

## Prevalence and Risk Factors for Caesarean Section Delivery Following Labour Induction at Mbarara Regional Referral Hospital

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### ABSTRACT

Labour induction is one of the most common obstetric interventions. According to most current studies, the rate varies from 9-33% of all pregnancies annually. According to American Congress of Obstetricians and Gynecologists, one-fifth of all pregnancies are terminated with the induction method. The aim of induction is to prevent maternal and fetal disorders such as preeclampsia, premature rupture of membranes, intrauterine growth retardation and prolonged pregnancy. Since the purpose of induction is vaginal delivery, a number of authors consider successful induction as vaginal delivery without regarding to the time limits. Induction failure is defined as failure of induction leading to cesarean section. The aim of this study was to determine the relationship between induction and risk of cesarean section delivery for women with term pregnancies who were admitted to Mbarara Regional Referral Hospital. A hospital based retrospective cohort study was conducted using maternally-linked data from MRRH birth registry. The study was restricted to deliveries intervened by labor induction at Mbarara Regional Referral Hospital during the year 2019 to 2021. Study samples size were 180 cases using convenience sampling among eligible pregnant women admitted to MRRH for induction. Data analysis was performed using SPSS version 21. Chi-square and t-test were used to compare groups with significant levels of less than 0.05, and logistic regression test was used to determine odds ratio with 95% confidence level. The mean age of those who underwent induction were  $26.7 \pm 5.6$  years. In terms of education, 63.3 % were at the elementary level, the majorities (94.6%) were housewives or unemployed prior to delivery, and 57.4% were nulliparous. The prevalence of cesarean section was 22.21%. The mean gestational age was  $39.3 \pm 2.6$  weeks and post-term pregnancies (40.63%), and PROM (24.12%) were among the most common causes for induction. Dilatation and birth weight were factors predicting labour induction success. Furthermore, performing Induction in dilatation 3 cm or less was associated with an increased risk of cesarean delivery. The prevalence of caesarean section after induction of labour in this study was 22.1%. Cervical dilatation (3 cm or less) prior to induction and increasing birth weight could be the major factors leading to caesarean section, hence predicting labor induction success. More funding is necessary by the hospital to further give more light to the all-time prevalence of cesarean section following labor induction within MRRH.

**Keywords:** Labour induction, vaginal delivery, Cesarean section, Maternal and fetal disorders, Premature rupture of membranes.

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### INTRODUCTION

Pregnancy and delivery are normal physiological phenomena that occur in women [1]. The majority of pregnant women give birth by spontaneous vaginal

delivery often achieved through labor induction [2]. However, approximately 10% of deliveries are considered as high risk, which may require cesarean section (CS)

[1]. Cesarean section is a surgical intervention which is carried out to ensure safety of mother and child when vaginal delivery is not possible (emergency CS) or when the responsible doctors consider that the danger to the mother and baby of vaginal delivery outweighs the risks of CS (planned CS) [1]. Latest available data (2010-2018) from 154 countries covering 94.5% of world live births shows that 21.1% of women gave birth by caesarean worldwide, averages ranging from 5% in sub-Saharan Africa to 42.8% in Latin America and the Caribbean [3]. CS has risen in all regions since 1990 from around 7% to 21.1% (1 in 5) today. Sub-regions with the greatest increases were Eastern Asia (44.9%), Western Asia (34.7%) and Northern Africa (31.5%) while sub-Saharan Africa (3.6%) and Northern America (9.5%) had the lowest rise. Projections showed that by 2030, 38 million (28.5 %) of women worldwide will give birth by CS annually of which 33.5 million (88%) will be in Low-to-Middle-Income Countries (LMIC) ranging from 7.1% in sub-Saharan Africa to 63.4% in Eastern Asia [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]. There are higher rates of CS deliveries in south western Uganda than the national CS rates & WHO recommended rates. Available data from 286 health facilities in Uganda representing 509,206 births and 71% of facilities performing caesarean delivery (CD) revealed that the overall CD rate is 17.9% ranging from 0.08% to 78% [6]. Most CDs are performed in General Hospitals (50.4%) and Regional Referral Hospitals (RRHs) (24.5%) while Health Centre IVs and Private Not For Profit (PNFP) facilities account for only 18.5% and 6.7% of the CDs respectively. There is significant variation in CD rates by facility type with RRHs more likely to have CD rates >30% compared to GH and HCIVs [7]. However, the rates of cesarean section at Mbarara Regional Referral Hospital (MRRH) does not support the figures described by Demographic Health Survey. In fact, it is expected that the cesarean section rates have been above the recommended rate by WHO (10 to 15 percent) for several years now [8]. There are several C-sections done

