

AFRICA UNIVERSITY
(A United Methodist-Related Institution)

PREVALENCE AND INDICATIONS FOR CAESAREAN
DELIVERY AT MBUYA NEHANDA MATERNITY HOSPITAL,
HARARE, ZIMBABWE

BY

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Abstract

Caesarean section is a lifesaving surgical procedure when medically indicated. However, overuse of this procedure is associated with poor health outcomes including an increase in maternal and neonatal mortality especially in low-to-middle income countries. WHO has established an optimum caesarean section rate of between 10 to 15% in which the best possible outcomes have been observed at population level. A preliminary review of records at Mbuya Nehanda Maternity Hospital in Harare, Zimbabwe, revealed a caesarean section rate that was 2 times higher than the WHO recommended threshold. The aim of this study was to assess the prevalence of and obstetric indications for caesarean delivery at Mbuya Nehanda Maternity Hospital over a year (September 2021 to August 2022). An analytical cross-sectional study design was conducted on 1668 participants who delivered at Mbuya Nehanda Maternity Hospital. Data on sociodemographic characteristics, obstetric indications and delivery method were collected using a structured questionnaire and from birth registers. Descriptive statistics were presented as frequencies whereas analytical statistics were based on logistic regression, odds ratio, and p-values as analysed using Stata version 16. Overall, the prevalence of caesarean section over the 12-month period was 39.3%. The highest prevalence was in September 2021 (71.2%) and the lowest was in January 2022 (18.7%). Sociodemographic factors such as residence, age, past obstetric complications and booking status were associated with delivery through caesarean section. Participants who were greater or equal to 40 years old had 7 times the odds of delivering through caesarean section compared to younger participants (OR 7.0, 95% CI = 2.9-17.1, p-value <0.000). The likelihood of delivering through CS for participants with a history of pregnancy complications was 6.1 times higher than that of participants without any past obstetric indications (OR = 6.1: 95% CI 0.0 – 0.01, p < 0.005). The odds of delivering through CS were more than double among those who did not book compared to those who had booked to deliver at Mbuya Nehanda Maternity Hospital (OR= 2.5: 95% CI = 1.7 – 3.8). Participants who resided within the Harare catchment area were 56.0% less likely to deliver through CS compared to those who resided outside the Harare catchment area (OR=0.4: 95% CI = 0.3-0.6, p < 0.001). The majority (67.4%) of participants with a history of pregnancy complications delivered through caesarean section. By proportion, the most common obstetric indications for caesarean delivery were having a previous caesarean section (40.1%), eclampsia (10.2%), foetal distress (10.1%), and prolonged labour (7.9%). Relative indications accounted for 58.4% of all caesarean deliveries during the study period. Primary caesarean sections accounted for 59.9% of all caesarean deliveries. In conclusion, there was a high caesarean section rate at Mbuya Nehanda Maternity Hospital during the study period. The researcher recommends a high alert on patients with sociodemographic characteristics associated with caesarean delivery.

Keywords: Caesarean section; Prevalence; Sociodemographic characteristics; Obstetric indications; Mbuya Nehanda Maternity Hospital

Declaration Page

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it be submitted to another university for the award of a degree.

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Dedication

This research is dedicated to all the mothers who have undergone caesarean section to save their lives and that of their children. This dedication is a tribute to your strength, resilience, and unwavering love for your children. Your trust in the medical team, your courage during challenging times, and your determination to provide the best possible start to your babies' lives inspires us all. May this research contribute to enhancing the understanding, safety, and overall experience of caesarean delivery for future mothers and families.

Lastly, this work is dedicated to the healthcare professionals at Mbuya Nehanda Maternity Hospital. This dedication recognizes your unwavering dedication, expertise, and compassion. Your tireless efforts and commitment to excellence despite having to work with limited resources, is a testament to your hard work and fulfillment of your calling.

List of Acronyms and Abbreviations

AU	Africa University
AUREC	Africa University Research and Ethics Committee
AVD	Assisted Vaginal Delivery
CS	Caesarean Section
HCC	Harare City Council
HIV	Human Immunodeficiency Virus
MOHCC	Ministry of Health and Child Care
MNMH	Mbuya Nehanda Maternity Hospital
NVD	Normal Vaginal Delivery
STI	Sexually transmitted infections
UNICEF	United Nations Children's Fund
WHO	World Health Organisation

Definition of Key Terms

Caesarean Section	delivery of a foetus(es) through surgical incision made through the abdominal and uterine walls.
Dysbiosis	Imbalance of microbiota in an ecosystem.
Indications	a sign, symptom or medical condition that leads to a recommendation of a medical procedure, test or treatment.
Microbiota	Total number of microorganisms in a habitat.
Microbiome	Collection of all genomes of microbiota in a habitat.
Prevalence of Caesarean Section	The proportion of caesarean sections performed to the total number of live births in a given place and time.
Unnecessary Caesarean Section	Caesarean Section that is done without any medical indication.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

This study sought to determine the prevalence and indications of caesarean section (CS) at Mbuya Nehanda Maternity Hospital (MNMH) during a 12-month period (September 2021 to August 2022). This followed a preliminary review of records at MNMH for the past 10 years which showed an average CS rate that was more than 2 times higher than what is recommended by WHO while both human and capital resources are limited. Furthermore, maternal mortality following CS was also high during the same period.

While global prevalence of CS has shown a notable increase, this upward trend in CS rates has raised concerns among healthcare experts, as it has consistently been observed across various demographic groups regardless of factors like race, age, medical condition, or gestational age. In 2015, CS accounted for 21% of all births worldwide, but the WHO had stated that a CS rate exceeding 10% at the population level did not lead to a reduction in maternal and neonatal mortality (Brown, 2018). These findings highlight the importance of critically examining the reasons behind the escalating CS rates and their potential implications for the health outcomes of both the mother and the child.

Despite the evidence of high CS rate and the associated maternal and neonatal mortality rate at MNMH, limited efforts have been made to examine the specific reasons for high CS in association with sociodemographic factors. In order to close or fill this existing knowledge gap, the researcher conducted this study with the aim of determining the prevalence of caesarean delivery and to identify the obstetric indications influencing caesarean delivery at MNMH from September 2021 to August

2022. The specific objectives of the study were to evaluate the sociodemographic factors associated with CS at MNMH from September 2021 to August 2022, determine the prevalence of CS at MNMH from September 2021 to August 2022 and to describe the obstetric indications for CS at MNMH from September 2021 to August 2022.

To fulfil these objectives, an analytical cross-sectional study design, which entailed the systematic collection and analysis of data from women who gave birth at MNMH during the study period (September 2021 to August 2022) was conducted. The study was conducted at MNMH, situated at Parirenyatwa Group of Hospitals in Harare, Zimbabwe. The substantial delivery volume, high CS rate and its role as a teaching hospital makes MNMH an ideal site to conduct the study.

The study was conducted taking all necessary ethical considerations. This included protecting the confidentiality of study participants by using a unique number identifier, collecting data without interfering with clinicians' duties and storing the hard copies of the collected data in a lockable cabinet and the soft copy in a password protected computer where only the researcher had access. The study was only conducted after ethical approval from the clinical director of Parirenyatwa Group of Hospitals and MNMH management. Furthermore, Africa University Research Ethics Committee also granted approval to conduct this study.

1.2 Background to the study

There is no doubt that increasing access to safe CS particularly in areas of underuse remains a public health priority (Martin et al., 2018). CS can be defined as delivery of a foetus(es) through surgical incisions made through the abdominal and uterine walls (Betran, Torloni, Zhang, & Gülmezoglu, 2016). It is a lifesaving procedure for the

mother and or the child when medically indicated (Slykerman, Li, & Milne, 2020). Globally, CS prevents about 187 000 and 2.9 million maternal and neonatal deaths respectively each year (Khan et al., 2017a). WHO has noted that the prevalence of this lifesaving procedure is increasing in hospitals worldwide (Brown, 2018).

Globally there has been an increase in CS rate from about 7% in 1990 to about 19% in 2014 (Lafta & Habeeb, 2020). This rise indicates increased access to obstetric care however, it has also sparked debate among health professionals as the unprecedented rise in CS has consistently been recorded regardless of race, age, medical condition or gestational age (Brown, 2018). By 2015, 21% of all global births were through CS (Wise, 2018). In the same year, WHO released a statement indicating that at population level, CS rate above 10% was not associated with reduction in maternal and or neonatal mortality (Taye et al., 2021).

In Africa, CS rate has also gradually increased with countries such as Mauritius and Egypt recording the highest rates at 47% and 51.8% respectively (Byamugisha & Adroma, 2020a). However, Africa as a whole has a CS rate of about 7.3% although this varies from country to country and from private to public hospitals (Byamugisha & Adroma, 2020a). Furthermore, there is enormous inequalities in accessing CS across the region with evidence of overuse mainly in privileged populations and underuse in disadvantaged populations while no considerable action is being taken to ensure universal access (Yaya, Uthman, Amouzou, & Bishwajit, 2018).

In Zimbabwe, there has been a steady increase in CS rate over the last two decades (UNICEF, 2020). At population level, the average CS rate over the last 5 years is about 8.1%. However, this is difficult to interpret because there is a double burden of underutilization, particularly in rural settings (less than 5%) while urban settings meet

the minimum 5% recommended by WHO and referral hospitals are usually congested often shouldering as high as 36% (UNICEF, 2020).

However, like any other surgical procedure, CS is associated with short and long-term effects which are more common in low- and middle-income countries (LMIC) (Yaya et al., 2018). Sub-Saharan Africa faces the highest burden of maternal death following CS coupled with a disproportionately high perinatal morbidity and mortality (Batist, 2019). Some estimates indicate that in developing countries, maternal mortality following CS is 100 times higher than in developed countries (Sobhy et al., 2019).

In the mother, CS is associated with risks related to the surgical procedure as well as the anaesthetic procedure (Sandall et al., 2018). For example, blood loss during operation and reactions to anaesthesia. Women who deliver through CS also face an increased risk of emotional and psychological challenges including postpartum depression (Sobhy et al., 2019). Several research articles have also indicated that the prevalence of maternal morbidity and mortality is higher after CS than vaginal delivery (Sobhy et al., 2019).

Other undesirable outcomes include an associated increased risk of wound infection, uterine rapture, abnormal placentation, and ectopic pregnancy. Furthermore, the associated cost and increased hospital stay are other factors that negatively impact the mother (Byamugisha & Adroma, 2020a).

In infants, the first risk, although rare (1-2%) is accidental laceration by surgical tools during a CS but fortunately the cuts are usually very small, and they usually heal quickly (Abdul-Mumin, Dawuni, & Peters, 2021). However, a more serious risk includes increased general respiratory morbidity. Although the exact cause is

unknown, it is thought that the physical changes that occur during labour are necessary for lungs to mature, and these changes might not be present during an elective CS (Anuwutnavin, Kitnithee, Chanprapaph, Heamar, & Rongdech, 2020). Other studies have suggested that since most elective CS are done between 37 and 40 weeks gestation, respiratory morbidity can be attributed to iatrogenic prematurity (Babooa, Shi, & Chen, 2017) (Lafta & Habeeb, 2020).

Another emerging and less known risk in infants who are delivered through CS is the disruption of the colonization and assembly of the infant gut microbiota. This is associated with an increased risk of poor metabolic, immunological, nutritional, and physiological outcomes (Arboleya et al., 2018). Several studies have shown that disruption of infant gut microbiota, termed dysbiosis, is associated with several poor health outcomes that include asthma (immunological), obesity (metabolic), inflammatory bowels disease, and neurodevelopmental challenges (Arboleya et al., 2018) (Carlson et al., 2018).

