Several studies have attempted to determine the factors that contribute to CS delivery including social demographics such as age, occupation , obstetric factors
(number of ANC visits, parity, timing of first ANC visit) and health system factors like referral status and distance (3, 10-14). There are few studies which focus on factors associated with CS in Uganda and these are limited to urban settings (9, 15).

There are higher rates of CS deliveries in the rural hospital in south western Uganda than the national CS rates & WHO recommended rates. Higher CS rates are associated with poor pregnancy outcomes such as hospital-acquired infections, delayed breastfeeding, long hospitalization & increased costs (1, 2, 16, 17). Studies have not been done in the rural private facility setting to account for the high rates of CS in Uganda and there is scanty literature focusing on reasons for the high CS rates and associated factors. Therefore, this study aimed at determining the proportion and factors associated with CS at a rural hospital in south western Uganda.

**Specific objectives**

1. To determine the proportion of CS delivery at a rural hospital in south western Uganda.
2. To determine the sociodemographic factors associated with CS delivery at a rural hospital in south western Uganda.
3. To identify the obstetric factors associated with CS delivery at a rural hospital in south western Uganda.
4. To identify the health system factors associated with CS delivery at a rural hospital in south western Uganda.

**Methodology**

**Study design and setting:** This was a hospital based cross sectional study that was conducted from December 2018 to March 2019 among 321 women who were immediate postnatal mothers within 72 hours at a rural hospital in south western Uganda. The rural hospital is a missionary not-for-profit referral hospital that offers general and specialized healthcare and serves a population of 300,000. In 2017, the rural hospital had a total of 2,229 deliveries, with 1,554 (SVD’s) and 675 (CS) (Hospital records, 2018). The rural hospital had staffing of 2 obstetricians, 5 Medical officers & 2 intern doctors and 23 midwives in 2017 (Hospital records, 2018).

**Study population and eligibility criteria:** The study included all women who had delivered in the rural hospital within 72hrs. Women who were critically ill, deaf and dumb, had still births and early neonatal deaths were excluded from the study. This study was conducted between December 2018 to March 2019.

**Sample size and Sampling Procedure**

The sample size was calculated using Kish-Leslie formula. The 30.2% proportion of CS was used in this study (Hospital Records, 2018), 95% confidence interval and gave a sample size of 324 women. Consecutive sampling was used to select the participants until the required sample was got.
Study variables

The outcome variable was CS while the independent variables included; social demographic, obstetric and health system factors. Caesarean section was defined as an operation performed under regional or general anaesthesia to deliver the fetus, placenta, and membranes through an incision in the abdominal and uterine wall (7, 8). Age was collected in complete years from date of birth. Age was then categorised as <18yrs, 18-34yrs and ≥35yrs. Parity and number of pregnancies one had had before were collected in complete numbers and both were categorized as 1, 2-4 and ≥5. Number of ANC visits a mother had attended during that pregnancy was collected in numbers and categorized as <4 and ≥4.

With education level, no formal education was collected as those who had never gone to school, primary education was collected as those who had had 1-7 years in school, secondary education was collected as 1-6 years in secondary school and tertiary education was collected as university or diploma.

Data collection procedure and tools: A structured questionnaire was the tool for data collection for both independent and dependent variables. A data abstract form was a tool used to gather additional information from the participant's medical file. The questionnaire was used to collect data on social demographic variables such as age, educational level, tribe, family income, religion, type of marriage, marital status and distance from home to the nearest health facility. The questionnaire had the obstetric variables such as parity, number of pregnancies one had ever had, number of ANC visits and timing of 1st ANC visit. The data abstract form was used to collect more information on obstetric variables such as gestational age at delivery, reasons for CS and the neonates' birth weight. The data abstract form was used to collect data on some health system variables such as referral status, referral distance and level of referring health facility. The questionnaire was also used to collect a health system variable like community based insurance.

Quality control: The questionnaire and data abstract forms were pretested at a rural hospital in Uganda. Data were checked for completeness, errors, and omissions. We recruited four research assistants and were trained on research protocols and data collection procedures.