at Mbarara Regional Referral hospital of over 250 C-sections averagely every month and it has been noticed that several mothers who undergo the operations have issues on the operation site which include wound infection, bleeding at the site, and burst abdomen [5]. There is increased mortality and morbidity of mothers who have undergone Cesarean section at Mbarara RRH. According to [9]. Puerperal sepsis was the leading cause of maternal death at Mbarara Regional Referral Hospital [5]. Various studies have been conducted on the prevalence and associated risk factors of caesarean section deliveries in different countries like China [10], Pakistan [11], Asia [12], Nepal [13], Ethiopia [14]; [1]. Tanzania [15], Uganda [16-18]. While studies in Uganda exist, studies on Mbarara regional referral hospital are limited yet this serves as the biggest hospital providing CS in western Uganda. The available studies in western Uganda have been conducted from a private hospital in Bushenyi [19], and this may not be generalized to the wider population. It is against the above background that the study sought to examine the Prevalence and Risk Factors for Caesarean Section Delivery following Labor Induction at Mbarara Regional Referral Hospital.

#### **Statement of Problem**

In Uganda, the government has made deliberate efforts to increase availability, quality, access to, and utilization of emergency obstetric care services to manage and treat complications of pregnancy, labour, and delivery [20]. However, the rate of C-section deliveries in Uganda is still high and this is one of the causes of high maternal mortality ratio (MMR) [18]. In Uganda according to recent statistics from Uganda Demographic and Health Survey [21], the C-section rate in Uganda has increased modestly from 3% in 2000-01 to 6% in 2016 [21], and 7% by 2019 [15]. Most C-section deliveries have been reported in urban residences at 13% as compared to 5% in rural residences and 16% of the richest people in relation to 3% among the poorest [15]; [21]. In Southwestern Uganda, Mbarara regional referral hospital had the highest level of

caesarean section rates of 11-14% [5]. Despite the rising rate of caesarean section in Uganda, the lack of harmony on the associated risk factors has been a concern among health professionals and the public at large especially in the Ugandan context [18]. While various local and international studies on the prevalence and risk factors for CS exist, there is still a wide gap in the literature in the context of Mbarara regional referral hospital yet it is the hospital where most CS deliveries are conducted in Southwestern Uganda. Hence, this study sought to examine the Prevalence and Risk Factors for Caesarean Section Delivery following Labor Induction at Mbarara Regional Referral Hospital.

#### **Aim of the Study**

To assess the Prevalence and Risk Factors for Caesarean Section Delivery following

Labor Induction at Mbarara Regional Referral Hospital.

#### **Specific Objectives**

- ❖ To assess the prevalence of Caesarean Section Delivery following Labor Induction at Mbarara Regional Referral Hospital.
- ❖ To assess the risk factors for Caesarean Section Delivery following Labor Induction at Mbarara Regional Referral Hospital.

#### **Research Questions**

- i. What is the prevalence of Caesarean Section Delivery following Labor Induction at Mbarara Regional Referral Hospital?
- ii. What are the risk factors for Caesarean Section Delivery following Labor Induction at Mbarara Regional Referral Hospital?

### **METHODOLOGY**

#### **Study Design**

A hospital based retrospective cohort study was conducted using maternally-linked data from Mbarara Regional Referral Hospital birth registry. The study was restricted to deliveries intervened by labor induction at Mbarara Regional Referral Hospital during the year 2019 to 2021. The hospital has well-trained midwives and nurses who collected information from the registry on every woman who gave birth at the facility during the specified time period. The researcher was therefore able to analyze the available data to identify the prevalence and risk factors for Caesarean Section Delivery at Mbarara Regional Referral Hospital.

