PREVALENCE, OUTCOMES, AND FACTORS ASSOCIATED WITH CAESARIAN SECTION DELIVERIES AMONG WOMEN WHO DELIVERED IN SELECTED HEALTH FACILITIES IN NJOMBE REGION, TANZANIA

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By

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A Dissertation Submitted in Partial Fulfilment of the Requirements for Master of Science in Applied Epidemiology of Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certifies that, they have read and hereby recommend for submission to the Muhimbili University of Health and Allied Sciences a dissertation entitled: "The prevalence, outcomes, and factors associated with caesarian sections among women who delivered in health facilities in Njombe region from March to May 2024", in partial fulfilment of requirement for the degree of Master of Science in Applied Epidemiology at Muhimbili University of Health and Allied Sciences.

_____

Prof. Rose M. Mpembeni (Supervisor)

Date_____



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Dr. Rogath S. Kishimba

(Co Supervisor)

Date_____

DECLARATION AND COPYRIGHT

I **Jonhas Masatu**, declare that this dissertation is my original work and that it has not been and will not be presented to any other university for a similar or any other degree award.

Signature _____ **Date**_____

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DEDICATION

I dedicate this special study to my parents, Mr. and Mrs. Masatu, family members, and Post-delivery women. With this study, I have opened up new knowledge of caesarian section services in our country. I love you all.

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LIST OF ABBREVIATIONS

ANCs	Antenatal Care Services
CDC	Center for Disease Control
CS	Caesarian Sections
DC	District Council
DHIS2	District Health Information System 2
HC	Health Centre
MoH	Ministry of Health
MUHAS	Muhimbili University of Health and Allied Sciences
PDW	Post Delivery Women
PNC	Postnatal Care Services
RAS	Regional Administrative Secretary
TC	Town Council
WHO	World Health Organization
RMO	Regional Medical Officer
DMOs	District Medical Officers
MOIs	Medical Officer In charges

DEFINITION OF TERMS

Caesarian section refers to the fetal delivery through an open abdominal or laparotomy and an incision of the uterus, which aims to save the lives of a pregnant mother and/or her newborn.

Caesarian section rate refers to the total number of caesarian deliveries divided by the total number of deliveries in a given geographical area in a specified period of time.

Danger signs during pregnancy are signs that may indicate the presence of obstetric complications.

Postnatal women refer to women who give birth within one to six weeks after delivery.

Safe caesarean section refers to the caesarian section performed for the right indications by qualified medical professionals using recommended medicines and medical equipment in qualified environmental conditions, resulting in minimal risk to the maternal and newborn's health.

ABSTRACT

Background: Caesarean section (CS) reduces maternal and fetal morbidities and mortality when done appropriately. However, excessive caesarean section utilization carries significant maternal and neonatal health risks. In Tanzania, the CS rate is estimated at 13%. But Njombe region reported a 29% CS rate in 2022, exceeding the World Health Organization's recommended threshold of 15%.

Broad objective: We aimed to study CS prevalence, outcomes, and associated factors among Post-Delivery Women (PDW) in selected facilities in the Njombe region.

Methodology: We conducted the facility-based cross-sectional study using quantitative methods. Multistage cluster sampling techniques were employed to select 567 PDWs who delivered in six selected heath facilities in Njombe region. Data was collected by closed-ended questions designed in the Kobo Collector toolbox and analyzed using Stata version 15. Means and standard deviations were used for summarizing of continuous variables while frequencies and proportions were used to summarize categorical variables. The results were presented in frequency distribution tables and graphs. The Modified Poisson regression analysis was used to assess association between CS delivery and the independent variables where variables with p values <0.2 in bivariable analysis were added into the multivariable analysis model. Variables with p values ≤ 0.05 were considered to be statistically significant associated with CS.

Results: The prevalence of CS in the selected facilities in Njombe region was found to be 45.50%. Notably, 1.6% of neonates died, post-CS maternal and fetal complications of 12.8% and 32.6%, respectively.