Furthermore, there is no evidence pointing to the benefits of CS for women or infants without medical indications (Opiyo et al., 2019). This is referred to as unnecessary CS. Since 1985, the international health care community has considered the ideal CS rate to be between 10% and 15% (Betran et al., 2016). In 2015, WHO released a new statement based on the available data on CS and in that statement, WHO concluded that, at population level, CS rates higher than 10% were not associated with a reduction in maternal and or neonatal deaths (Hoang, Levy, & Vandenplas, 2021).

Although a global reference for CS rate was set at population level, it is difficult to determine an appropriate or optimum CS rate at health facility level due to the different case mix and obstetric profile of patients. WHO encouraged the use of the Robson

classification system to optimise CS at health facilities (Solanki, Cornell, Daviaud, & Fawcus, 2020). Using data from the WHO Multi-Country Survey on Maternal and Newborn Health, several experts proposed the use of a mathematical model for a global reference of CS rate at facility level (Souza et al., 2016).

However, the starting and critical point in establishing an optimum CS rate at institutional level is to determine the prevalence and indications of CS at the health facility. Therefore, investigating the prevalence and indications of caesarean delivery at MNMH will provide essential information for risk stratification and strategies for targeted efforts in ensuring timely and safe CS while optimising the use of CS.

1.3 Statement of the problem

Upon a preliminary review of records at Mbuya Nehanda Maternity Hospital (MNMH) for the past 10 years, there has been a predominantly high CS rate. Over the past 10 years, there was an average CS rate of 31.3% which is more than double the WHO recommended CS rate of between 10 to 15% (Lebedenko et al., 2021). This is also compounded by the high maternal and neonatal mortality ratio following CS as recorded at MNMH (Busumani & Mundagowa, 2021).

Although the maternal and neonatal mortality rate following CS has been noted at MNMH, very little has been done to describe the obstetric indications for CS and to evaluate the sociodemographic factors associated with CS. This study provides essential information for risk stratification and strategies for targeted efforts in ensuring timely and safe use of CS while optimising the use of CS to achieve health equity.

1.4 Objectives of the study

1.4.1 General objective

To determine the prevalence of CS (CS rate) and to identify the indications influencing CS delivery at MNMH from September 2021 to August 2022

1.4.2 Specific Objectives

- i. To evaluate the sociodemographic factors associated with CS at MNMH from September 2021 to August 2022
- ii. To determine the CS rate at MNMH from September 2021 to August 2022
- iii. To describe the obstetric indications for CS at MNMH from September 2021 to August 2022

1.5 Research questions

- i. What are the sociodemographic factors associated with CS at MNMH from September 2021 to August 2022?
- ii. What is the CS rate at MNMH from September 2021 to August 2022?
- iii. What are the obstetric indications for CS at MNMH from September 2021 to August 2022?

1.6 Significance of the study

The high CS rate at MNMH has consistently been above the World Health Organisation (WHO) recommended threshold. Although, CS rate at tertiary institutions is generally on the high side, maternal mortality following CS is much higher in resource limited settings compared to resourceful institutions.

This study intended to evaluate the sociodemographic characteristics associated with caesarean delivery and to describe the obstetric indications for caesarean section. This creates a starting point in establishing a specific institutional CS rate threshold using an objective mathematical model.

Although the factors associated with maternal and perinatal mortality following CS are complex, identifying the sociodemographic characteristics and indications for CS also provides a guide on risk factors for CS and therefore allows targeted efforts in ensuring timely and safe CS while trying to optimize the use of CS.

1.7 Delimitations

Although Zimbabwe has several public and private hospitals and clinics that offer maternity services, the researcher narrowed down the research to one institution, Mbuya Nehanda Maternity Hospital, considering that it records one of the highest annual birth deliveries in the country. Furthermore, the study did not include private hospitals due to budgetary and time constraints. Valuable information regarding CS rate and maternal and perinatal outcomes in a private hospital setting could be informative.

1.8 Limitations

This study was conducted at MNMH only and therefore it was a hospital-based study. In as much as the catchment of MNMH covers most parts of the country since it is a referral tertiary hospital, the results cannot be generalised to the national population.

The prevalence of CS may have been influenced by other variables such as the effect of COVID-19 on healthcare delivery which has been documented in other research (Bikwa, Murewanhema, Kanyangarara, Madziyire, & Chirenje, 2021).

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

In this chapter, the framework that forms the basis for this study will be discussed. The literature that will be reviewed in this section covers data on relevant research studies that was conducted globally, regionally, and locally with a focus on the objectives of this study. In addition, the review process included the assessment of the literature and analysis of the results, assumptions, and biases.

2.2 Theoretical Framework

There are several indications of caesarean delivery which can either be absolute or relative. Absolute indications of caesarean delivery are those factors that have a well-established rationale meaning caesarean delivery cannot be avoided and it's not a matter of choice (Brown, 2018). These factors include umbilical cord prolapse, foetal asphyxia and uterine rupture (Begum et al., 2017).

On the other hand, relative indications are those factors that can potentially be avoided in which a choice of methods of delivery exists, but caesarean section seems to give the best chance of safety for both the mother and the child (Babooa et al., 2017). These factors include previous caesarean section and slow or failure to progress in labour.

Sociodemographic factors also have a contribution to caesarean delivery. These factors include age, weight, parity, gravidity, and socioeconomic status. All these independent variables contribute to the dependent variable of caesarean section as shown in figure 1 below. Caesarean section rate can then be calculated by dividing the total number of caesarean deliveries by total live births in the same period and then expressed as a percentage by multiplying by 100% (Taye et al., 2021).

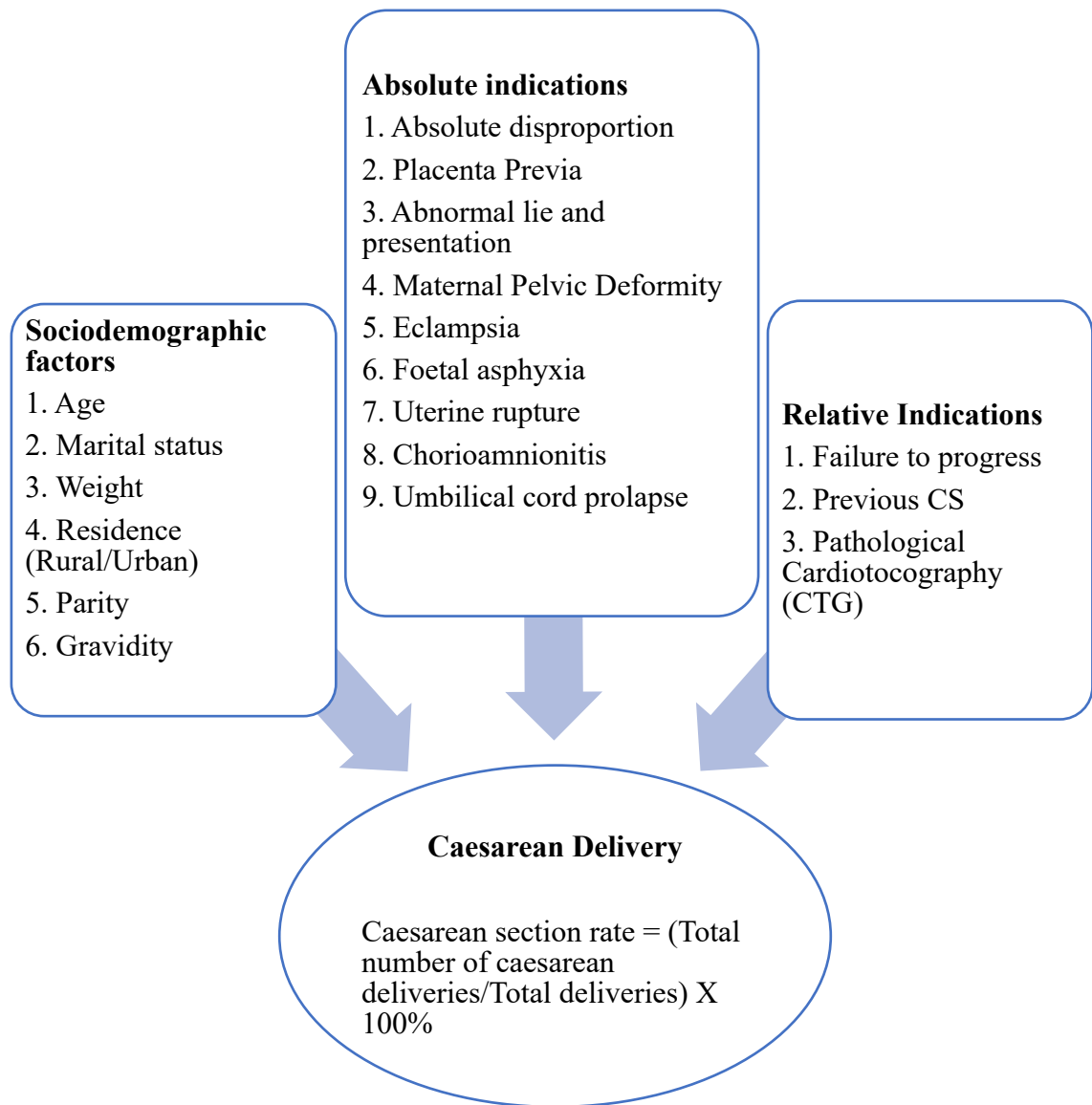


Figure 1: Theoretical framework for the prevalence of Caesarean delivery.

2.3 Relevance of Theoretical Framework

The framework above is relevant to this study as discussed by various authors below.

2.3.1 Socio-demographic characteristics

Socio-demographic attributes seem to have an influence on CS rate. Several studies have indicated the role that socio-demographic characteristics play in influencing the CS rate (Lafta & Habeeb, 2020) (Khan, Islam, Shariff, Alam, & Rahman, 2017b). Socio-demographic characteristics that have been associated with CS rate include maternal age, level of education, occupation, parity, and marital status.

In a study conducted in Ghana, increase in maternal age was associated with increased odds of having a CS (Manyeh, Amu, Akpakli, Williams, & Gyapong, 2018). This could be explained by the increased risk of diabetes and hypertension (risk factors for pregnancy complications and indications for CS) that is also associated with advanced age. With globalization, a majority of urban women in Zimbabwe are delaying having children due to education and career pursuit. This changing demographic characteristic may influence CS rate particularly in urban and more affluent populations.

With increasing parity, there is a decrease in the odds of CS according to a study conducted in West Africa (Naa Gandau et al., 2019). This could be explained by the fact that birth by CS is limited to between 3 and 5 depending on risk factors and as a result, those with increasing parity are more likely delivering through the vaginal canal.

Maternal level of education has been associated with preference for CS according to a study done in Turkey (Ardic, 2018). With increased level of education, preference for elective CS also increases. This is so because increased level of education is associated with increased socioeconomic status which increases access to this relatively expensive obstetric procedure.

Although several studies did not show any significant contribution of marital status to CS rate, one study in Nigeria demonstrated how married women did not take up CS due to fear of judgement from their husbands as a result of cultural perceptions of CS (Aziken, Omo-Aghoja, & Okonofua, 2007). In the Zimbabwean traditional culture, the husband has a say on the method of delivery and may influence the method of delivery despite the obstetric indications or what is best for both the mother and child (Lawani et al., 2019).

Overall, sociodemographic characteristics may have an association with CS rate and establishing this association in specific populations will help to tailor make guidelines and interventions to optimize the use of CS.