Data analysis

Data were entered, cleaned, analyzed using SPSS computer package version 23.0. Continuous variables were summarized as medians, means, and standard deviation. The proportion of CS was determined by dividing the number of postnatal women who had delivered by CS by the total number of women who had delivered from the rural hospital during the study period. Bivariate analysis was done to determine the factors associated with CS. Odds ratios and 95% confidence intervals were computed to measure association and a P<0.05 indicated statistical significance. All variables with P values <0.05 at bivariate
analysis were entered into a multivariate logistic regression model to determine independent associations with CS.

**Results**

**Social demographic characteristics**

The mean age of the study participants was 25.8 (±6.086), median age 25.0 years and majority 275 (85.7%) of the respondents were aged 18-34 years. The social demographic characteristics of participants are shown in *(Table 1)*

**Obstetric characteristics of study participants**

More than half of the respondents 180 (56.1%) had had 2-4 pregnancies and majority of the participants 211 (65.7%) had attended <4 ANC visits. The obstetric characteristics of participants are shown in *(Table 2)*

**Health system of study participants**

More than half of the respondents 168 (52.3%) had community based insurance, 27 (8.4%) were referrals and 12 (44.4%) of the respondents had travelled a distance of ≥20km to a rural hospital in south western Uganda. The health system characteristics of participants are shown in *(Table 3)*.

**Proportion of caesarean section**

Out of the 321 women who delivered at the rural hospital, almost two thirds 198 (62.0%) of them had SVD and 123 (38.0%) had CS. Of the 123 women who had CS, 110 (89.4%) were emergencies and 13 (10.6%) had electives.

**The indications of caesarean section**

Out of 123 respondents who had had CS delivery, slightly over one in four (29.9%) was due to fetal distress, (18.2%) was due to previous CS and (10.7%) was due to poor progress of labour.

**Factors associated with caesarean section**

In this study, multivariate analysis was not done because almost all the factors associated with CS were not statistically significant after bivariate analysis. Number of ANC visits attended was the only factor found to be associated with CS after bivariate analysis in this study.

**Table 1: The social demographic characteristics of study participants**
| Characteristics                                      | Frequency | Percentage |
|------------------------------------------------------|-----------|------------|
| **Age in years**                                     |           |            |
| <18                                                  | 9         | 2.8        |
| 18-34                                                | 275       | 85.7       |
| ≥35                                                  | 37        | 11.5       |
| **Ethnicity**                                        |           |            |
| Mukiga                                               | 271       | 84.4       |
| Others***                                            | 50        | 15.6       |
| **Marital status**                                   |           |            |
| Single                                               | 13        | 4.0        |
| Married/Cohabiting                                   | 305       | 95.0       |
| Divorced/Separated                                   | 03        | 0.9        |
| **Educational level**                                |           |            |
| No formal education                                  | 13        | 4.0        |
| Primary                                              | 158       | 49.2       |
| Secondary                                            | 132       | 41.1       |
| Tertiary                                             | 18        | 5.6        |
| **Religion**                                         |           |            |
| Catholic                                             | 178       | 55.5       |
| Others*                                              | 143       | 44.5       |
| **Occupation**                                       |           |            |
| Formal employment                                    | 17        | 5.3        |
| Peasants                                             | 241       | 75.1       |
| Self-employment                                      | 63        | 19.6       |
| **Residence**                                        |           |            |
| Urban                                                | 10        | 3.1        |
| Rural                                                | 247       | 76.9       |
| Semi urban                                           | 64        | 19.9       |
| **Distance from home to nearby HC (km)**             |           |            |
| ≤5                                                   |           |            |
|   |   |   |
|---|---|---|
| ⩾6 | 176 | 56.6 |
|   | 135 | 43.4 |