#### **Area of Study**

The study was conducted at Mbarara regional referral hospital. Owned by the government, Mbarara regional referral hospital started in the 1930s as a nursing school for the South Western Ankole region. Its status was then elevated in the 1950s to a district hospital for the former Ankole region until it was again elevated to a regional referral facility in the early 1990s. Currently, the hospital serves a population of over four million people in its catchment area comprising the districts of Mbarara, Bushenyi, Ntungamo, Kiruhura, Ibanda, Buhweju, Rubirizi, Mitooma and Isingiro. The hospital also

receives patients from Kabale, Masaka, Fort Portal and neighboring countries like Rwanda and Tanzania. Every day, the hospital sees about over 100 at the Maternal and Child Health Unit [22].

#### **Inclusion Criteria**

- i. All deliveries following labor induction.
- ii. All deliveries with singleton babies.
- iii. All subjects whose information on delivery mode achieved is readily available.

#### **Exclusion Criteria**

- All deliveries that did not follow labor induction.
- All deliveries with multiple gestation.
- All subjects with missing information on delivery mode achieved.

#### **Data Collection**

The data was collected from records from the Mbarara Regional Referral Hospital maternity registry database which captures information regarding maternal socio-demographic characteristics, health status of the mother before and during pregnancy as well as information concerning delivery. The study also considered socio-demographic information extracted from the mothers who were available for interviews including age, occupation, education level, place of residence, marital status, tribe and religion. The study explored information

on clinical data on delivery including parity status, gestational age, mode of delivery, use of induction and indications for Induction of labour (IOL) methods.

#### Data Analysis

Data analysis was performed using SPSS version 21.0. Mean and standard deviation (SD) were used to describe continuous variables. Comparison of proportions was performed by Pearson chi-square ( $X^2$ ) for categorical variables to determine associations between selected covariates and delivery mode. Multivariable log-binomial regression models was used to estimate Relative Risks (RRs) for CS following IOL with 95% confidence intervals (CIs). A p-value of 5% and below (2-tailed) was considered statistically significant for univariate and multivariable analyses of risk factors for CS delivery. The study used Caesarean Section Delivery as

the primary unit of analysis and conducted a clustered analysis technique with robust estimation of variances to account for the correlation between repeated deliveries from the same woman.

#### Ethical Considerations

The study was conducted putting into consideration of the ethical procedures. An official permission to conduct research was accessed from the KIU Faculty of Medicine and from the administrator MRRH. In addition, the study ensured that names and identity of women whose information were in the registry were not disclosed anywhere in the study report [23]. Records were selected and reviewed with the guidance of the records officer. All unauthorized information in the records office were not accessed unless given permission.

### RESULTS

**Table 1: Samples demographic and obstetric characteristics (n=539)**

Specifications	Number (%)
Age	
≤19	46 (5.8)
20-24	157 (29.2)
25-29	169 (31.3)
30-34	105 (19.5)
≥35	11.5 (62)
Education	
Illiterate	29 (5.4)
Primary	341 (63.3 )
Secondary	144 (26.7)
University	25 (4.6)
Occupation	
Housewife/unemployed	510 (94.6)
Employed	29 (5.4)
Parity	
Primiparous	308 (57.14)
Multiparous	231 (42.86)
Mode of delivery	
Vaginal	157 (29.1)
Vaginal + Episiotomy	251 (46.5 )
Vacuum or forceps	12 (2.3)
Caesarean section	119 (22.1)
Induction Method	
Oxytocin	338 (72)
Prostaglandin E2	14(6.2)
Amniotomy + oxytocin	93 (17.3)
prostaglandins + Oxytocin	

To perform induction oxytocin alone in 72% of the cases, misoprostol alone in 2.6 % of the cases as well as combination

regimes in 85.6% of the cases were used leading to vaginal delivery.