2.3.2 Prevalence of Caesarean Delivery

Prevalence of caesarean delivery refers to the total number of caesarean deliveries expressed as a proportion of the total live births (Shirzad et al., 2021). It represents access to emergency obstetric care. In an effort to meet the Sustainable Development Goal - 3 (SDG - 3) of reducing maternal mortality ratio (MMR), equity and equality in availability of emergency obstetric care including assisted vaginal delivery (AVD) and CS is of paramount importance (Desai et al., 2017).

Globally, there has been an increase in the prevalence of CS with 1 in 5 women now giving birth by CS (Brown, 2018). On average, CS rate has been increasing at 4.4% per annum (Souza et al., 2016). The highest rates have been reported in Latin America and the Caribbean (40.5%) with South America as a subregion having the highest CS rate in the world (42.9%) (Abdul-Mumin et al., 2021).

Countries with the highest CS rate in each region are Brazil (55.6%) and Dominican Republic (56.4%) in Latin America and the Caribbean. In Africa, Egypt (51.8%) has the highest while in Asia, Iran (47.9%) and Turkey (47.5%) have leading CS rates. In Europe, Italy (38.1%) has the highest rate. United States (32.8%) in North America and New Zealand (33.4%) in the Oceania have the highest CS rates (Lebedenko et al., 2021). Although this high prevalence indicates greater access to emergency obstetric care, several health professionals have questioned the rationale especially when there seems to be no significant increase in the absolute indications for CS.

While it is not easy to pinpoint the direct and precise cause for the rising rates of CS, several factors such as maternal, institutional and health professionals' factors have been attributed to this rise. In Brazil, which has one of the highest CS rates in the world, a considerable number of women consider CS as a lifestyle of and symbol for wealthy families (Dorji et al., 2021). Several women request to have a CS even when there is no medical indication to support it. For fear of medical litigation, convenience that comes with performing a CS coupled with the increased income, medical professionals are more inclined to perform it or even encourage it. The private sector in Brazil has close to 90% of all deliveries by CS which is way more than the 10-15% recommended by WHO (Gervasio, Malinverni, Salim, & Cuenca, 2020).

While other regions on the world show a remarked increase in the prevalence of CS, Africa and more especially, Sub-Saharan Africa show a small increase in the same period (Solanki, Cornell, et al., 2020). A number of factors account for this slow progress chief among which is poor health financing coupled with inequality and inequity in accessing this emergency obstetric care. However, the relatively low CS

rate in Sub-Saharan Africa is not easy to interpret because there are disparities without and within countries in the distribution on CS (Allagoa et al., 2021).

In South Africa, CS rate at population level is 27.4%, however in the private sector it has been reported to be above 70% while in rural settings the rate has been lower than the recommended optimum rate (Allagoa et al., 2021). Just focusing on the population CS rate alone will not give a conclusive picture of what interventions to implement so that access to CS can be increased and optimised. CS rate at institutional level both in private and public settings needs to be investigated with its corresponding obstetric indications so that optimum level at institutional level can be identified.

Like South Africa, Zimbabwe has disparities in CS prevalence with urban population having a higher rate compared to the rural population. Although the average CS rate at population level in the past 5 years is about 8.1%, the prevalence in private sector is about 20%, while the public sector is about 6% (Muyotcha, 2017). However, within the public sector, at institutional level, CS at referral hospitals is high, often above 30% while instrument AVD is very low and rarely practiced. Maternal mortality following CS is also high coupled with infant morbidity and mortality.

Relying on the universal CS rate of 10-15% at population level is not adequate in achieving an optimum rate at institutional level. Considering the possibility of adopting the universal health insurance with cross subsidisation being key, improving equality and equity in accessing CS becomes of paramount importance in order to achieve sustainability (Anuwutnavin et al., 2020). Furthermore, determining the prevalence of CS and evaluating the obstetric indications and sociodemographic characteristics can be the starting point in benchmarking CS rate at institutional level.

2.3.3 Indications for Caesarean Delivery

Indications for CS can be divided into two main categories namely relative and absolute indications (Begum et al., 2017). The reason for performing a CS is mainly guided by what is best for or may save the lives of the mother and child after an extensive risk analysis (Shirzad et al., 2021). Elective CS which is performed solely on the request of the mother, without any medical indications, is usually considered a separate indication.

Absolute indications for caesarean delivery refer to circumstances where the necessity for surgical procedure is unequivocal and cannot be avoided, leaving no room for any alternative options or personal choice. These indications are based on well-established rationales supported by medical evidence. Several factors fall into this category, including but not limited to umbilical cord prolapse, foetal asphyxia and uterine rupture.

For absolute indications such as uterine rupture, the lives of both the mother and the child are at risk. Uterine rupture is the leading cause of maternal and perinatal mortality in developing countries (Desta et al., 2021). Uterine rupture is the tearing of the uterine wall and loss of its integrity through breaching during pregnancy, delivery or immediately after delivery (Astatikie, Limenih, & Kebede, 2017). It is a catastrophic event often resulting in adverse consequences to both the mother and child especially if emergency obstetric procedures such as CS are not employed in time (Donati, Fano, Maraschini, & Group, 2021). Due to the imminent risks involved, an immediate caesarean delivery is necessary to protect the well-being of both the mother and the child. It is thus an absolute indication because caesarean delivery cannot be avoided.

Foetal asphyxia refers to a condition where the foetus experience a lack of oxygen, jeopardising its well-being and potentially leading to severe neurological damage and even death. When foetal distress is detected, and other interventions fail to alleviate the situation promptly, a caesarean section becomes the most appropriate course of action to swiftly deliver the baby and mitigate the risks associated with prolonged oxygen deprivation.

Another absolute indication is umbilical cord prolapse which is a life-threatening emergency for the foetus. This is when the umbilical cord slips through the open cervix and protrudes into the birth canal ahead of the foetus, potentially causing compression or obstruction of the cord and compromising the foetal oxygen supply during labour (Egbo & Oraekwe, 2019). This may result in foetal asphyxia and in severe cases lead to brain damage or death due to severe lack of oxygen (Wong, Kwan, Lau, Sin, & Leung, 2021). In this instance, an emergency caesarean delivery is imperative to ensure the safety of the foetus and prevent further complications or loss of life.

In a study conducted in Germany, it was observed that only 10% of all caesarean deliveries in their population were performed due to absolute indications. This finding underscores the fact that while these indications necessitate surgical interventions, a considerable portion of caesarean sections are performed for other reasons, such as relative indications or maternal request, which may be influenced by other factors beyond the immediate medical necessity (Mylonas & Friese, 2015).

On the other hand, relative indications are those factors that can potentially be avoided in which a choice of methods of delivery exists, but caesarean section seems to give the best chance of safety for both the mother and the child (Donati et al., 2021). These factors include having sexually transmitted infections (STIs) such as Human

Immunodeficiency Virus (HIV), previous caesarean section and slow or failure to progress in labour.

In a bid to reduce HIV vertical transmission from mother to child, CS has been proposed as a delivery method of choice especially when the mother has a high viral load. Some Studies have shown that using CS can result in a reduction of more than 200% in vertical transmission rates compared to vaginal delivery in patients with high viral loads. On the other hand, a recent study in Mozambique recommended low CS rate among HIV positive mothers due to limited financial resources, increased risk of occupational transmission, and potential complications associated with the procedure itself (Jaén-Sánchez et al., 2023). However, caution should be taken and planned vaginal delivery should be supported especially when the viral load is low (Chilaka & Konje, 2021)..

Although having a previous CS is one of the leading contributors to the rise in global CS rate, a number of studies, including a recent study conducted in Zimbabwe, have concluded that vaginal delivery after CS is reasonably safe even in resource limited settings such as Zimbabwe (Hukuimwe, Chimiunda, Nhemachena, & Gidiri, 2017). These findings provide reassurance that women with a previous CS can attempt vaginal delivery for subsequent pregnancies. However, attempting vaginal birth after CS should be approached with close monitoring to allow emergency CS to those who present with complications during labour (Slykerman et al., 2020).

In a study conducted in Nigeria, it was observed that the most common causes of CS were relative indications and these included failure to progress and previous caesarean section (Byamugisha & Adroma, 2020b). These relative indications can introduce biases in the choice of delivery method. However, by detecting these indications early,

at-risk pregnant women can be referred to maternity facilities equipped to handle caesarean section, ensuring timely interventions when necessary. Relative indications can bring biases in the mode of delivery.

In 2001, Robson proposed a classification system that enables understanding of the internal structure of the CS rate at individual health facilities and identification of strategic population groups to prevent the use of unnecessary CS (Robson, 2001). This system enables a comprehensive analysis of CS rates within individual health facilities and aids in the identification of specific target areas for interventions.

Additionally, a large-scale study conducted in 43 countries attempted to create a global reference for CS rates at facility level, utilizing a mathematical model (Souza et al., 2016). However, establishing such a reference requires a baseline prevalence of CS and a comprehensive understanding of the obstetric indications for CS. In both cases, a baseline prevalence of CS and the obstetric indications for CS are essential to establish this reference (Liang et al., 2018).

2.4 Chapter Summary

This chapter delved into an extensive exploration of global, regional, and local literature to examine and emphasize the significance of caesarean section as a life-saving procedure when there are clear medical indications. The researcher critically analysed the existing literature to highlight the essential role of caesarean section in addressing obstetric emergencies and improving maternal and neonatal outcomes in medically necessary cases. Moreover, the chapter also delved into the potential detrimental effects of overutilizing caesarean section in the absence of medical indications, particularly in resource-limited settings. The chapter also provide an in-

depth discussion of the theoretical framework that underpinned the study and the justification and relevance for selecting it.

Overall, this chapter served as a comprehensive review, drawing upon global, regional, and local sources to highlight the importance of caesarean section when medically indicated. By integrating findings from various sources, this chapter contributed to a deeper understanding of the importance of caesarean section when medically indicated and consequences when overused, ultimately informing evidence-based decision-making in obstetric care.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter describes the study setting and design while providing a rationale for why those selections were made. The study population and methods used to determine sample size and sampling method are also described. Study variables and tools that were used to collect and analyse data are described. The strategies that were employed to access the study site are also discussed including pilot testing strategies. Limitations and delimitations are also acknowledged while highlighting the relevance of the study. Ethical considerations are also mentioned highlighting the measures taken to protect the participants' and study data in line with acceptable standards as approved by MNMH and Africa University Research Ethics Committee (AUREC).

3.2 Study setting

This study was conducted at Mbuya Nehanda Maternity Hospital located at Parirenyatwa Group of Hospitals in Harare, Zimbabwe. MNMH is a referral and teaching hospital associated with the University of Zimbabwe (UZ). Its catchment area includes Harare City Council (HCC) clinics, as well as clinics and hospitals in other provinces.

The choice of this particular site was deemed suitable due to several factors. Firstly, the hospital's significant number of deliveries made it an ideal setting for conducting the study, ensuring a robust sample size for data collection and analysis. Additionally, the high rate of CS observed at MNMH made it particularly relevant for examining the factors associated with this mode of delivery.

Furthermore, the choice of a teaching hospital provided an additional advantage. The findings derived from this study can be readily utilized as educational material, contributing to the enhancement of obstetric care, and serving as valuable resource for teaching purposes. The hospital's status as a teaching institution facilitated the dissemination and application of research outcomes, potentially leading to positive changes in clinical practices and patient care

3.3 Study Design

This research was an analytical cross-sectional study which entailed the systematic collection and analysis of data from women who give birth at MNMH during the study period. The selection of a cross-sectional study design was deliberate, as it is particularly well-suited for prevalence studies. By adopting a cross-sectional approach, this research was able to capture a snapshot of the population at a specific point in time, thus enabling the examination of the prevalence of caesarean delivery among the participants.