The CS was associated with Marital status, where women who were single were 1.25 more likely to delivered by CS compared to married women (aPR = 1.25 [95% CI: 1.01–1.74]), women who delayed ANC booking were1.52 more like to delivery by CS compared to early booking (aPR = 1.51 [95% CI: 1.10.1.42]), Height of the mother also showed significant

association with CS where women who had Maternal height ≤150 cm were 1.24 more likely to undergo CS compared to ones with height above 150 cm(aPR = 1.24 [95% CI: 0.90-1.60]).

In terms of delivery factors , Baby weight was associated with CS were by women who delivered babies with weight above 4.1 Kg were1.67 more likely to delivered by CS compared with ones with babies with weight below 2.5Kg (aPR = 1.67 [95% CI: 1.07–2.27]), There was association between gestation age during delivery where by women with gestation age of 43+ at delivery were 1.49 more likely to reliever by CS compared to ones with gestation age below 37 week during delivery (aPR = 1.49 (aPR = 1.49 [1.25-1.73]), Number of babies born was associated with CS where by women with twin deliveries were 1.15 more likely to delivered by CS compared to single ones with single babies (aPR = 1.15 [95% CI: 1.03–1.68]).

There was a significant association between CS and referral status where women who referred from health centers were 2.10 more likely to delivered by CS compared to ones who come from home (aPR = 2.10 [95% CI: 1.50–3.80]), Women who delivered in Private owned health facilities were 1.13 more likely to delivery by CS compared to ones delivered in public health facilities (aPR = 1.13[95% CI: 0.75-1.67]), and Women who used NHIF financing method were 1.12 more likely to undergo CS compared to ones who paid cash for labor and delivery services (aPR = 1.12 [95% CI: 1.40-1.90]).

Conclusion: The prevalence of CS among PDW in the selected health facilities in Njombe region was found to be 45.5% (95% CI: 41%-49%). The leading fetal and maternal indications for caesarian section were previous scars and fetal distresses. Notably, there was a neonatal death rate of 1.6% and post-CS maternal and fetal complications of 12.8% and 32.6%, respectively. The CS deliveries and newborns factors was associated with social demographics (marital status), Maternal characteristics (timing of ANC visits, maternal height), health facility-related factors (admission from, health facility ownership, and health financing method), delivery and newborn characteristics (baby sex, birth weight, multiple pregnancies, and gestational at delivery).

1.0. INTRODUCTION

1.1. Background

Caesarean section (CS) is a method of fetal delivery involving an open abdominal or laparotomy approach and an incision in the uterus, primarily undertaken to safeguard the lives of pregnant mothers and/or their newborns (1,2). The global prevalence of CS stands at 21% annually, with Latin America and sub-Saharan Africa contributing 42% and 5% of CS deliveries, respectively (2). Over the past three decades, there has been a substantial rise in CS rates worldwide, reaching 7% to 21% in both developed and developing nations (3).

Notably, sub-Saharan Africa and America experienced an increase from 3.6% to 9.5% in CS rates (3). Projections indicate a potential rise to 29% by 2030, with sub-Saharan Africa and Asian countries expected to range from 28% to 63% (3). Sub-Saharan African countries have witnessed a concerning surge in CS rates, exposing women and newborns to acute and chronic complications, especially from medically unjustified CS procedures (3).

The maternal mortality rate following CS is notably higher than that of vaginal deliveries, emphasizing CS as a public health concern (3). Tanzania, for instance, has experienced a significant increase in CS rates from 8% to 13% between 2012 and 2022, with specific regions like Njombe demonstrating a huge rise from 13% to 33% during the same period. Despite Njombe region fertility rate of 4.0%, the region reported a higher CS rate than other regions in the country, as shown in the Tanzania Demographic Health Survey of 2022.

Despite the medical implications of CS on maternal and newborn health, the rapid escalation in CS rates in Tanzania poses substantial burdens on post-CS women, their families, and the national healthcare system (4). Notably, regions with high CS rates, such as Njombe, may divert significant financial and human resources away from an already strained healthcare system (4). Monitoring the increase in CS rates without medical indications is crucial to mitigate the negative outcomes associated with such procedures, commonly referred to as CS on maternal requests, which contribute to maternal and perinatal morbidity and mortality (5).