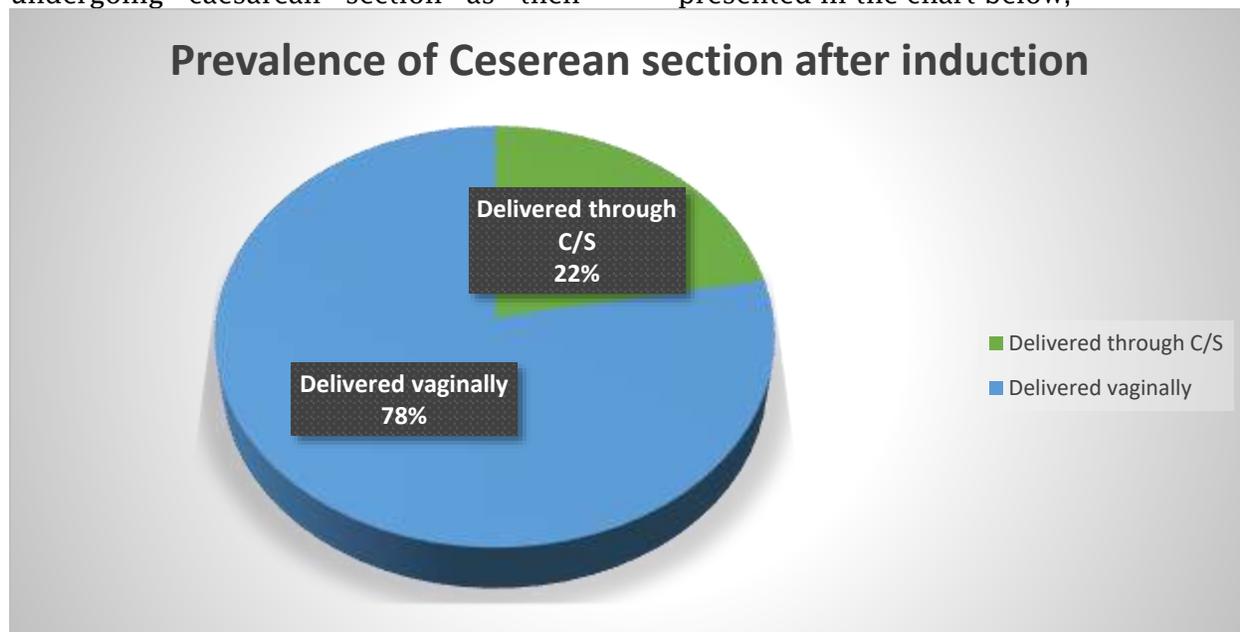
**Table 2: Indications for induction**

Cause	No (%)
Post term	219(40.63)
PROM	130 (24.12)
Failure of progress	29 (5.38)
Hypertension disorder	41(7.61)
Maternal disease	29 (5.38)
Fetal disorder (IUFD, IUGR, Abnormally)	11(2.04)
Oligohydramnios	20 (3.71)
physician order	18 (3.34)

**Prevalence of Caesarean Section following Labor Induction**

Out of the participants (180) who underwent labor induction, 40 ended up undergoing caesarean section as their

mode of delivery. This translates to 22.1% of the study participants and this is presented in the chart below;



**Risk factor for caesarean deliveries following labor induction**

Most common cause for caesarean section was failure of progress (47.90%), Other causes are listed in Table 4.

**Table 3: Reason for opting for Cesarean Section**

Etiology	No (%)
Failure of progress	57(47.90)
Fetal distress	27(22.69)
Meconium	23(19.33)
Others (Placental abruption, CPD, Macrosomia )	12(10.08)
<b>Total</b>	<b>119 (100)</b>

There was no significant relationship between maternal age (P=0.724) and Parity

(p=0.286) with success rate of induction, whereas a significant relationship between

number of pregnancies with success rate of induction (p=0.002) was found. In addition, there was no significant correlation between Bishop Score and induction success (p=0.286) and no statistically significant difference between the induction successes with dilatation (p=0.000). There was a significant relationship between the method of

induction and its success (p=0.000) nevertheless, no significant correlation was found between delivery success and induction regimen (high or low dose) (p=0.038). From the other side, there was a statistically significant relationship between success of induction and birth weight (p = 0.03) (Table 4).

**Table 4: Success rate of induction in subjects according to infant's birth weight**

Birth Weight		≤2500	2500-4000	≥4000
<b>Induction Success</b>	Yes	17 (70.8)	371 (76.7)	24 (77.4)
	No	7(29.2)	113 (23.3)	7 (22.6)
	Total No.	24(4.5)	484 (8.89)	31 (5.8)

Effect of variables including; dilation, effacement, descent, cervical position, cervical consistency, maternal age, and parity on the success of induction using logistic regression models was controlled and the results showed that among all of the above variables, just effect of dilatation on the success of induction was significant (P=0.03). Other variables were not significant in the logistic regression model and were removed. Logistic

regression results indicated that success of induction in 4 cm dilatation is 1.24 times compared to 1 cm dilatation and chances of successful induction increased with increasing dilatation. Logistic regression showed that chances of cesarean section for those with cervical dilatation of 3 cm or less was 2.5 times higher than those who with 4 cm or higher dilatation (OR=2.5,95% CI, 0.87-7.2).