The analytical aspect of the study was of paramount importance, as it allowed the researcher to delve into the underlying factors and associations contributing to caesarean delivery. This deep analysis of data was important in uncovering potential correlations and understanding the complex nature of caesarean section utilization in the context of the study population at MNMH. Furthermore, the analytical component of this study facilitated a more comprehensive analysis to ascertain the presence or absence of associations between the main study variables and occurrence of caesarean delivery.

This study encompassed a diverse range of sociodemographic characteristics that served as the dependent variables under investigation. The main variables were

residence, age, gravidity (number of pregnancies), parity (number of previous births), marital status, religion, past obstetric indications, number of antenatal clinic visits, booking status, and level of education.

Residence was an important sociodemographic characteristic, as it provided insights into the participants' geographical locations and potential variations in healthcare access and delivery practices across different areas. In addition, booking status was an important variable that highlighted the distribution of emergency cases which could have potentially influenced the method of delivery. Number of antenatal visits prior to admission was another valuable variable that allowed the researcher to assess the health seeking behaviour of the participants and access to health services.

Age, as a variable, provided valuable information regarding participants' life stages and potential age-related factors that could impact the choice of delivery method.

Gravidity and parity were significant variables because they shed light on the participants' pregnancy histories and obstetric experiences. These variables allowed for an exploration of potential associations between the number of pregnancies or previous births and the likelihood of delivering through caesarean section. In addition, past obstetric indications were also an important variable that added value in understanding the association between risk factors and caesarean delivery.

Marital status was considered to understand the influence of the participants' social support system especially when considering the role that husband plays in patriarchal traditional culture. Religion provided insights into the cultural and religious beliefs that may influence the decision-making process regarding delivery.

By studying these sociodemographic characteristics as dependent variables and the method of delivery as the independent variable, this study aimed to analyse the complex relationships and factors influencing delivery by caesarean section at MNMH thereby providing a way for strategies to optimize obstetric care and maternal-infant health outcomes.

3.4 Study Population and Sampling

3.4.1 Study Population

The study population for this research consisted of pregnant women who sought healthcare services at Mbuya Nehanda Maternity Hospital between September 2021 and August 2022 (12 months). Records of delivery during the study period were collected and analysed.

3.4.2 Sample Size

The researcher used the register of admitted patients as a sampling frame. Using systematic random sampling, 1668 participants were enrolled in the study over the 12-month period (139 participants were selected each month).

For Sample size calculation, the following formulae was used:

$$N = \frac{CV^2(1-p)(p)}{d^2}$$

Where N = minimum sample required, CV = critical value, p = prevalence and d = margin of error or precision. Recent statistics stated that the prevalence of CS in Zimbabwe was 9% (UNICEF, 2020), therefore at 95% CI and 5% margin of error, sample size determination was as follows:

$$N = \frac{CV^2(1-p)(p)}{d^2} = \frac{1.96^2(0.91)(0.09)}{0.05^2}$$

$$= 125.850816 \approx 126$$

Based on preliminary data analysis and assuming a missing data rate of 10%, a sample size of 139 was ideal. A total sample size of 139 was successfully enrolled each month over the 12-month study period. Therefore, a total of 1668 participants were successfully enrolled in the study.

3.4.3 Inclusion Criteria

All women who delivered at Mbuya Nehanda Maternity Hospital from September 2021 to August 2022 were included in the study. All birth records of deliveries that occurred from September 2021 to August 2022 were included in the study.

By including all women who delivered at MNMH, the study ensured a representative sample that accurately reflected the population of interest. This approach aimed to minimize selection bias and provide a comprehensive understanding of the prevalence of caesarean delivery at MNMH during the study period.

To capture the complete range of data required for the study, all birth records from September 2021 to August 2022 were meticulously collected and included in the analysis.

By including all women who delivered at MNMH and considering all birth records within the specified study period, this research sought to provide a robust and comprehensive understanding of the factors influencing the method of delivery at MNMH.

3.4.4 Exclusion Criteria

To ensure integrity and focus of the study, certain exclusions were implemented. Specifically, all women who were referred from tertiary institutions were excluded from the study. This decision was made due to the fact that referrals from tertiary institutions typically indicate complex pregnancies or medical conditions that require specialized surgical interventions such as caesarean section. By excluding these cases, the study aimed to maintain a more homogenous sample of women who delivered at MNMH thus providing a clearer understanding of the factors specifically related to method of delivery.

Records that fell outside of the study period were also excluded from the study. This exclusion ensured that the study focused solely on the data from the deliveries that occurred between September 2021 and August 2022, thereby enhancing the accuracy and relevance of the findings within the specified study period.

Furthermore, incomplete, and ineligible records were also excluded from the study. This exclusion was crucial for maintaining data quality and ensuring that only reliable and valid information was included in the analysis. Incomplete records could have compromised the accuracy and integrity of the findings, potentially leading to biased or unreliable conclusions.

3.5 Data Collection Instruments

The researcher designed a questionnaire and a data collection sheet to collect the required data meant to answer the objectives of the study. The researcher administered questionnaires to collect sociodemographic characteristics (See Appendix C and D).

The data collection sheet was designed to collect data from delivery registries. The first part captured the prevalence of caesarean section by recording the total number of caesarean deliveries as a percentage of total deliveries during the study period. The data collection sheet was used to ensure data uniformity.

The last part of the data collection sheet was used to record obstetric indications for CS at MNMH during the study period. These indications were recorded as found on the registers and graded as either absolute or relative indications (See Appendix G).

3.6 Data Collection Procedures

3.6.1 Study Variables

A range of sociodemographic characteristics such as residence, age, gravidity, parity, marital status, religion and level of education and obstetric indications were the dependent variables. Method of delivery used which was either caesarean section or normal vaginal delivery were the independent variables.

3.6.2 Pretesting of tools

The questionnaire and data collection sheet were pretested using 10% of sample size and optimized to meet the objectives of the study.

3.6.3 Data collection Process

To select participants for this study, the researcher employed systematic random sampling method, using MNMH admission register. After selection of participants, informed consent was obtained from participants, and they were given a choice between completing the informed consent form and study questionnaire in English or Shona. Participants that consented to be part of the study responded to the

questionnaire as administered by the researcher. All participants chose to use the English questionnaire although the Shona version was also available.

To ensure the safety of both the participant and the researcher during the COVID-19 pandemic, physical distancing of at least one meter, wearing of a face mask, and hand sanitizing before and after signing the consent form were all strictly observed, as stipulated by MNMH and in line with the recommendation from WHO. A summary of the information captured on the questionnaire is described below.

Study participants were asked about their residence, age, marital status, level of education, religion, employment status, gravidity, parity, past obstetric complications, booking status and number of ANC follow up visits they had.

Residence was recorded as being within the Harare catchment area or outside of the Harare catchment area. Age was recorded as absolute figures and as a continuous variable. Marital status was recorded using four parameters that is, single, married, divorced and cohabiting. Level of education was recorded also as a dichotomous variable with responses such never/primary education (0) and secondary and tertiary (1) while religion was recorded as Christian (1) and other (0). Study participants were also asked about their employment status with responses as either housewife or employed.

The researcher then used the data collection sheet to record the data found on birth registers after participants gave birth at MNMH during the study period. The data included method of delivery and past obstetric indications.

Data collection was conducted by the researcher while ensuring that no routine clinical work was interrupted. For missing values in the registers, the researcher retrieved the

information from the patients' files. However, if critical information was missing, the participant was excluded from the study.

3.7 Organization and Analysis of Data

Raw data collected from the questionnaires and on the data collection sheets were entered into a password protected Microsoft Excel sheet to ensure the security and confidentiality of participants' information. To maintain data integrity, systematic organization and cleaning procedures were implemented, aimed at verifying the completeness and accuracy of the collected data before commencing with the data analysis phase.

Identification of participants was done using random numbers generated in Microsoft Excel to maintain confidentiality and to avoid duplication of participant numbers. This approach ensured that each participant was assigned a unique identifier while maintaining the anonymity of their personal information.

Following data coding and cleaning, logistic regression analysis was conducted as the primary statistical method to explore the relationships between variables. Odds ratios and p-values were calculated using Stata version 16, a statistical software package, to quantify the strength and significance of associations between variables.

Tables and figures were generated using Stata version 16 and modified using Microsoft Excel 2019. These visual representations facilitated a clear and concise presentation of data, enhancing the understanding of the results.

Descriptive statistics, including frequencies and tables, were generated to provide a comprehensive overview of the collected data. Bivariate and multivariate regression was done to further explore the relationships between variables while controlling for

potential confounding factors. Odds ratios were utilized to measure the magnitude of associations, and statistical significance was determined by p-values below the threshold of 0.05, indicating a strong likelihood that the observed associations were not due to random chance.

The statistical analysis conducted in this study adhered to rigorous standards to ensure the validity and reliability of the findings. Overall, by employing appropriate statistical techniques, the study aimed to provide valuable insights into the relationship between the variables that were under investigation.

3.8 Ethical considerations

The researcher sort and was granted authorisation from the Parirenyatwa clinical director and Mbuya Nehanda Maternity Hospital management for use of the population and data for this study. The research proposal was also presented to the Africa University Research Ethics Committee (AUREC) for approval and the researcher was granted permission (Approval Number: 2621/22).

To protect the confidentiality of participants data, no names were recorded on the data collection sheet. Instead, serial numbers were used as found on the birth record registers. The serial numbers were later linked to randomly generated numbers in excel to further protect the participants identity.

Additionally, data was coded, cleaned, and entered into Stata version 16 for cleaning and analysis on a computer that was password protected and only accessible to the researcher.

Data collection procedures were done without interrupting the routine duties of the clinicians. Majority of data collection was done during the weekend when the theatre

and labour ward was less busy. No harm incurred to the participants. No monetary benefits were given to the participants. The completed data collection sheets were stored in a lockable cabinet where only the researcher had access.

Research outcomes will be presented at Africa University as part of fulfilling the requirements for a Master of Public Health program. The full dissertation will be available in hard and soft copy version in the Africa University library, MNMH and Parirenyatwa Group of Hospitals clinical director. Findings will also be published in a peer review journal and disseminated through research symposiums.

3.9 Chapter Summary

An analytical cross-sectional study was conducted among pregnant women at MNMH between September 2021 and August 2022. A total of one thousand six hundred and sixty-eight (1668) participants were enrolled in the study. Data was collected using an interview questionnaire and a data collection sheet. Sociodemographic characteristics, obstetric indications and method of delivery were the major variables under study. Ethical approval was obtained from Parirenyatwa Group of Hospitals clinical director, MNMH and Africa University Research Ethics Committee (AUREC).

CHAPTER 4 DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.1 Introduction

This chapter presents the results of the study. Data presentation is in the form of tables, graphs, and figures. Statistical methods were used to describe and analyse the study variables. The study results were interpreted to give meaning to the outcomes of the statistical analysis.

4.2 Data Presentation and Analysis

4.2.1 Sociodemographic characteristics of participants

Data from a total of 1668 participants were analysed. From the 1668 participants, 82% (n=1374) were residents of the Harare catchment area whilst only 18% (n=294) were referred from clinics outside of the Harare catchment area (Figure 2).