*Peasants included all women who practice small scale farming

*Others include: Anglicans, born again and Muslims

***Others include: Banyankole, Baganda, Batooro, Bahiima

Table 2: The Obstetric characteristics of study participants
| Characteristics                                      | Frequency (%) | Mean (SD), Median |
|------------------------------------------------------|---------------|-------------------|
| **Number of pregnancies ever had**                   |               |                   |
| 1                                                    |               |                   |
| 2-4                                                  | 95 (29.6)     |                   |
| ≥5                                                   | 180 (56.1)    | 2.79 (±1.787), 2.0|
|                                                       | 46 (14.3)     |                   |
| **Parity**                                           |               |                   |
| 1                                                    | 107 (33.3)    |                   |
| 2-4                                                  | 177 (55.1)    | 2.6 (±1.673), 2.0 |
| ≥5                                                   | 37 (11.5)     |                   |
| **Number of ANC visits attended**                    |               |                   |
| <4                                                   |               |                   |
| ≥4                                                   | 211 (65.7)    | 2.60 (±1.673), 2.0|
|                                                       | 110 (24.3)    |                   |
| **First ANC visit in current pregnancy**             |               |                   |
| <12 weeks                                            |               |                   |
| 12-24 weeks                                          | 71 (22.1)     |                   |
| 25-32 weeks                                          | 235 (73.2)    | 16.85 (±4.742), 16.0|
|                                                       | 15 (4.7)      |                   |
| **Weeks of gestation at delivery**                   |               |                   |
| 30-37                                                |               |                   |
| 38-42                                                | 44 (13.7)     |                   |
| 43                                                   | 274 (85.4)    | 39.2 (±2.017), 40.0|
|                                                       | 3 (0.9)       |                   |
| **Baby's birth weight (kg)**                         |               |                   |
| <2.5                                                 | 27 (8.4)      | 3.16 (±0.514), 3.14|
| 2.5-4.0                                              | 283 (88.2)    |                   |
| >4                                                   | 11 (3.4)      |                   |
| **Maternal HIV status**                              |               |                   |
|                |       |
|----------------|-------|
| Negative       | 306 (95.3) |
| Positive       | 15 (4.7) |
| Characteristics                        | Frequency | Percentage |
|---------------------------------------|-----------|------------|
| Community Based Insurance             |           |            |
| Yes                                   | 153       | 47.7       |
| No                                    | 168       | 52.3       |
| Referral status                       |           |            |
| Yes                                   | 27        | 8.4        |
| No                                    | 294       | 91.6       |
| Reasons for referral (n=27)           |           |            |
| Poor progress of labour               | 18        | 5.6        |
| Fetal distress                        | 4         | 1.2        |
| Others*                               | 5         | 1.5        |
| Level of referring Health Centre (n=27)| |          |
| HC II                                 | 3         | 0.9        |
| HC III                                | 0         | 0.9        |
| HC IV                                 | 14        | 4.4        |
| Private facility                      | 3         | 0.9        |
|                                       | 7         | 2.2        |
| Distance from referring HC to a rural hospital (km) (n=27) | | |
| <20                                   | 8         | 29.6       |
| 20-49                                 | 7         | 26.0       |
| ≥50                                   | 12        | 44.4       |

Table 4: Bivariate analysis of the social demographic factors associated with caesarean section delivery at Kisiizi Hospital
| Variables                              | CS n (%) | SVD n (%) | Crude Odds Ratio (95% CI) | P-value |
|---------------------------------------|----------|-----------|---------------------------|---------|
| **Age in years**                      |          |           |                           |         |
| <18                                   |          | 4 (44.4)  | 5 (55.6)                  | 1.00    |
| 18-34                                 | 108 (39.3)| 167 (60.7)| 0.529 (0.119-2.351)      | 0.403   |
| ≥ 35                                  | 11 (29.7) | 26 (70.3) | 0.808 (0.212-3.078)      | 0.755   |
| **Marital status**                    |          |           |                           |         |
| Married                               |          | 114 (37.4)| 191 (62.6)                | 1.00    |
| Not married                           | 9 (56.3)  | 7 (43.8)  | 2.154 (0.781-5.942)      | 0.138   |
| **Educational level**                 |          |           |                           |         |
| Primary & below                       |          | 62 (36.3) | 109 (63.7)                | 1.00    |
| Secondary and above                   |          | 61 (40.7) | 89 (59.3)                 | 1.205   |
|                                       |          |           | (0.768-1.892)             | 0.418   |
| **Occupation**                        |          |           |                           |         |
| Peasants                              |          | 90 (37.3) | 151 (62.70)               | 1.00    |
| Employed                              | 33 (41.7) | 47 (58.8) | 1.178 (0.703-1.974)      | 0.534   |
| **Residence**                         |          |           |                           |         |
| Urban                                 |          | 29 (39.2) | 45 (60.8)                 | 1.00    |
| Rural                                 | 94 (38.1) | 153 (61.9)| 0.953 (0.560-1.624)      | 0.860   |
| **Distance from home to nearby HC (km)** |       |           |                           |         |
| >5                                    |          | 45 (33.3) | 90 (66.7)                 | 1.00    |
| ≤ 5                                   |          | 73 (41.5) | 103 (58.5)                | 1.417 (0.889-2.261) | 0.143 |
*Variables selected for multivariate analysis (P<0.2)