**DISCUSSION**

**Prevalence of Caesarean section following labor induction**

In this study, the prevalence of cesarean section after induction was 22.1% therefore indicating that the induction success rate in this study was 87.9% and this agrees with the results of other studies [24]. Induction success rate in Al shaikh et al study had been reported as (84%). This difference could be due to type of induction. We used oxytocin for the majority of patients in our study since it is was a routine medication in our center, whereas; prostaglandin E2 were used for 86.7% of the cases in Al Shaikh et al study (2011) Oxytocin is used as a preferred method for induction of labor in Latin America [25]. More use of oxytocin in our center is because of its availability which is not associated with cervical status. In the present study, number of women for whom more than one method of induction was used was about 25.5%. Nevertheless, higher percentage of oxytocin alone usage (72%) could imply the acceptance and availability of oxytocin in our medical

center. Our study also had similar findings to others done within the East African region. A retrospective study by [2], about the prevalence and risk factors for Caesarean Section Delivery following labor induction at a tertiary hospital in North Tanzania and findings revealed that the prevalence of caesarean section following labour induction was 26.75%.

**Risk factor for caesarean deliveries following labor induction**

In this study, the most common indication for induction was post-term pregnancy which was in consistent with other studies [26]: [27]: [25]. Induction in post-term pregnancy compared to prenatal survival rate and expectant treatment may be associated with a decrease in prenatal mortality rate [25]. Although many researchers believe that increasing number of deliveries will be followed by favorable outcome of induction, the failure rate of induction in nulliparous women was 29.1% and for multipara women it was 64.01% that is consistent with [28]. This difference could be the result of decisions made by

specialists in our center and multipara women who prefer cesarean for fear of induction complications. Since in this study duration of latent and active phase of labor were not recorded; therefore, there is no information about the impact of duration of these phases on physician's decision. The results of this study showed significant association between birth weight and successful induction, which is in agreement with the results of [28]. Hence, induction failure rate increased with increasing birth weight [29]. Although the results of the present study showed no significant relationship between Bishop Score and induction success, and regression model showed a significant correlation between dilatation and successful induction. Sadeghi et al in a study aimed to determine factors predicting successful labor induction showed that every one centimeter dilation increase the likelihood of successful labor induction about 2.55 times and reported that dilation could be a factor in predicting successful induction [30]. Results of the present study showed that by increasing one cm of dilation the chance of a successful induction will be 0.31 times. Other components of Bishop (effacement, descent, cervical consistency, and cervical position) had no effect on the prediction of a successful induction. In our medical center Bishop score is determined only by finger examining, while Teixeira et al believe that despite the widespread use of Bishop score this method lacks the power to predict success of induction and recommended that it is better to replace it by another method such as cervical assessment by sonography that is a better predictor for the outcome of induction [31]. Results of this study showed that chance of cesarean section for those who had cervical dilatation of 3 cm or less was 2.5 times higher than those who had

dilation of 4 cm or high (95% CI, 0.87-7.2). This finding is in consistent with results of Jacquemyn et al and Ehrenthal et al studies [32]. In addition, findings are somewhat similar to Vahratian et al results that reported nulliparous women who had an elective induction with cervical ripening had 3.5 times the risk of cesarean delivery during the first stage of labor compared with those admitted in spontaneous labor, but elective induction without cervical ripening, on the other hand, was associated with a faster labor progression from 4 to 10 cm and did not increase the risk of cesarean delivery, compared with those in spontaneous labor [33]. The current study also showed there was no significant relationship between Bishop Score and induction success rate, but dilatation is of higher predictive value and in lower dilatation the risk of cesarean delivery is higher in induction.