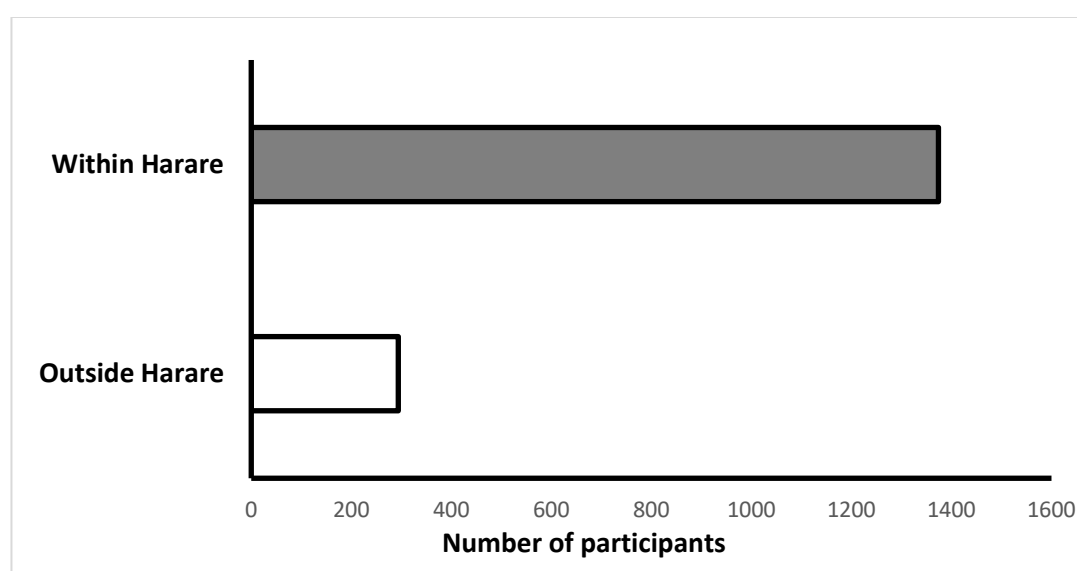


Figure 2: Distribution of participants according to residence at Mbuya Nehanda Maternity Hospital from September 2021 to August 2022

The participants age ranged from 15 to 44 years with an average and median age of 28 years with a standard deviation of 6 years. About half (51.5%) of the participants were between 18 and 29 years. The second most frequent age range was 29-39 years (41.4%). Only 3.7% of the participants were less than 17 years old and participants greater than 40 years were only 3.4%.

A total of one thousand and eighty (1080) participants were married (64.7%) and constituted the majority. About four hundred and eighty-one (481) participants were living together (co-habiting) without being legally or traditionally married (28.8%). A small proportion of the participants were divorced (3.4%). Only 56 participants were single (3.1%).

Most of the participants (74.0%) had obtained at least a secondary level education as their highest academic qualification. About a fifth (17.9%) of participants had at least a tertiary education. Only about 8% of the participants had primary education as their highest academic qualification. There were only two (0.1%) participants who had never obtained a formal education at all.

Of the one thousand six hundred and sixty-eight (1668) participants enrolled in this study, most of the participants (68.0%) were Christians. About a quarter (27.0%) belonged to the traditional Apostolic sect from Manicaland. Only about 4.9% belonged to the African tradition religion. Only two (0.1%) of the participants were Muslims.

Almost three quarters (74.8%) of the participants were housewives. About a quarter (25.2%) were employed or actively engaged in an income generating project.

During the study period, most of the participants who delivered at Mbuya Nehanda Maternity Hospital had at least one previous pregnancy (67.5% gravida >1). About a

third (32.5%) of the participants were admitted for their first pregnancy. Study participants had a mean gravida of 2.4 with a standard deviation of 1.4. About 66.3% of participants had given birth to at least one live neonate or at 24 weeks or greater gestation regardless of whether it was a live or stillbirth. Less than half (33.7%) of the participants had not given birth before.

Only about 31.8% of all the participants had a history of past obstetric indications or pregnancy complications. Many of the participants (68.2%) had no reported history of any past obstetric indications or pregnancy complications.

Nearly every participant (93.6%) had booked to deliver at Mbuya Nehanda Maternity Hospital. Only a few participants (6.4%) did not book but instead were admitted as unbooked patients who came in as emergencies.

On admission, the least gestational age was 21 weeks, and the highest gestational age was 43 weeks. The average gestational age on admission was 38 weeks with a standard deviation of 2.9 weeks. The majority (71.0%) of participants who delivered at MNMH had a gestational age of between 37 and 42 weeks. A few participants were admitted with a gestational age below 37 weeks and above 42 weeks accounting for 27.1% and 1.3% respectively.

Almost all participants (95.9%) had at least three antenatal care (ANC) visits before delivery at Mbuya Nehanda Maternity Hospital. A small proportion of participants had less than three ANC visits accounting for just 4.1% of all participants. A summary of the sociodemographic data after conducting a univariate analysis is outlined in Table 1 below.

Table 1: Univariate Analysis - Demographic Characteristics of Participants at Mbuya Nehanda Maternity Hospital from September 2021 to August 2022

Variable	Response n (%)
Residence	
Outside Harare	294 (18.0)
Within Harare	1374 (82.0)
Age (years)	
<17	62 (3.7)
18-28	859 (51.5)
29-39	690 (41.4)
>40	57 (3.4)
Marital Status	
Single	56 (3.4)
Married	1080 (64.7)
Divorced	51 (3.1)
Co-habiting	481 (28.8)
Education Status	
Never	2 (0.1)
Primary	133 (8.0)
Secondary	1234 (74.0)
Tertiary	299 (17.9)
Religion	
Christian	1134 (68.0)
Apostolic	450 (27.0)
Muslim	2 (0.1)
Traditional	82 (4.9)
Employment Status	
Housewife	1248 (74.8)
Employee	420 (25.2)
Gravidity	
1	543 (32.6)
>1	1125 (67.4)
Parity	
0	563 (33.8)
>1	1105 (66.2)
Past Obstetric Indication	
Yes	531 (31.8)
No	1137 (68.2)
Booking Status	
Yes	1561 (93.6)
No	107 (6.4)
Gestational Age (weeks)	
<37	362 (21.7)
37-42	1284 (77.0)
>42	22 (1.3)
Number of ANC follow up	
<3	68 (4.1)
3	1089 (65.3)
>3	511 (30.6)

4.2.2 Sociodemographic factors associated with CS

Several sociodemographic factors were associated with delivery through CS. These factors include residence, age, gravidity, parity, previous obstetric indications, booking status and gestational age on admission.

A total of 55.8% of participants who were residents outside of the Harare catchment area delivered through CS whilst only 35.8% of participants who resided within Harare catchment area delivered through CS (Figure 3). Upon a bivariate analysis, there was an association between residence and delivery method ($p < 0.001$). After adjusting for other study variables ($p < 0.001$), the odds of delivering using CS among those within Harare catchment area were 0.4 times the odds of those residing outside Harare (OR = 0.4 :95% CI = 0.3 – 0.6, $p < 0.001$) (Table 3).

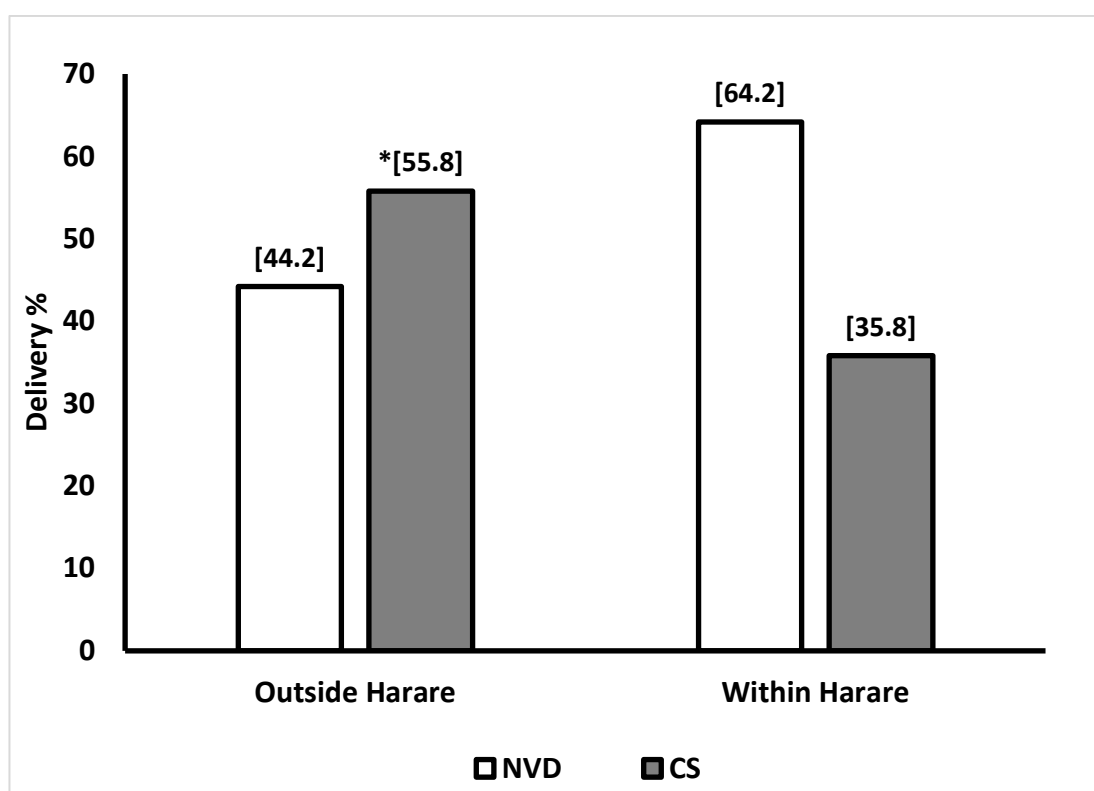


Figure 3: Association between residence and delivery method at Mbuya Nehanda Maternity Hospital from September 2021 and August 2022. * Statistically significant.

There was an association between method of delivery and age of participants. A bivariate analysis showed that overall, as the age of participants increased, delivery through CS also increased. A total of 71% of all participants who were less than 18 years old delivered through NVD while only 29% delivered through CS (p value <0.001). On the other hand, a total of 71.9% of all participants who were greater or equal to 40 years old delivered through CS whilst only 28.1% delivered through NVD (p value <0.001). The lowest delivery through CS was within the 18 to 28 years group where almost three quarters (73.9%) delivered through NVD and only 26.1% delivered through CS (p value <0.001).

After a multivariate analysis, participants aged 40 years and above had 7 times the odds of delivering through CS (OR 7.0, 95% CI = 2.9-17.1, p-value <0.000) compared to participants younger than 40 years. Table 4 below outlines these findings.

About 43.8% of multigravida participants delivered through CS while only 30.0% of primigravida participants delivered through CS (p<0.005). However, after a multivariate analysis (Table 3), the odds of delivery through CS among the multigravida was not statistically significant (OR= 1.2: 95% CI=0.5-2.9, p=0.614).

Almost a third (31.4%) of nulliparous participants gave birth through CS while 43.4% of multiparous participants gave birth through CS (p<0.005). the odds of delivering through CS among the multiparous participants was 0.4 times that of nulliparous participants (OR= 0.4 : 95% CI = 0.2 – 1.0, p = 0.044).

A little over two thirds (67.4%) of participants with past obstetric indications delivered through CS. Only about a quarter (26.2%) of participants with no past obstetric indications delivered through CS (p<0.005). After a logistic regression, the odds of

delivery through CS for participants with past obstetric indications was 6.1 times that of participants with no past obstetric indications (OR = 6.1: 95% CI 0.0 – 0.01, $p < 0.005$) (Table 3).