Several factors contribute to the escalating CS rates in sub-Saharan African countries, including levels of maternal education, economic incentives for healthcare providers, facility ownership,

urban or rural residence, the economic status of women and their partners, and obstetric and medical factors such as body mass index, gravidity, parity, and maternal and fetal complications (8). Studies conducted in Mali and Benin highlight that medically unjustified CS may be performed to alleviate pain during labor or due to free CS health policies in some African countries (9). This trend is alarming in region like Njombe (10). Also, Tanzania's free CS policy, especially in public health facilities, may contribute to the observed increases (10, 11).

Given the rising cesarean sections rate and their implications in Tanzania, particularly in the Njombe region, there is an urgent need for research to explore the prevalence, outcomes, and associated factors of CS among women who delivered in the region to identify potential solutions using primary health facilities. This study aimed to address this problem by examining the prevalence, outcomes, and factors associated with CS among women who gave birth in the health facilities found in Njombe region between March and May 2024.

The findings from this study are used to provide valuable insights for healthcare providers, stakeholders, and the Ministry of Health, enabling the development of appropriate measures to address the negative outcomes associated with the increase in medically unjustified CS at multiple levels: maternal, newborn, family, community and national.

1.2. Conceptual frame work

The CS is influenced by the following factors: First are the social demographic characteristics of women, which include age, education, marital status, occupation, residences, partner incomes, and partner education.

Second are obstetric factors, which are parity, gravidity, gestation age, abortion history, number of children, and previous scars.

Third are clinically related factors, which include chronic illness, HIV/AIDS and other medical conditions.

The fourth factor is ANC factors, booking time, and the number of ANC visits. A Caesarian section is done by considering obstetric and gynecological indications like prolonged labor, obstructed labor, malpresentation, severe pre-eclampsia, fetal distress, multiple pregnancies, placenta previa, previous scars, and other indications. We also considered influencing the outcome. In addition, health facility-related factors, which include ownership, providers' qualifications, and health facility levels.

The study assessed both maternal and newborn outcomes, whereby maternal outcomes were: (alive/died, referred, post-delivery complications) and newborn outcomes were: (alive/died, baby sex, weight, number of babies and newborn complications). The concept framework was adapted and modified from the study done in Rwanda by Kizito and Schumacher (31).