Table 5: Bivariate analysis of the obstetric factors associated with caesarean section delivery
| Variables                  | SVD n (%) | CS n (%) | Crude Odds Ratio (95% CI) | P- value |
|----------------------------|-----------|----------|---------------------------|----------|
| Number of Pregnancies      |           |          |                           |          |
| ≥ 5                        |           |          |                           |          |
| 1-4                        | 30 (65.2) | 16 (34.8)| 1.00                      |          |
|                            | 168 (61.1)| 107 (38.9)| 1.194 (0.621-2.295)       | 0.594    |
| Parity                     |           |          |                           |          |
| ≥ 5                        |           |          |                           |          |
| 1-4                        | 26 (70.3) | 11 (29.7)| 1.00                      |          |
|                            | 171 (60.4)| 112 (39.6)| 1.548 (0.736-3.258)       | 0.250    |
| Number of ANC visits       |           |          |                           |          |
| <4                         |           |          |                           |          |
| ≥ 4                        |           |          |                           |          |
|                            | 141 (66.8)| 70 (33.2)| 1.00                      |          |
|                            | 57 (51.8) | 53 (48.2)| 1.873 (1.169-3.000)       | 0.009*   |
| First ANC visit (weeks)    |           |          |                           |          |
| 1-12                       |           |          |                           |          |
| 13-32                      | 40 (56.3) | 31 (43.7)| 1.00                      |          |
|                            | 158 (63.2)| 92 (36.8)| 0.751 (0.440-1.283)       | 0.295    |
| Gestation weeks at delivery|           |          |                           |          |
| 43                         |           |          |                           |          |
| 28-37                      | 2 (66.7)  | 1 (33.3) | 1.00                      |          |
| 38-42                      | 26 (59.1)| 18 (40.9)| 1.385 (0.117-16.444)      | 0.797    |
|                            | 170 (62.0)| 104 (38.0)| 1.224 (0.110-13.661)      | 0.870    |
| Baby's birth weight        |           |          |                           |          |
| >4kg                       |           |          |                           |          |
| 2.5- 4kg                   | 7 (63.6)  | 4 (36.4) | 1.00                      |          |
| ≤2.5                       | 172 (60.8)| 111 (39.2)| 1.129 (0.323-3.948)       | 0.849    |
|                            | 19 (7.4)  | 8 (29.6) | 0.737 (0.168-3.238)       | 0.686    |

*Variables selected for multivariate analysis (P<0.2)
Table 6: Bivariate analysis of the health System factors associated with caesarean section delivery

| Variable                                      | SVD n (%) | CS n (%) | Crude Odds Ratio (95% CI) | P-value |
|-----------------------------------------------|-----------|----------|---------------------------|---------|
| Community Based Insurance                     |           |          |                           |         |
| No                                            | 101 (60.1)| 67 (39.9)| 1.00                      | 1.149 (0.732-1.804)| 0.546   |
| Yes                                           | 97 (63.4)| 56 (36.6)|                           |         |
| Referral status                               |           |          |                           |         |
| No                                            | 185 (62.9)| 109 (37.1)| 1.00                      | 1.828 (0.828-4.032)| 0.135   |
| Yes                                           | 13 (48.1)| 14 (51.9)|                           |         |
| Level of referring HC to Kisiizi Hospital      |           |          |                           |         |
| Public                                        | 2 (28.6)| 5 (71.4)| 1.00                      | 0.327 (0.051-2.105)| 0.240   |
| Private                                       | 11 (55.0)| 9 (45.0)|                           |         |
| Distance from referring HC to Kisiizi Hospital (km) (n=27) | | |                           |         |
| <20                                           | 2 (25.0)| 6 (75.0)| 1.00                      | 5.143 (0.807-32.773)| 0.083   |
| ≥20                                           | 12 (63.2)| 7 (36.8)|                           |         |