Of all the participants that booked to deliver at MNMH, about 38.0% delivered through CS while 60.7% of those who did not book delivered through CS ($p < 0.005$). The odds of delivering through CS were more than double among those who did not book compared to those who had booked to deliver at MNMH (OR= 2.5 : 95% CI = 1.7 – 3.8).

There was a significant difference in gestational age on admission between participants who had NVD compared to those who delivered through CS ($p < 0.001$). The mean gestational age on admission among those who had a NVD was 37.6 weeks compared to 38.5 weeks among those who delivered through CS.

About 81.8% of participants who were admitted with a gestational age greater than 42 weeks delivered through CS while only 18.2% delivered through NVD. Upon a multivariate analysis, the odds of delivering through CS when admitted with a gestational age greater than 42 weeks were 1.2 times higher when compared to those admitted at a lower gestational age (OR 1.2 :95% CI = 1.1-1.2, $p < 0.000$).

Table 2: Bivariate Analysis of sociodemographic factors and delivery method at MNMH between September 2021 and August 2022

Variable	Delivery method		p-value
Residence	NVD n (%)	CS n (%)	
Outside Harare	130 (44.2)	164 (55.8)	<0.001
Within Harare	882 (64.2)	492 (35.8)	
Age (years)			
<17	44 (71.0)	18 (29.0)	<0.001
18-28	635 (73.9)	224 (26.1)	
29-39	317 (45.9)	373 (54.1)	
>40	16 (28.1)	41 (71.9)	
Marital Status			
Single	37 (66.1)	19 (33.9)	0.061
Married	622 (57.4)	458 (42.6)	
Divorced	34 (66.7)	17 (33.3)	
Co-habiting	319 (65.6)	162 (34.4)	
Education Status			
Never	2 (100.0)	0 (0.0)	0.321
Primary	76 (57.1)	57 (42.9)	
Secondary	735 (59.6)	499 (40.4)	
Tertiary	199 (66.6)	100 (33.4)	
Religion			
Christian	698 (61.6)	436 (38.4)	0.184
Apostolic	260 (57.8)	190 (42.2)	
Muslim	1 (50.0)	1 (50.0)	0.066
Traditional	53 (64.6)	29 (35.4)	
Employment Status			
Housewife	768 (61.5)	480 (38.5)	0.661
Employee	244 (58.1)	176 (41.9)	
Gravidity			
1	380 (70.0)	163 (30.0)	<0.001
>1	632 (56.2)	493 (43.8)	
Parity			
0	386 (68.6)	177 (31.4)	<0.001
>1	626 (56.7)	479 (43.4)	
Past Obstetric Indications			
Yes	839 (73.8)	298 (26.2)	<0.001
No	173 (32.6)	358 (67.4)	
Booking			
Yes	951 (62.0)	583 (38.0)	<0.001
No	42 (39.3)	65 (60.7)	
Gestational Age (weeks)			
<37	240 (66.3)	122 (33.7)	<0.001
37-42	761 (59.3)	523 (40.7)	
>42	4 (18.2)	18 (81.8)	
Number of ANC follow up			
<3	42 (61.8)	26 (38.2)	0.180
3	664 (61.0)	425 (39.0)	
>3	306 (59.9)	205 (40.1)	

After considering all variables and in order to account for confounding variables, a multivariate analysis was conducted to determine the association between the different variables and method of delivery. The odds ratio and confidence interval were also determined as outlined in Table 3 below.

Table 3: Logistic regression outputs of sociodemographic factors associated with delivering through caesarean section at Mbuya Nehanda Maternity Hospital from September 2021 to August 2022

Variable		Odds Ratio (95% CI)	p-value
Residence			
	Outside Harare	Ref.	
	Within Harare	0.4 (0.3-0.6)	0.000
Age			
	18 - 28	0.9 (0.5-1.7)	0.827
	29 - 39	3.1 (1.6-6.0)	0.001
	>40	7.0 (2.9-17.1)	0.000
Gravidity			
	1	Ref.	
	>1	1.2 (0.5-2.9)	0.614
Parity			
	0	Ref.	
	>0	0.4 (0.2-1.0)	0.044
Past Obstetric Complications			
	No	Ref.	
	Yes	6.1 (0.0-0.01)	0.000
Booking Status			
	Yes	Ref.	
	No	2.5 (1.7-3.8)	0.000
Gestational Age			
	<37	0.6 (0.4-1.8)	0.782
	37-42	Ref.	
	>42	1.2 (1.1-1.2)	0.000

4.2.3 Prevalence of CS at MNMH

During the study period, a total of 1012 (60.7%) participants delivered through NVD while 656 (39.3%) delivered through CS. The most common method of delivery was NVD (60.7%).

The overall prevalence of CS during the 12 months study period was **39.3%**. The month with the highest CS rate was September 2021 (71.2%) and the lowest CS rate was recorded in January 2022 (18.7%). CS rate in each month was above the WHO recommended 15% threshold.

Almost half (49.4%) of participants delivered through CS in December 2021 but there was a sharp decrease in January 2022 where less than a quarter (18.7%) delivered through CS. A more detailed illustration is shown in figure 4 below.

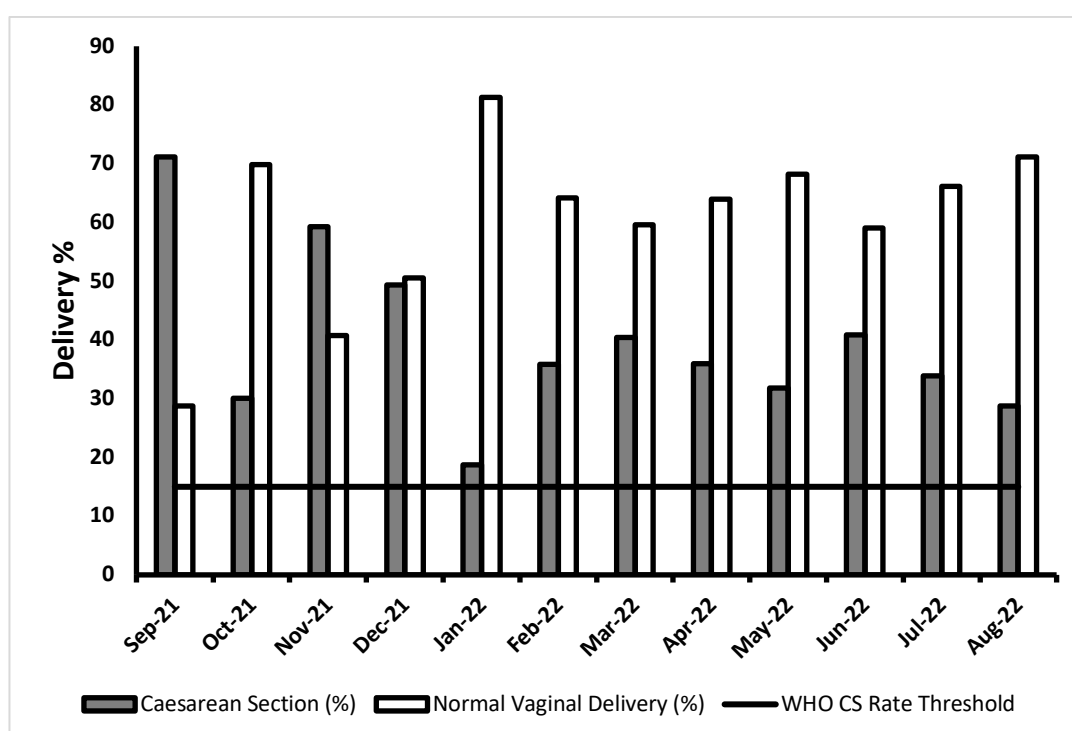


Figure 4: Caesarean section rate at Mbuya Nehanda Maternity Hospital from September 2021 to August 2022. The horizontal line indicates the caesarean section rate threshold (15%) as recommended by the World Health Organisation.

4.2.4 Indications for CS

The most common obstetric indication (40.1%) for CS at MNMH during the study period was having a previous caesarean section. The least common indication was psychosis (0.2%).

The obstetric indications for CS were grouped into either relative or absolute indications. Relative indications accounted for about 58.4% of all deliveries through CS. Less than half (41.6%) were absolute indications for delivery through CS.

About 54.9% of obstetric indications were due to maternal factors, 23.7% were due to infant factors and the remaining 21.4% was due to both maternal and infant factors. The most common maternal factors were previous caesarean section (40.1%), eclampsia (10.2%), and pre-eclampsia (4.6%).

The most common infant factors were foetal distress (10.1%), breech (7.5%), big baby (4.6%), cord prolapse (4.4%), and intrauterine growth restriction (0.8%). The least common infant factors were oligohydramnios (0.3%) and fibroid uterus (0.3%).

Other obstetric indications were both maternal and infant factors and these included prolonged labour (7.9%), big baby (5.7%), twin pregnancy (2.7%), postdates (1.7%), and maternal genital warts. A summary of the obstetric indications for CS is outlined in table 4 below.

Table 4: Obstetric indications for caesarean section at Mbuya Nehanda Maternity Hospital, Harare, Zimbabwe

Obstetric Indication	Frequency	Percentage
Previous CS*	263	40.1
eclampsia	67	10.2
Foetal distress	66	10.1
Prolonged labour*	52	7.9
Breech	49	7.5
Big baby*	37	5.7
Pre-eclampsia	30	4.6
Cord prolapses	29	4.4
Twin pregnancy*	18	2.7
Cephalopelvic disproportion	15	2.3
Post-dates*	11	1.7
Intrauterine growth restriction	5	0.8
Antepartum haemorrhage	3	0.5
Previous miscarriage*	2	0.3
Genital Warts*	2	0.3
Fibroid uterus*	2	0.3
Obstructed labour	2	0.3
Oligohydramnios	2	0.3
Psychosis	1	0.2
TOTAL	656	100.0

* Relative indication for caesarean section

4.3 Chapter summary

Overall, prevalence of CS at MNMH during the study period was 39.3% which is higher than the WHO recommended threshold. Several sociodemographic factors were associated with delivery through CS and these included residence, age, gestational age on admission, parity, past obstetric complications and booking status. Marital status, religion, education status, employment status, and number of ANC visits had no association with delivery through CS. Of all the obstetric indications for CS, having a previous CS was the most frequent indication. Maternal indications were more prevalent than infant factors. More than half of the indications were relative indications (58.4%).

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the researcher gives a summary of the findings of the study and discusses these findings relative to the objectives of the study in a way that allows conclusions to be drawn and recommendations to be made. Outstanding areas for possible further research will also be mentioned in this chapter.

5.2 Discussion

5.2.1 Sociodemographic characteristics

Several sociodemographic factors were associated with delivery through CS and these included place of residence, age, gravidity, parity, past obstetric complications and booking status. However, other factors such as marital status, religion, employment status and level of education had no significant association with delivery through CS.

Place of residence was associated with method of delivery. The odds of delivering through CS among those within the Harare catchment area were 0.44 times the odds of those staying outside the Harare catchment area. This means that those within the Harare catchment area were 56.0% less likely to deliver through CS than those outside the Harare catchment area.

The increased odds of delivery through CS could be due to the long distance travelled by patients referred from hospitals and clinics outside the Harare catchment area (Niyitegeka et al., 2017). In Papua New Guinea, Jan Sandall et al, found the same relationship between poor health access and increase in CS rate. In the same article, they referenced a similar phenomenon in a Tanzanian study thus further augmenting

the fact that increase in CS rate is associated with place of residence (Sandall et al., 2018).

In this study, age was associated with delivery method. In general, as the age of participants increased, the odds to deliver through CS also increased. Participants above 40 years old were 7 times more likely to deliver through CS than those who were less than 40 years old. Furthermore, with increased age, the risk of obstetric complications also increases hence the association with delivery through CS (Isah, Adewole, & Zaman, 2018).