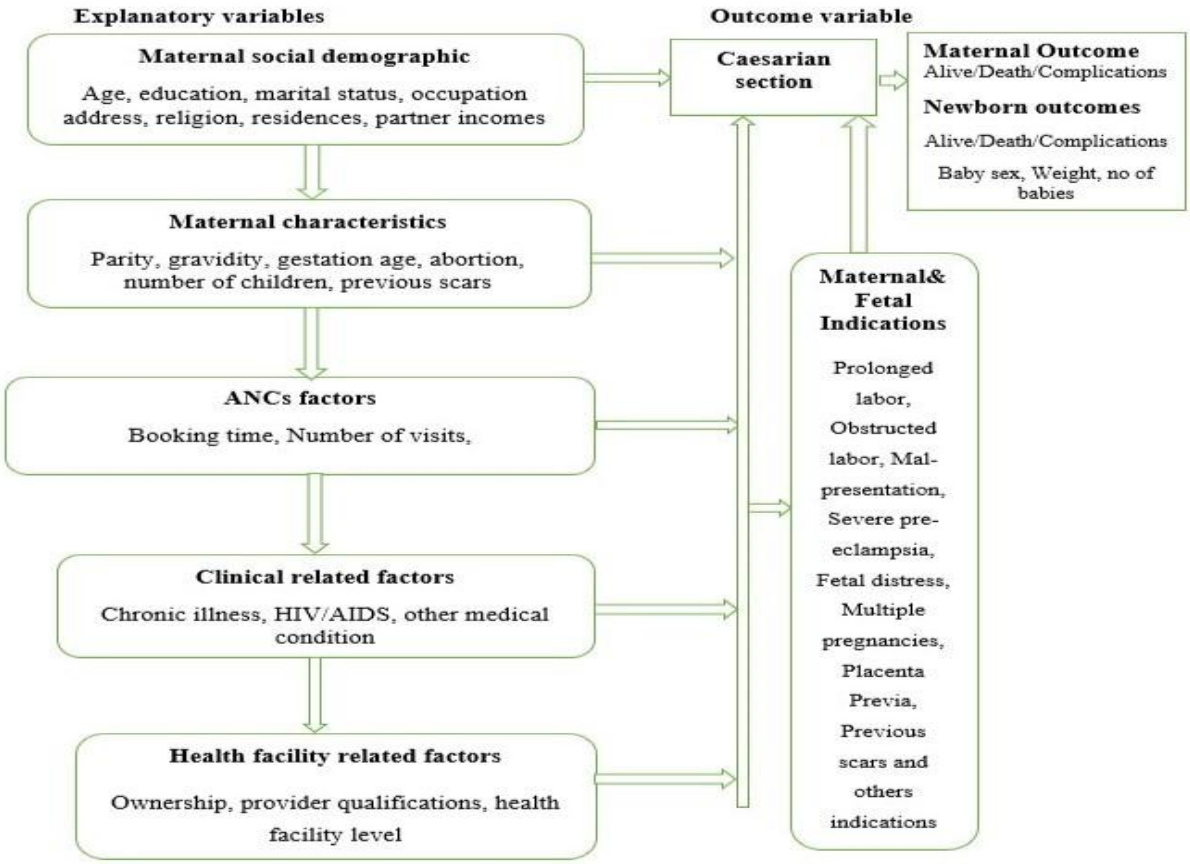


Figure 1: Conceptual framework for assessing the prevalence, outcomes and factors associated with CS among women who delivered in health facilities at Njombe region adapted from Kizito &Schumacher 2021(31).

1.3. Rationale of the study

The finding from this study provides vital guidance to the Ministry of Health, stakeholders, and healthcare providers in creating effective strategies to:

- Develop policies and approaches to lower the CS rate both within the region and across the country.
- Reduce negative maternal and fetal outcomes associated with unplanned or unnecessary CS deliveries.

1.4 Problem Statement

Globally, the annual number of CS exceeds 30 million procedures, signifying a prevalent mode of delivery (6). In Tanzania, the overall CS rate is estimated at 13**%,** with Njombe region reporting an alarming rate of 33 % in 2022 that surpassing the WHO recommended standard of not more than 15% (4). While CS is recognized as a life-saving intervention for both maternal and perinatal well-being, recent research highlights concern about the potential risks associated with rapidly performed, medically unindicated CS deliveries, which may elevate maternal and perinatal mortality and morbidity rates (6).

Unsafely conducted CS pose significant threats to maternal health, leading to complications such as post-caesarian sepsis, hemorrhages, urinary system injuries, and challenges in subsequent pregnancies (6). Postoperative complications, including infections, blood transfusions, and anesthetic complications which affects more than 16% of women undergoing CS (15).

Neonates born through CS face a threefold increased risk of complications, such as neonatal sepsis and respiratory distress, compared to those delivered by vagina deliveries (6). In sub-Saharan Africa, 30% of newborns born through CS encounter adverse outcomes, including sepsis and respiratory problems (12, 16). Additionally, unnecessary CS contribute to a fivefold

Njombe region has reported the highest CS rates super passing other 25 regions in Tanzania (10). However, there is a notable lack of comprehensive information regarding the prevalence, outcomes, and contributing factors related to CS among PDW in the region. This study addressed the existing knowledge gap by assessing the prevalence, outcomes, and factors associated with CS among PDW who delivered health facilities at Njombe region from March to May 2024.

1.5.0 RESEARCH QUESTION

1.5.1 Broad research question

What is the prevalence, outcomes, and factors associated with CS among women who delivered in selected health facilities in Njombe region from March to May 2024?

1.5.2 Specific research questions

1. What is the prevalence of CS among delivered women who delivered at selected health facilities in Njombe region from March to May 2024?
2. What are the indications of CS among postnatal women delivered by CS in selected health facilities at Njombe region from March to May 2024?
3. What are maternal and newborn outcomes after CS in among women who delivered in selected health facilities at Njombe region from March to May 2024?
4. What are the factors associated with CS among women delivered in selected health facilities at Njombe region from March to May 2024?