The results of this study also is consistent with the results of Heffner et al who reported that In nulliparas, labor induction was associated with an increase in cesarean delivery from 13.7% to 24.7% (adjusted odds ratio [OR] 1.70; 95% confidence interval [CI] 1.48, 1.95)). In multiparas, induction was associated with an increase from 2.4% to 4.5% (OR 1.49; 95% CI 1.10, 2.00). Other variables that placed a nulliparous woman at increased risk for cesarean delivery included maternal age of at least 35 years and gestational age of over 40 weeks. For multiparas, only maternal age 40 years or older and gestational age of 41 weeks were associated with an increase in cesarean deliveries [33]. Although in the present study both nulliparous and multipara group who underwent induction were not investigated separately, but between age and success of induction (vaginal delivery) did not show a significant statistical relationship.

## CONCLUSION

The prevalence of caesarean section after induction of labor in this study was 22.1%. Cervical dilatation (3 cm or less) prior to induction and increasing birth weight could be the major factors leading to caesarean section, hence predicting labor induction success.

### Strengths and Limitations

The strengths of this study are; being prospective, investigating nulliparous and multiparous women who are undergoing induction for medical reasons, providing information regarding the confirmation of Bishop score in predicting successful

induction, providing information on the outcome of induction as one of the most common obstetric interventions as well as, data collected by trained midwives. Weaknesses of this study could be lack of data on Latent and Active phase during the first stage and second stage of labor, groups were not separated into nulliparous and multiparous women, nulliparous and multiparous groups were not compared, and they were not compared with women in spontaneous labor. Also the complications of this procedure have not been studied and cervical check has been done only by finger examining. Because

this study was conducted only at one center, it has a low power and cannot be generalized effectively. Therefore, further studies should be conducted to determine the induction period and decision time for intervention in nulliparous and multiparous women.

#### Recommendations

- More funding is necessary by the hospital to further give more light to the all-time prevalence of cesarean section following labor induction within MRRH

#### REFERENCES

1. G/Mariam, B., Tilahun, T., Merdassa, E., & Tesema, D. (2021). Indications, Outcome and Risk Factors of Cesarean Delivery among Pregnant Women Utilizing Delivery Services at Selected Public Health Institutions, Oromia Region, South West Ethiopia. *Patient Related Outcome Measures*, Volume 12(June), 227-236. <https://doi.org/10.2147/prom.s304672>.
2. Tarimo, C. S., Mahande, M. J., & Obure, J. (2020). Prevalence and risk factors for caesarean delivery following labor induction at a tertiary hospital in North Tanzania: A retrospective cohort study (2000-2015). *BMC Pregnancy and Childbirth*, 20(1), 1-8. <https://doi.org/10.1186/s12884-020-02861-8>.
3. Betran, A. P., Ye, J., Moller, A. B., Souza, J. P., & Zhang, J. (2021). Trends and projections of caesarean section rates: global and regional estimates. *BMJ Global Health*, 6(6), e005671. <https://doi.org/10.1136/BMJGH-2021-005671>.
4. WHO. (2021). Caesarean section rates continue to rise, amid growing inequalities in access. <https://www.who.int/news/item/16-06-2021-caesarean-section-rates-continue-to-rise-amid-growing-inequalities-in-access-who>.
5. Atuheire, E. B., Opio, D. N., Kadobera, D., Ario, A. R., Matovu, J. K. B., Harris, J., Bulage, L., Nakiganda, B., Tumwesigye, N. M., Zhu, B. P., & Kaharuza, F. (2019). Spatial and temporal trends of cesarean deliveries in Uganda: 2012-2016. In *BMC Pregnancy and Childbirth* (Vol. 19, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s12884-019-2279-6>.
6. Nuwabaine, L., Mathius, A., & Nakalega, P. A. (2020). High proportion of caesarean section at a rural hospital in south western Uganda: A cross sectional study. *Research Square* [Preprint].
7. Okolo, I., Lugobe, H. M., Garba, D., Tibaijuka, L., Byamukama, O., Ngonzi, J., & Boatman, A. A. (2021). 1095 Cesarean delivery variation across facilities in Uganda. *American Journal of Obstetrics and Gynecology*, 224(2), S675. <https://doi.org/10.1016/j.ajog.2020.12.1119>.
8. Spencer, N. (2011). Cesarean Section Rates and Indications at MRRH. <https://nmfonline.org-2011-uganda-spencer-n>.
9. Opiyo, N., Kingdon, C., Oladapo, O. T., Souza, J. P., Vogel, J. P., Bonet, M., Bucagu, M., Portela, A., Mcconville, F., Downe, S., Metin Gülmezoglu, A., & Betrán, A. P. (2020). Non-clinical interventions to reduce unnecessary caesarean sections: WHO recommendations. *Bull World Health Organ*, 98, 66-68. <https://doi.org/10.2471/BLT.19.236729>.