Consistent with these findings, Marconi et al, showed that women who were equal or greater than 40 years old had an increased odds of delivering through CS. However, in their findings, there was only a twofold increased odds of delivering through CS when compared to women who were between 25 and 29 years old (Marconi, Manodoro, Cipriani, & Parazzini, 2022).

After a bivariate analysis, multiparous participants were associated with delivering through CS. This could be because multiparous women have an increased risk of obstetric complications (Kadir, Fatima, Batool, & Rana, 2021). After adjusting for other factors, a multivariate analysis revealed that the odds of delivery through CS for multiparous participants were 0.42. This means that nulliparous participants were 58% less likely to deliver through CS compared to multiparous participants. However, this was not very convincing ($p = 0.044$).

Contrary to these findings, Taye et al, in a similar setting in Zambia, found that parity was not associated with delivery through CS (Taye et al., 2021). On the other hand, Al Busaidi et al, found a significant decrease in CS rate in multiparous women (Al

Busaidi, Al-Farsi, Ganguly, & Gowri, 2012). These different findings might indicate that parity is a complex variable to generalize, and it seems to be context and institutional specific.

After a bivariate analysis, multigravida was found to be associated with delivery through CS but after adjusting for other variables through a multivariate analysis, the odds of delivering through CS among the multigravida participants were not significantly increased. In line with these findings, Taye et al, in a similar setting, concluded that gravidity was not associated with delivery through CS (Taye et al., 2021).

As expected, having past obstetric indications was found to be associated with delivery through CS (Lawani et al., 2019). Several studies have found similar findings (Al Busaidi et al., 2012) (Desai et al., 2017) (Isah et al., 2018).

Booking status was associated with method of delivery. After a multivariate analysis, participants who did not book had 2.52 odds of delivery through caesarean section. This means, those who did not book had a two and half fold increased odds of delivery through CS compared to those who had booked to deliver at MNMH. Participants who did not book were admitted as an emergency since they had serious obstetric indications. Booking, especially early booking, is encouraged because it allows for accurate assessment of gestational age and monitoring and evaluation of antenatal care (Manyeh et al., 2018).

This explains the increased odds of delivery through CS among participants who did not book to deliver at MNMH. Consistent with these findings, Oriwarotimi Ireti

Akinola et al, in a Nigerian setting, stated that booking status was a significant predictive factor for delivering through CS (Akinola et al., 2014).

However, in this study, several sociodemographic factors were not associated with method of delivery. These factors include marital status, level of education, religion, employment status, number of ANC visits. Similar studies in similar settings also established the same relationship.

For example, Dankwah et al, in a similar setting, found no association between marital status and method of delivery (Dankwah, Kirychuk, Zeng, Feng, & Farag, 2019). However, in a similar setting in Southern Ghana, Manyeh et al, found that marital status was associated with method of delivery and that being married was a factor associated with delivery through CS (Manyeh et al., 2018). The differences in these findings could be due to differences in culture and traditions.

5.2.2 Prevalence of CS

Worldwide, there has been an increase in the prevalence of CS. This increase has been associated with several different factors such as obstetric indications and sociodemographic factors. In this study, the prevalence of CS at MNMH during each month of the study period was higher than the WHO recommended threshold. The overall prevalence of CS or the CS rate during the 12-month period was 39.3% which is consistent with the high CS rate that was initially established from the preliminary pilot study.

In line with these findings, Muyotcha (2018), also found a high prevalence of CS (30.2%) at MNMH. Muyotcha concluded that MNMH was currently operating beyond its capacity to meet the number of Caesarean Sections it was handling as evidenced by

the institutional failure to meet the ideal decision-to-delivery interval (DDI) of 30 mins due to staff shortages (Muyotcha, 2017). Furthermore, shortage of staff, lack of theater space, functioning equipment, and blood products contributed to the increased CS rate (Muyotcha, 2017)

The high CS rate at MNMH could be because it is a tertiary institution and therefore handles complicated pregnancies. However, it is important to establish an optimal CS rate that can be successfully handled even at a tertiary institution to ensure that patients get the best possible care. During this study, about 60% of all CS performed were primary CS and a significant number were multiparous without past obstetric complications. Furthermore, more than half of the indications for CS were relative indications (58.4%) suggesting an opportunity for improvement.

Overuse of CS has been reported in other tertiary teaching hospitals in resource limited settings such as MNMH (Litorp et al., 2015). Factors such as convenience, staffing patterns and economic incentives contributed to performance of CS in doubtful indications (Litorp et al., 2015). However, in the same article, it was noted that a systems approach is more effective than an individual attack. This means that for better outcomes, a relook at the whole system is essential and not a mere focus on healthcare providers. For instance, at MNMH, there are very limited human and capital resources hence delays in attending to patient needs might lead to emergency CS.

Consistent with these findings, Kamanda and Malama reported a CS rate of 37.5% at Kitwe teaching hospital in Zambia (Kamanda & Malama, 2021). In their paper, they stated that efforts should be made to reduce unnecessary CS by following the recommendation from WHO to use nonclinical interventions to reduce CS rate.

Furthermore, Taye et al, (2020), noted a high prevalence of CS of 39.1% in an Ethiopian comprehensive specialized hospital (Taye et al., 2021). After noting the factors that were associated with delivery through CS, Taye et al, concluded that despite the setting being a comprehensive specialized hospital, the CS rate was too high compared to other tertiary institutions in and outside the region.

South Africa has consistently recorded high CS rates especially at tertiary and private institutions with CS rate as high as 76% in private institutions (Solanki, Daviaud, Fawcus, & Cornell, 2020). With the advent of the national health insurance (NHI) in South Africa, there is fear that this trend will also be seen in public institutions (Solanki, Daviaud, et al., 2020).

As Zimbabwe considers adopting the NHI in order to provide universal healthcare, it becomes imperative to establish an optimal CS rate at each level of health care and provide both human and capital resources to provide the best possible care. By determining the sociodemographic characteristics associated with CS, a mathematical model can be used to establish the optimal CS rate. Objective health systems audits can also help educate and optimize the use of CS.

5.2.3 Obstetric indications for CS

During this study, having a previous CS was the most common obstetric indication for CS (40.1%). It has long been established that having a primary CS increases the risk of repeat CS in subsequent pregnancies (Trojano et al., 2019). In fact, up until 1970's, healthcare providers were guided by the phrase, "once a Caesarean, always a Caesarean" (Horowitz, Edelstein, & Lippman, 1981). Consistent with these findings, Chawanpaiboon et al, in Bangkok, Thailand, found similar results where the most

common indication for CS was having a previous CS (35.1%) (Chawanpaiboon, Titapant, & Pooliam, 2022).

However, contrary to these findings, Osegi et al, in a similar setting in Nigeria, found that CPD was the most common indication for CS (Osegi & Makinde, 2019). However, having a previous CS was the most common indication for an elective CS and these findings were consistent with what Govender et al found in a South African setting (Govender, Steyn, Maphasha, & Abdulrazak, 2019).

Although having a CS increases the risk for a repeat CS in subsequent pregnancies, a previous study done to audit CS rate in Zimbabwe indicated that it was reasonably safe to have a vaginal birth after CS (VBAC) especially when resources are timely provided for emergency CS to women who deviate from expected pattern of labour. The success rate for attempting to have a vaginal birth after a CS was found to be 51.1% (Hukuimwe et al., 2017). The lack of resources at MNMH could account for the high CS rate because of previous CS.

Eclampsia and foetal distress were the second and third most common indications for caesarean delivery respectively. These are absolute indications and accounted for 20.3% of all indications in this study. Eclampsia is a life-threatening condition among pregnant women accounting for over 12% of maternal deaths and up to 31% of perinatal deaths globally (Irene et al., 2021). Most of these deaths occur in sub-Saharan Africa and Zimbabwe is not spared. The high incidence of these obstetric indications could explain the high maternal and perinatal mortality especially at the backdrop of under-resourced health facilities.

About 58.4% of all caesarean deliveries at MNMH during the study period were due to relative indications. This means that more than half of the caesarean deliveries were due to reasons which could be subjective. In a teaching hospital in Dar es Salaam, Tanzania, Litorp et al, made similar observations that there was an increase in CS rate among low risk patients with relative obstetric indications (Litorp, Kidanto, Nystrom, Darj, & Essén, 2013). They later concluded that healthcare workers should accept their contribution to the rise in CS rate as decision-makers and medical experts and strive to optimize the use of CS (Litorp et al., 2015).

5.3 Conclusions

From the outcomes of this study, it can be concluded that Mbuya Nehanda Maternity Hospital had a high caesarean section rate of 39.3% over the 12-month study period. This high CS rate is above the World Health Organization's recommendation of between 10 to 15%. Residence, age, gestational age on admission, parity, gravidity, past obstetric complications and booking status were some of the sociodemographic factors associated with caesarean delivery. These factors can be used in risk stratification to reduce the decision-to-delivery interval for emergency CS.

It can also be concluded that more than half of the obstetric indications were relative indications. This means that some of the caesarean deliveries were subjective and could be optimized through a system audit. Additionally, 60% of all deliveries were primary CS meaning that most participants had a CS for the first time and unfortunately their risk for a repeat CS in subsequent pregnancies has increased. Avoiding primary CS is an easy target when trying to reduce or optimize the use of CS.

5.4 Recommendations

After establishing the sociodemographic characteristics associated with CS at MNMH, the researcher recommends a high alert especially on patients with multiple sociodemographic characteristics associated with CS so that the decision-to-delivery interval is shortened in case of an emergency CS.

Additionally, findings from this study can be used to negotiate with Zimbabwe, Ministry of Health and Child Care (MOHCC) to equip MNMH with better resources and advocate for capacitation of hospitals outside the Harare catchment area since patients residing outside Harare catchment area had more than 2 times the odds of delivering through CS compared to patients who resided within the Harare catchment area.

With the high CS rate at MNMH, the researcher recommends an independent audit to determine the capacity of MNMH to handle high caesarean deliveries. This can be done through a qualitative and quantitative study where healthcare workers are involved in finding solutions to optimize the use of CS. Furthermore, an objective mathematical model can be used to determine the optimal CS rate that is specific for MNMH as a referral institution. This optimal CS rate can then be used as a marker of overuse or underuse and thus quickly resolve issues timeously.

Although healthcare workers' perspectives regarding the reasons for high CS rate at MNMH are absent, more than half of the obstetric indications for CS were relative thus suggesting that they could have been subjective. Hence the researcher recommends implementation of evidence-based obstetric care guidelines coupled with

structured second opinion for CS indications that are relative. To successfully implement this, MNMH needs to be adequately resourced with senior clinicians.

However, caution should be taken in implementing these recommendations because CS should be provided to those with medical indications hence a monitoring and evaluation team can be established to assess the impact of implementing these recommendations.

5.5 Suggestions for further study

Although many questions were answered regarding CS at MNMH, this was only an institution-based study utilizing an analytical cross-sectional method. There remains a gap on CS rate in private and rural institutions to identify the full picture of health inequity in Zimbabwe. Therefore, the researcher suggests nationwide research representing health institutions at every level. This could provide information on how resources should be distributed to reduce high CS rate at tertiary institutions. This will be a critical study especially when the government adapts the NHI policy.

Additionally, perceptions of healthcare workers at MNMH and other institutional factors contributing to the high CS rate need further research to enable a more holistic approach in optimizing the use of CS.