Table 7: Multivariate analysis of the factors associated with caesarean section delivery
| Variables                          | Unadjusted OR (95% CI) | Adjusted OR (95% CI) | P value |
|-----------------------------------|------------------------|----------------------|---------|
| Marital status                    |                        |                      |         |
| Married                           | 1.00                   | 1.00                 | 0.071   |
| Not married                       | 2.185 (0.792-6.026)    | 2.626-0.922-7.479    |         |
| Number of pregnancies             |                        |                      |         |
| <4                                |                        |                      |         |
| ≥4                                | 1.532 (0.974-2.416)    | 1.245 (0.768-2.019)  | 0.374   |
| Number of ANC visits (weeks)      |                        |                      |         |
| <4                                | 1.00                   | 1.00                 |         |
| ≥4                                | 1.914 (1.194-3.067)    | 1.941 (1.195-3.154)  | 0.007*  |
| Distance from home to nearby HC (km) |                        |                      |         |
| <10                               |                        |                      |         |
| ≥10                               | 1.821 (0.942-3.521)    | 1.788(0.906-3.529)   | 0.094   |
| *statistically significant variables (P<0.05) |

**Discussion**

**Proportion of caesarean section delivery**

In this study, the proportion of women who had CS was 38.3%. This proportion is higher than the national average of 11% in Uganda (Atuheire et al., 2019). In addition, this proportion is also higher than the 25% CS rates reported in Kabarole District, western Uganda (Dusabe et al., 2018). The WHO recommends an acceptable CS range of 10-15% so as to achieve optimum maternal and neonatal benefits (WHO, 2015). The rural hospital is a not for profit private hospital with general and specialized health care services and serves the surrounding population of Rukungiri District and neighboring districts. The results of this study may be explained by the fact that the rural hospital is known in the western region for offering high quality, affordable obstetric services, which may attract many women to deliver from there either as self-referrals or as referrals from other public and private facilities within Rukungiri district and beyond.
The other reason for the high proportion of CS in this study, maybe attributed to the fact that most of the rural health centres have inadequate resources and the shortage of healthcare staff such including midwives, nurses, general doctors and obstetricians (Dusabe et al., 2018), and this may lead to women preferring to deliver from this rural hospital compared to other health facilities within the region. This is because the study rural hospital has 2 obstetricians, 5 medical officers, 2 intern doctors and 33 midwives and this staffing, in particular, which may contribute to the high proportion of CS, put other studies related (Hospital records, 2018). High level of staffing being associated with increased CS is also found in other studies done in other countries (Can, Catak, SÜTLÜ, & Kilinc, 2016; Gholami et al., 2014).

Currently, the study rural hospital has staff from the United Kingdom supporting the Obstetrics &Gynaecology Department as part of the Uganda Maternity and Newborn Hub program and this may attribute to the high CS rates in this hospital compared to other rural hospitals without such programs. This study, in particular, enrolled only eligible immediate postnatal women within 72 hours and this could have resulted into the missing out of women who delivered by SVD and got discharged within 24-48 hours, thus by time the researcher and her team came to the postnatal ward the next day, they may have ended up finding the majority of the admissions as post-operative CS clients as their main study participants. This may have contributed to the high proportion of CS in the rural hospital.

The high proportion CS in this study is almost similar to the findings of a study done in Kenya where the proportion of CS was 32.6% (Juma, Nyambati, Karama, Githuku, & Gura, 2017). These findings almost coincide with those of another study done in Bangladesh (35.0%), Ethiopia (34.3%) and Northern America (32.3%) (Betrán et al., 2016). Despite the high proportion of CS found in this study, other studies that were done in the private hospitals of Tehran Iran, Brazil and two public hospitals of Shanghai found much higher CS rates of 86.2%, 62.0% and 58.1% respectively (Amini, Mohammadi, Omani-Samani, Almasi-Hashiani, & Maroufizadeh, 2018; Ji et al., 2015; Vieira et al., 2015). The high proportion of CS in these studies may be attributed to higher preferences for CS among women in developed countries.