1.6.0 RESEARCH OBJECTIVES

1.6.1 Broad objectives

To assess the prevalence, outcomes, and factors associated with CS among women who delivered in selected health facilities at Njombe region from March to May 2024.

1.6.2 Specific objectives

The specific objectives were:

1. To determine the prevalence of CS among women who delivered in selected health facilities in Njombe region from March to May 2024.
2. To determine indications of CS among women delivered in selected health facilities by CS in Njombe region from March to May 2024.
3. To determine the maternal and newborn outcomes among women delivered by CS in selected health facilities in Njombe region from March to May 2024.
4. To assess the factors associated with CS among women delivered selected health facilities in Njombe region from March to May 2024.

2.0. LITERATURE REVIEW

2.1 Prevalence caesarian sections

The prevalence of CS has witnessed substantial global increases, ranging from 4% to 9%, with particularly noteworthy spikes observed in sub-Saharan African and Asian nations (17). Health care providers commonly perform elective or emergency CS for various reasons, including prolonged labor, obstructed labor, fetal distress, elevated blood pressure, multiple pregnancies, malpresentation of the baby, and other indicated complications (18). Appropriate implementation of CS has demonstrated significant reductions in both maternal and neonatal morbidities and mortalities (5). Ethiopian studies reveal that the prevalence of CS surpasses 20% in most sub-Saharan African countries, emphasizing the widespread nature of this surgical intervention (19). Despite its potential benefits in reducing maternal and perinatal mortalities and morbidities, the surge in CS prevalence in sub-Saharan African countries has been linked to a 4-fold increase in maternal mortality among post-CS women, compared to vaginal deliveries (19). Moreover, the escalating prevalence of CS in developing countries poses a financial burden on healthcare systems, particularly in providing quality maternal, reproductive, and child health services (8).

In Tanzania, studies conducted in tertiary hospitals reveal a wide range of CS prevalence, varying from 22% to 36% (21). While the District Health Information System reports a seemingly normal 13% CS rate in the country, regions like Njombe stand out with an alarming 29% CS rate, significantly surpassing the WHO recommended standard of 15% (22, 23). The increase in CS rates in Tanzania extends beyond health outcomes, impacting the cost of care for post-delivery women (22). Notably, the cost of care for single CS deliveries exceeds 20 USD, in contrast to 11 USD for single vaginal deliveries. Additionally, CS elevates the risk of post-delivery women's hospitalization threefold when compared to vaginal delivery (5).

The prolonged hospital stays resulting from increased CS rates pose a considerable burden to health system financing in sub-Saharan African countries, such as Tanzania (5). The lack of comprehensive data on the prevalence, outcomes, and factors associated with CS among postnatal women in Tanzanian hospitals underscores the urgency for a cross-sectional study.

This review highlights the escalating global prevalence of CS and its associated factors, particularly in the context of sub-Saharan African countries like Tanzania. With a specific focus on the Njombe region, there is a critical need for a comprehensive cross-sectional study to assess the prevalence, outcomes, and factors associated with CS among women who delivered between March to May 2024. Such research is essential for informing evidence-based practices, policies, and interventions that can optimize maternal and neonatal health outcomes while addressing the financial challenges posed by increased CS rates in resource-constrained settings.

2.2. Indications of CS deliveries

When CS are performed without clear medical indications, poses significant risks to both maternal and newborn health. As evidenced by a cross-sectional study done in Bangladesh, revealed that such non-medically indicated CS were linked to post-delivery hip pain in mothers and breastfeeding problems in newborns (9). Alarming statistics from some tertiary hospitals in Tanzania indicate that over 58% of CS lack clear medical justifications, with more than 48% of post-caesarian section women experiencing surgical site infections (6). Non-medically indicated CS is found to be associated with various maternal social demographics, including age, education, marital status, occupation, address, and religion. Maternal characteristics such as parity, gravidity, gestation age, abortion history, number of children, and previous scars (6).

Additionally, medically related factors such as HIV status, underlying medical conditions, and specific indications further influence the likelihood of undergoing CS deliveries (6). Household characteristics, including wealth index, residences, partner incomes, and partner educations, play a role in the decision-making process. Intervening variables such as attendance in antenatal care (ANC), place of delivery, and access to information are also identified as factors influencing the prevalence of CS (6).