10. Shi, Y., Jiang, Y., Zeng, Q., Yuan, Y., Yin, H., Chang, C., & Pang, R. (2016b). Influencing factors associated with the mode of birth among childbearing women in Hunan Province: A cross-sectional study in China. *BMC Pregnancy and Childbirth*, 16(1), 1-9. <https://doi.org/10.1186/S12884-016-0897-9/TABLES/5>.
11. Nazir, S. (2020). Determinants of Cesarean Deliveries in Pakistan.
12. Verma, V., Vishwakarma, R. K., Nath, D. C., Khan, H. T. A., Prakash, R., & Abid, O. (2020). Prevalence and determinants of caesarean section in South and South-East Asian women. *PLoS ONE*, 15(3), 1-15. <https://doi.org/10.1371/journal.pone.0229906>.
13. Bhandari, A. K. C., Dhungel, B., & Rahman, M. (2020). Trends and correlates of cesarean section rates over two decades in Nepal. *BMC Pregnancy and Childbirth*, 20(1), 1-13. <https://doi.org/10.1186/s12884-020-03453-2>.
14. Abebe, F. E., Gebeyehu, A. W., Kidane, A. N., & Eyassu, G. A. (2016). Factors leading to cesarean section delivery at Felegehiwot referral hospital, Northwest Ethiopia: A retrospective record review. *Reproductive Health*, 13(1), 1-7. <https://doi.org/10.1186/s12978-015-0114-8>.
15. Asimwe, G. (2020). C-section deliveries in Uganda: why you should get concerned. <http://makir.mak.ac.ug/handle/10570/8179>.
16. Kizito, O. (2021). Determinants of caesarean section rates in private-not-for-profit healthcare facilities: St. Joseph's Hospital Kitovu. *Cogent Medicine*, 8(1), 0-29. <https://doi.org/10.1080/2331205x.2021.1928939>.
17. Pebalo, F. P., Steven, B., & Grace, A. A. (2021). Is the 14% cesarean section rate in Gulu Regional Referral Hospital justifiable? *PAMJ Clinical Medicine*, 5(74). <https://doi.org/10.11604/pamj-cm.2021.5.74.28263>.
18. Pius, T., Joaniter, N., Mbina, S., Nabaasa, S., Nabukeera, S., Ntu-, I., Ssebuufu, R., & Eze, E. D. (2020). International Journal of Case Studies in Clinical Assessment of Factors Associated with Caesarean Section Among Women Attending Kampala International University Teaching Hospital: A Retrospective Study. *International Journal of Case Studies in Clinical Research*, 4(2), 2-5.
19. Waniala, I., Nakiseka, S., Nambi, W., Naminya, I., Osuban Ajeni, M., Iramiot, J., Nekaka, R., & Nteziyaremye, J. (2020). Prevalence, Indications, and Community Perceptions of Caesarean Section Delivery in Ngora District, Eastern Uganda: Mixed Method Study. *Obstetrics and Gynecology International*, 2020. <https://doi.org/10.1155/2020/5036260>.
20. Mucunguzi, S., Wamani, H., Lochoro, P., & Tylleskar, T. (2014). Effects of improved access to transportation on emergency obstetric care outcomes in Uganda. *African Journal of Reproductive Health*, 18(3), 87-94.
21. UBOS. (2016). Uganda 2016 Demographic and Health Survey: Key Findings. Uganda 2016 Demographic and Health Survey.
22. Mrrh. (2015). Mbarara Regional Referral Hospital. [https://www.health.go.ug/sites/default/files/Mbarara\\_RRH.pdf](https://www.health.go.ug/sites/default/files/Mbarara_RRH.pdf)
23. Ugwu Chinyere Nneoma, Eze Val Hyginus Udoka, Ugwu Jovita Nnenna, Ogenyi Fabian Chukwudi & Ugwu Okechukwu Paul-Chima (2023). Ethical Publication Issues in the Collection and Analysis of Research Data. *NEWPORT INTERNATIONAL JOURNAL OF SCIENTIFIC AND EXPERIMENTAL SCIENCES (NIJSES)* 3(2): 132-140.
24. Hladik, W., et al. (2008). "The estimated burden of HIV/AIDS in Uganda, 2005-2010." *Aids* 22(4): 503-510.
25. Atuhaire, S. (2021). Knowledge and Practices of Post Cesarean Section Mothers Towards Self-Care After Delivery at Mbarara Regional Referral.