On the other hand, a study conducted in Ghana found a much lower proportion of CS (6.59%) (Manyeh et al., 2018). This is similar in developing countries like Somalia where health services remain a challenge, CS rates were low and women resisted CS due to some cultural and social economic reasons for their refusal to consent for CS (Borkan, 2010). In addition, in Ethiopia, CS rates were also low and many deliveries were not attended by skilled health care workers and the government attempted to improve access to care by training non-physician clinicians to perform CS (CSA, 2012). Another study conducted in Cameroon found CS rate was 5.69% in semi-urban and 6.22% in rural areas (Vieira et al., 2015).

Out of the 123 participants who had CS delivery in this study, 110 (89.4%) of them were emergencies and 13 (10.6%) were elective or planned CS deliveries. The common indications for CS in this study were fetal distress at the percentage of 28.5, history of previous CS scar (18.7%), poor progress of labour (11.4%) and CPD (6.5%). This is not surprising as the majority of the literature sources indicate the same common indications for CS (Alden et al., 2013; Marshall & Raynor, 2014; Mehrbalian & Mehdizadeh, 2019). The high
percentage of fetal distress maybe attributed to over-diagnosis since the FHR was determined subjectively using a fetoscope.

The high proportion of CS may be attributed to the poor quality of the ANC services that could be provided to women, with medical staff missing out to detect early the pregnancy deviations, so as to prepare women for delivery. The high rates of emergency CS maybe are attributed to the poor monitoring of labour by midwives, nurses and doctors hence having a large percentage of women go for CS. The indications of CS in this study are similar to those from other studies done in Fort portal Uganda, South Africa, Nepal, Bangladesh and Brazil (Begum et al., 2017; Inyang-Otu, 2014; Khanal, Karkee, Lee, & Binns, 2016; Nelson, 2017; Vieira et al., 2015). Similar indications of CS including failure of progress of labour and history of the previous scar were also found in a systematic review and meta-analysis done in LMICs (Sobhy et al., 2019).

Factors associated with caesarean section delivery

In this study, the number of ANC visits was associated with CS delivery. Women who had attended ≥4 ANC visits were more likely to have CS compared to their counterparts who had attended <4 ANC visits. This finding may be attributed to the poor quality of ANC services offered to women by the healthcare providers, where the pregnancy deviations may not be detected early. The finding in this study is coherent with similar studies done in Uganda, Kenya and Bangladesh where attendance of ≥4 ANC visits was associated with increased CS (Dusabe et al., 2018; Oweya, 2010; Shiblee, 2017). Another study done in public hospitals in Brazil found that having ≥6 consultations during ANC visits was associated with increased CS (Vieira et al., 2015). These findings are contrary to those of a study done in Southwestern Ethiopia which found that respondents who had attended one ANC visit were more likely to have CS compared to their counterparts who had attended more than one ANC visit (Dadi & Mihrete, 2018).

Findings in this study show that women who had parity of ≤4 were more likely to have CS compared to their counterparts who had parity of ≥5. This is not surprising as information from literature resources identify primigravida as a risk factor for CS (Alden et al., 2013; Marshall & Raynor, 2014). Although parity was not associated with CS in this study, other studies were done in South Africa, Brazil and Bangladesh have found a relationship of less parity with increased CS (Begum et al., 2017; Inyang-Otu, 2014; Vieira et al., 2015). Similar findings from other studies done in Japan and Brazil found that CS was more common among nulliparous women (D’orsi et al., 2006; Suzuki & Nakata, 2013). On the contrary, a study conducted in Ghana found that the odds for CS decreased with increasing parity (Manyeh et al., 2018). This discrepancy may be explained by the information in different textbooks and literature sources which consider both categories as risk factors for CS (Alden et al., 2013; Marshall & Raynor, 2014).
In this study, respondents with the secondary and above level of education were more likely to have CS compared to their counterparts who had primary and below level of education. This finding may be explained by the frequent ANC visits attended by such women with high education level at the hospital, as this study found attendance of $\geq 4$ ANC visits is associated with increased CS. Although education was not significantly associated with CS in this study, other studies done in Bangladesh and Kenya have found a relationship between secondary education and above with increased CS (Begum et al., 2017; Oweya, 2010). On the contrary, a study done in Ghana found primary education and junior schooling was associated with increased CS (Manyeh et al., 2018). This discrepancy in these studies may be associated with the difference in a study setting, sample size, study time and the percentage of people with secondary education and above within the sample size.