A prospective study using a mathematical model to calculate the optimum CS rate at MNMH while observing both maternal and neonatal outcomes can be done. This will help create an objective CS rate threshold based on obstetric indications and the capacity of MNMH.

A laboratory-based infant gut microbiome study can be done on infants delivered through emergency CS, elective CS, and normal vaginal delivery to assess the impact

of CS on the health of the infant. Although some studies have attempted to establish the relationship between infant gut microbiome, maternal gut microbiome and method of delivery, no attempt has successfully established the mechanism or direct causation for this relationship. A laboratory-based *in vitro* and *in vivo* model can be created to establish this causation.

Additionally, an investigation on maternal mortality following CS can provide useful information on how to decrease maternal mortality rate in Zimbabwe which is unacceptably high.

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Appendix 1: Questionnaire, English Version

Prevalence and indications of caesarean delivery at Mbuya Nehanda Maternity Hospital, Harare

Section A: Demographic data

Q1. Age

Q2. Marital Status: Married Single/Never married

Divorced Widowed

Co-habiting Separated

Q3. Educational level: Never Primary

Secondary Tertiary

Q4. Religion:

Q5. Employment status: Unemployed Informal

Formal public Formal private

Other

Section B: Obstetric history

Q6. How many pregnancies have you had before this current pregnancy?

Q7. How many full-term pregnancies have you had before?

Q8. How many children do you have?

Q9. How many ANC visits did you have before this visit?

Q10. Have you ever had any pregnancy complications? Yes No

Q11. How many still births have you had before?

Q12. How many CS deliveries have you had before?

Q13. How many times have you booked at MNMH?

Q14. How many weeks was your pregnancy when you were admitted at MNMH?

Q15. What treatment are you currently taking?

Q16. What is your HIV status?

Appendix 2: Questionnaire, Shona Version

Prevalence and indications of caesarean delivery at Mbuya Nehanda Maternity Hospital, Harare

Chikamu chekutanga: Nhorondo yehupenyu

Q1. Makore ekuzvarwa

Q2. Makaroorwa here: Ndakaroorwa Handisati ndaroorwa

Takarambana Ndakafirwa

Tinogarisana Takapesana

Q3. Makadzidza kusvika papi: Handina kuenda kuchikoro Primary

Secondary Korichi

Q4. Chitendero:

Q5. Munoenda kubasa here: Handishandi Ndinozviitira

Muhurumende Kukamba yakazvimirira

Zvimwe

Chikamu chechipiri: Nhorondo yezve kusununguka

Q6. Makaita pamuwiri kangani musati maita pamuwiri pamuinapo izvozvi?

Q7. Makaita mimba inobudirira yenguva yakazara kangani?

Q8. Mune vana wangani?

Q9. Maka onekwa ku kiriniki maererano nekuzvitakura kwemakaita kangani?

Q10. Makamboita zvainetsa pakuzvitakura here? Hongu Kwete

Q11. Maka sununguka mwana akafa kangani?

Q12. Maka sununguka ne chikamu chekisiriyi kangani?

Q13. Maka nyoresa kusunungukira pa MNMH kangani?

Q14. Manga makazvitakura kwe mavhiki mangani musati maradzikwa pa MNMH?

Q15. Parizvino muno tora mushonga upi?

Q16. Chimiro chenyu nezve HIV?

Appendix 3: Informed Consent Form – English Version



Informed Consent for Antenatal attendants at Mbuya Nehanda Maternity Hospital

Principle Investigator: Sidney Tendai Sithole

Name of Organization: Africa University

Name of Project: Prevalence and Indications of Caesarean delivery at Mbuya Nehanda Maternity Hospital, Harare.

Introduction

My name is Sidney Tendai Sithole and I am pursuing my studies in Master of Public Health degree with Africa University. I am doing a research on the prevalence and indications for caesarean delivery at Mbuya Nehanda Maternity Hospital. I am going to give you information regarding this study and invite you to be part of the study. Participation is voluntary and you have the right to decline participation at any time. If you understand the information I am going to share with you and feel that you want to be part of the study, I will ask you to sign at the end of the form to show that you understood the information and your participation is voluntary.

Purpose of the research

Safe delivery is important to you, your baby and to the nation at large. We want to know the proportion of women who deliver through caesarean section, their sociodemographic information and the indications that result in caesarean delivery.

Type of Research Intervention

The research will involve you responding to a few questions for about 30 minutes. The questions involve your sociodemographic information. Some of the questions involve personal and confidential information. Feel free not to respond to any question if you feel uncomfortable.

Benefits

There is no financial benefit for you participating in the study but the information we get may be used by policy makers to improve access to caesarean section to those that have a medical indication.

Reimbursements

For participating in this study, you are not going to receive any form of payment.

Confidentiality

All the information you provide will be kept very confidential and nothing in the study report will be traceable to you. No one who is not part of the study will access this information. The report will not include your name.

Sharing the Results

The results of the study will be shared with Mbuya Nehanda Maternity Hospital and Africa University, but nothing in the report will be attributable to you.

Right to Refuse or Withdraw

As mentioned earlier, you have the right to refuse or withdraw from the study at any time.

You will not be penalized for that.

Who to Contact

If ever you think or find something you may want to discuss or share after the interview, feel free to contact me (0774154279) or any of your clinicians. You may ask me any questions if you want.

Part II: Certificate of Consent

Having been invited to take part in the study, I have read the above information and understood it. I was given a chance to ask questions where I did not understand, and the questions were answered to my satisfaction. I therefore, voluntarily consent to take part in the study.

Name of Participant _____

Signature of Participant _____

Date _____

Day/month/year

Statement by the researcher/person taking consent

I confirm that the participant was given an opportunity to ask questions about the study, and

all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent_____

Signature of Researcher /person taking the consent_____

Date _____

Day/month/year

Appendix 4: Informed Consent Form – Shona Version



Gwaro remvumo yekupinda mutsvakurudzo

Mudzidzi: Sidney Tendai Sithole

Zita rechikoro: Africa University

Zita reongororo: Ongororo yekuwanda ne zvinoratidza kuti paitwe Chikamu che Kasariya (Caesarean Section) pa Mbuya Nehanda Maternity Hospital.

Nhanganyaya

Zita rangu ndinonzi Sidney Tendai Sithole uye ndiri mudzidzi pachikoro cheAfrica University ndichiita zvidzidzo zvekuva mazvikokota mune zvehutano hweruzhinji. Ndiri kuda kuita wongororo yekuwanda ne zvinoratidza kuti paitwe Chikamu che Kasariya (Caesarean Section) pa Mbuya Nehanda Maternity Hospital. Ndichakupai ruzivo rwezveongororo iyi zvizere nekukukumbirai kupinda muongororo iyi kana makasununguka. Kupinda kwenyu muongororo iyi ndekwekuzvidira, hakumanikidzwi uye makasununguka kuramba kupinda kana kubuda muongororo pamunodira. Kana muchinge manzwisisa zviri maererano neongororo iyi uye muchinzwa kuti munoda kupinda muongororo iyi ndichakukumbirai kuti mugoisa runyoro rwenyu kumapeto kwegwaro rino kuratidza kuti mapinda muongororo muchiziva uye musina kumanikidzwa.

Chinangwa cheongororo

Kuzvara kusina matambudziko kwakakosha chaizvo kwamuri, kumwana wenyu neku nyika yose zvayo. Tinoda kuziva kuwanda ne zvino ratidzira kuti paitwe Chikamu che Kasariya (Caesarean Section), pa Mbuya Nehanda Maternity Hospital.

Maitirwe eongororo

Muongororo muchabvunzwa mibvunzo ingatora chinguva chinenge minhasvi makumi matatu. Mibvunzo iyi inosanganisira nhorondo yehupenyu hwenyu. Mimwe yemibvunzo yacho inogona kuva yezvakakosha nezvakavanzika zvenyu. Sunungukai kundimisa pane upi zvawo mubvunzo kana monzwa kumanikidzika kupindura mubvunzo wacho.

Mubairo

Kupinda muongororo iyi hakuna mubairo wemari kana chimwe chinhu. Zvichabuda muongororo zvinogona kushandiswa nevatungamiri kuti Chikamu che Kasariya chivanikwe kune wese vane zviratidzo zvino pinza mwana kana amai panjodzi.

Zvamuchadzorerwa

Hamusi kuzobhadharwa kupinda muongororo iyi. Hapana njodzi yamu chasangana nayo mu ongororo ino.

Tsindidzo

Humbowo huchabuda muongororo nenhaurwa dzose zviri pakati penyu neni. Hakuna mumwe munhu asiri muongororo ino achaona zvatataurirana. Gwaro nyorwa richabuda muongororo iyi harizoratidzi zvatataurirana izvi uye hapana chichanongedza kwamuri.

Kugoverwa kwezvichabuda muongororo

Zvichabuda muongororo zvichapiwa kuvatungamiri weMbuya Nehanda Maternity Hospital nevadzidzisi veku Africa University.

Kodzero yekuramba kana kubuda muongororo

Sekurehwa kwazvamboitwa kwekutanga kwegwaro rino, mune kodzero yekuramba kupinda muongororo kana kubudira pamunoda. Hamuzombopiwa mhosva yekuramba kana kubuda muongororo.

Kana mukada wekutora naye

Mukanzwa kuda kubvunza mimwe mubvunzo nyangwe mushure menhaurirano ino sunungukai kundibvunza (0774154279) kana kubvunza vana mazvikokota venyu vanokubatsirai pachipatara pano. Kana pane zvimwe zvamungada kubvunza bvunzai zvenyu.

CHITUPA CHEMVUMO YEKUPINDA MUONGORORO

Mushure mekunge ndaziviswa nezveongororo iyi uye ndakumbirwa kupinda muongororo, ndaverenga mashoko akanyorwa pamusoro apo ndikaanzwisisa. Ndapiwa mukana wekubvunza pandanga ndisinganzwisise uye zvatsanangurwa zvandigutsa. Nekudaro ndinozvipira zvisina kumanikidzwa kupinda muongororo iyi.

Zita remubatsiri muongororo _____

Rupawo rwemubatsiri _____

Zuva _____
Zuva/Mwedzi/Gore

Mashoko emudzidzi

Ndinotsidza kuti mubatsiri uyu ndamupa humbowo huzere hweongororo iyi uye mibvunzo yaabvunza ndapindura nemazvo sekugona kwangu. Ndinotsidzazve kuti mubatsiri haana kunyengedzwa kana kumanikidzwa kupinda muongororo asi apinda nekuda nekunzwisisa kwake.

Rimwe gwaro rakadai rapiwa mubatsiri uyu.

Zita remudzidzi _____

Rupawo rwemudzidzi _____

Zuva _____
Zuva/Mwedzi/Gore

Appendix 5: Data Collection Sheet from Delivery Registries

Prevalence and indications of caesarean delivery at Mbuya Nehanda Maternity Hospital, Harare, Zimbabwe

Section A: Prevalence of caesarean delivery at Mbuya Nehanda Maternity Hospital, Harare, Zimbabwe

Date	Vaginal Delivery	Caesarean Sections (CS)	Total Deliveries	CS rate

Section B: Obstetric indication

Absolute Indications	Tick appropriate	Comments (maternal and perinatal outcome)
Absolute disproportion		
Placenta Previa		
Abnormal lie and presentation		
Maternal Pelvic Deformity		
Eclampsia		
Foetal asphyxia		
Uterine rupture		
Chorioamnionitis		
Umbilical cord prolapses		
Other (Specify)		
Relative Indications	Tick appropriate	Comments (maternal and perinatal outcome)
Previous CS		
Big baby		
Failure to progress		
Other (Specify)		