- Journal of Obstetrics and Gynaecology, 1-13.
26. Auma, S. (2016). Factors Influencing Utilisation of Early Infant Diagnosis of HIV Among HIV Exposed Infants Receiving care at Kisenyi Health Centre IV Kampala City, International Health Sciences University.
  27. Bwana, V. M., et al. (2018). "Accessibility of early infant diagnostic services by under-five years and HIV exposed children in Muheza District, North-East Tanzania." *Frontiers in public health*6: 139.
  28. Chiduo, M. G., Mmbando, B. P., Theilgaard, Z. P., Bygbjerg, I. C., Gerstoft, J., Lemnge, M., & Katzenstein, T. L. (2013). Early infant diagnosis of HIV in three regions in Tanzania; Successes and challenges. *BMC Public Health*, 13(1), 1-8. <https://doi.org/10.1186/1471-2458-13-910>.
  29. Izudi, J., Auma, S., & Alege, J. B. (2017). Early Diagnosis of HIV among Infants Born to HIV-Positive Mothers on Option-B Plus in Kampala, Uganda. *AIDS Research and Treatment*, 2017. <https://doi.org/10.1155/2017/4654763>.
  30. Gebreegziabher Hailu, A., Kebede Fanta, T., Tekulu Welay, F., Etsay Assefa, N., Aregawi Hadera, S., Aregawi Gebremeskel, G., Weldeclassie Gebremedhin, H., & Asefa, G. G. (2020). Determinants of Cesarean Section Deliveries in Public Hospitals of Addis Ababa, Ethiopia, 2018/19: A Case-Control Study. *Obstetrics and Gynecology International*, 2020. <https://doi.org/10.1155/2020/9018747>.
  31. Musoba, N. et al. (2017). Uganda HIV / AIDS Country Progress Report July 2016-June 2017. Uganda AIDS Commission, June.
  32. Chimpreports (2019). "Hoima tops Western region in HIV prevalence; Herbal medicine to blame." Retrieved 20/12/2019, 2019, from <https://chimpreports.com/hoima-tops-Western-region-in-hiv-prevalence-herbal-medicine-to-blame/>.
  33. Betrán, A. P., Temmerman, M., Kingdon, C., Mohiddin, A., Opiyo, N., Torloni, M. R., Zhang, J., Musana, O., Wanyonyi, S. Z., Gülmezoglu, A. M., & Downe, S. (2018). Interventions to reduce unnecessary caesarean sections in healthy women and babies. *The Lancet*, 392(10155), 1358-1368. [https://doi.org/10.1016/S0140-6736\(18\)31927-5](https://doi.org/10.1016/S0140-6736(18)31927-5).
  34. Winnie, O. A. (2023). Post Cesarean Care for Mothers Attending Arua Regional Referral Hospital Drivers and Challenges. *Newport International Journal of Biological and Applied Sciences*. 3(2), 185-200.
  35. Kojoki, V. (2023). Factors Influencing Success of Vaginal Delivery after Cesarean Section among Women with One Previous Scar at Hoima Regional Referral Hospital, Western Uganda. *Eurasian Experiment Journal of Scientific and Applied Research (EEJSAR)*. 4(1), 106-115.
  36. Mercy, M. M. (2023). Knowledge and Practices on Infection Control among Health Workers in Jinja Regional Referral Hospital. *Newport International Journal of Scientific and Experimental Sciences*. 3(2), 141-148.

Atukunda Sandra (2023). Prevalence and Risk Factors for Cesarean Section Delivery Following Labour Induction at Mbarara Regional Referral Hospital. *IDOSR JOURNAL OF SCIENTIFIC RESEARCH* 8(3) 59-68. <https://doi.org/10.59298/IDOSR JSR /2023/00.5.6000>