Findings in this study show that women aged $\geq 35$ years were 19.2% less likely to have CS compared to their counterparts aged <18 years. This may not make sense in this study due to the low numbers found where both age groups are at a risk of having CS as mentioned by different literature sources and textbooks. Although age of $\geq 35$ years was not significantly associated with CS in this study, surprisingly, studies in Ghana, Bangladesh, Brazil and Denmark found that advanced maternal age $\geq 35$ years was positively associated with CS (Begum et al., 2017; Manyeh et al., 2018; Rydahl, Declercq, Juhl, & Maimburg, 2019; Shiblee, 2017; Vieira et al., 2015). The higher odds for CS among women with advanced maternal age in these studies are explained by the increased risk of maternal obstetric complications develop with advanced maternal age as evidenced by written literature from textbooks (Alden et al., 2013; Marshall & Raynor, 2014). On the contrary, a study done in Ethiopia and Ghana found that the odds of CS were lower among women aged 15-19 years compared to women aged $\geq 35$ years (Abebe et al., 2015; Manyeh et al., 2018). In this study, women who were employed were more likely to have CS compared to their counterparts who were peasants. This may be attributed to the fact that employed women have some finances with them thus are empowered to attend more ANC visits, thus early detection of pregnancy complications increasing the likelihood of CS. Although occupation was not statistically significant with CS in this study, other studies done in Kenya, Ethiopia, Bangladesh and Pakistan established a statistically significant relationship between occupation and CS (Amjad et al., 2018; Begum et al., 2017; Betrán et al., 2016; Oweya, 2010).

Women who were referred were more likely to have CS compared to the non-referrals in this study. This is not surprising because they already had delivery complication as explained by the high percentages of indications of CS in this study. Although referral status was not significantly associated with CS in this study, a study conducted in the Democratic Republic of Congo found that referral status was associated with CS delivery (Philémon et al., 2017). Similarly, in another study conducted in Tanzania, the level of CS among medically referred women was higher (Sørbye et al., 2011).
Findings in this study show that women who were on community-based insurance were more likely to have CS compared to their counterparts who were not insured. This may be due to the frequent ANC visits attended by women on insurance, as they have already planned costs and attendance of more ANC visits is found associated with CS in this study. Although there was no statistical significance between health system factors such as community-based insurance, referral status, and level of the referring health facility with CS in this study, previous studies done in the Democratic Republic of Congo, Kenya and Tanzania identified a relationship between some of these factors and having CS (Oweya, 2010; Philémon et al., 2017; Sørbye et al., 2011). On the other hand, a systematic review and meta-analysis found that women with private insurance were more likely to have CS compared to their counterparts with public insurance (Hoxha, Braha, Syrogiannouli, Goodman, & Jüni, 2019).

Study limitation

There were inadequate numbers of some variables during analysis for the different categorizes. This was a cross-sectional study and therefore it cannot derive the causal relationship from the cross-sectional analysis. Consecutive sampling was used and thus introduced a form of bias.

Conclusion

The proportion of CS in this study was 38.3% (123/321). Of these, 110 (89.4%) were emergencies and 13 (10.6%) electives. Only 8.4% of the respondents were referrals. The commonest indications of CS were fetal distress (28.5%), history of previous CS (18.7%) and poor progress of labour (11.4%).

Recommendations

There is the need for caesarean section audits to check whether these CS deliveries were medically indicated at a rural hospital and this may help the hospital to reduce the unnecessary CS if identified.

There is a need to assess the labour monitoring process by health care providers in a rural hospital as fetal distress was the commonest indication of CS delivery and this would help to rule out the issue of over diagnosing or misdiagnosing fetal distress by the staff.

List Of Abbreviations

ANC: Antenatal Care
APH: Antepartum Hemorrhage
COR: Crude Odds Ratio
CPD: Cephalopelvic disproportion
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Availability of data and materials

The data set used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethical approval and consent to participate

Ethical approval was sought from the School of Health Sciences Research and Ethics Committee at Makerere University College of Health Sciences (CHS). Administrative approval was sought from the Medical Superintendent, rural hospital in south western Uganda. The study procedures, purpose, risks, and benefits were explained to participants before obtaining informed consent. The participants were also informed about confidentiality and privacy measures were put in place for the information collected. Filling in of questionnaires was done in one of the offices in the postnatal ward to ensure privacy.

Consent for publication

Not applicable
Competing interests

These author(s) declared that they have no competing interests.

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LN conceptualized and also designed the research study, collected data and analyzed the data collected plus also drafted the initial manuscript. MA and PAN offered great guidance and supervision in research proposal development, data analysis development of the thesis and drafting of the manuscript.

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References

1. Keag OE, Norman JE, Stock SJ. Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis. PLoS medicine. 2018;15(1):e1002494.
2. Organization WH. WHO statement on caesarean section rates. Geneva: WHO; 2015 [citado 15 jul 2017]. WHO/RHR/15.02). Disponível em: http://apps.who.int/iris/bitstream/10665 ... 

3. Schantz C, Sim KL, Petit V, Rany H, Goyet S. Factors associated with caesarean sections in Phnom Penh, Cambodia. Reproductive health matters. 2016;24(48):111-21.

4. Betrán AP, Ye J, Moller A-B, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990-2014. PloS one. 2016;11(2):e0148343.

5. Atuheire EB, Opio DN, Kadobera D, Ario AR, Matovu JK, Harris J, et al. Spatial and temporal trends of cesarean deliveries in Uganda: 2012–2016. BMC pregnancy and childbirth. 2019;19(1):132.

6. Al Busaidi I, Al-Farsi Y, Ganguly S, Gowri V. Obstetric and non-obstetric risk factors for cesarean section in Oman. Oman medical journal. 2012;27(6):478.

7. Alden KR, Lowdermilk DL, Cashion MC, Perry SE. Maternity and women’s health care-E-book: Elsevier Health Sciences; 2013.

8. Marshall JE, Raynor MD. Myles’ Textbook for Midwives E-Book: Elsevier Health Sciences; 2014.

9. Nelson JP. Indications and appropriateness of caesarean sections performed in a tertiary referral centre in Uganda: a retrospective descriptive study. The Pan African Medical Journal. 2017;26.

10. Amjad A, Amjad U, Zakar R, Usman A, Zakar MZ, Fischer F. Factors associated with caesarean deliveries among child-bearing women in Pakistan: secondary analysis of data from the Demographic and Health Survey, 2012–13. BMC pregnancy and childbirth. 2018;18(1):113.

11. Juma S, Nyambati V, Karama M, Githuku J, Gura Z. Factors associated with caesarean sections among mothers delivering at Mama Lucy Kibaki Hospital, Nairobi, Kenya between January and March, 2015: a case-control study. Pan African Medical Journal. 2017(ARTISSUE).

12. Vieira GO, Fernandes LG, de Oliveira NF, Silva LR, de Oliveira Vieira T. Factors associated with cesarean delivery in public and private hospitals in a city of northeastern Brazil: a cross-sectional study. BMC pregnancy and childbirth. 2015;15(1):132.

13. Amini P, Mohammadi M, Omani-Samani R, Almasi-Hashiani A, Maroufizadeh S. Factors Associated with Cesarean Section in Tehran, Iran using Multilevel Logistic Regression Model. Osong public health and research perspectives. 2018;9(2):86.

14. Saraiva JM, Gouveia HG, Gonçalves AdC. Factors associated with cesarean sections in a high complexity university hospital in southern Brazil. Revista gaucha de enfermagem. 2017;38(3).

15. Dusabe J, Akuze J, Kisakye AN, Kwaresiga B, Nsubuga P, Ekirapa E. A case-control study of factors associated with caesarean sections at health facilities in Kabarole District, Western Uganda, 2016. Pan African Medical Journal. 2018;29(1):1-9.

16. Sobhy S, Arroyo-Manzano D, Murugesu N, Karthikeyan G, Kumar V, Kaur I, et al. Maternal and perinatal mortality and complications associated with caesarean section in low-income and middle-income countries: a systematic review and meta-analysis. The Lancet. 2019.

17. Dadi TL, Mihrete KM. Determinants of unjustified cesarean section in two hospitals southwestern Ethiopia: retrospective record review. BMC research notes. 2018;11(1):219.