The existing body of literature underscores us to conduct the study on the prevalence, outcomes, and factors associated with CS among women who delivered in the Njombe region from March to May 2024. The multifaceted nature of these associations calls for a comprehensive study to assess the complexities surrounding non-medically indicated CS and to inform targeted interventions and policies aimed at optimizing maternal and newborn health outcomes.

2.3 Outcomes of caesarian sections

A cohort study conducted in Tanzania has revealed that the case fatality rate associated with CS is 3 per 1000, significantly higher than the minimal 0.02 case fatality rate observed in vaginal deliveries (29, 30). While CS offer benefits for the fetus when medically indicated, there is evidence to suggest that when performed without clear medical justification, they can yield adverse outcomes for the mothers and their newborns. As demonstrated in a Tanzanian cross-sectional study, this study found that nearly 45% of newborns delivered through CS experienced birth asphyxia, in contrast to those born via vaginal delivery (21).

2.4 Risk factors associated with CS deliveries

Over the past three decades, the prevalence of CS in Tanzania and other Sub-Saharan African countries has witnessed a steady rise, influenced by various factors such as the induction of labor, gravidity, baby weight, and the type of residence (rural or urban), as well as labor and delivery factors like prolonged labor (13).

Another factor which may associated with CS is decision-making process for CS which relay and involves factors such as skills of physician decisions, maternal requests, religious beliefs, and the financial capacity of both the mother and her partner (13).

Some of psychosocial factors contribute to the growing trend of CS where by some women perceive CS as a pain-free and user-friendly delivery method compared to vaginal delivery, leading to an increased preference for this CS of delivery (9). Lack of knowledge to women about CS deliveries where by some women opt for CS without adequate awareness of the potential negative consequences for their future obstetric health, financial implications, and physical well-being is one among of the factors for increased CS deliveries (24).

A cohort study encompassing 68 Asian countries has identified factors associated with CS, including obstetric complications, residency, maternal age, and previous scars (25). Additional factors such as maternal request, education, and economic status were found to significantly influence the likelihood of CS among pregnant women (25). A cross-sectional study done in Vietnam, highlighted that more than 58% of CS were performed in private health facilities, with 42% in public health facilities (21). Risk factors identified included maternal body mass index and parity (21). Meanwhile, a study conducted in Pakistan underscored that improvements in

health services, maternal socio-economic status, and healthcare provider behavior aiming to generate income from CS were pivotal reasons for the increased prevalence of CS (26).

Cross-sectional studies in Tanzania revealed various determinants of CS, with factors such as maternal body mass index, parity, gravidity, rural-urban residence, and obstetric complications accounting for more than 41% of CS in tertiary health facilities (27). Another study in Tanzania and Kenya associated CS with maternal health insurance coverage, level of education, maternal addresses (rural or urban), and maternal incomes (28).

There are several factors associated with CS and this necessitates us to conduct a thorough investigation to assess the prevalence, outcomes, and the factors associated with CS among women who delivered in selected health facilities in Njombe region from March to May 2024. This study is crucial for developing targeted interventions, policies, and educational programs to address the multifaceted influences shaping the decision-making process surrounding CS deliveries.

3.0. MATERIALS AND METHODS

3.1 Study design

We conducted the cross-sectional study using quantitative research methods to determine the prevalence, outcomes, and factors associated with CS among PDW in selected facilities in Njombe region from March to May 2024.

3.2 Study setting

The study was carried out in the Njombe region of Tanzania. Njombe region is one of 26 regions found in Tanzania's mainland, with a population of 889,946 people (Males: 420,533 and Females: 469,413) (32). It's bordered by Iringa region in the north, Mbeya region in the east, Ruvuma in the south, and Lake Nyasa in the western part. It has six districts' councils, which are Njombe District Council (DC), Njombe Town Council (TC), Ludewa DC, Makambako TC, Makete DC, and Wanging'ombe DC.

It has a total of 337 health facilities, which include 271 dispensaries, 44 health centers, and 22 hospitals. There are 24 health facilities that provide caesarian delivery services which include 11 hospitals and 13 health centers (32). District Health Information System data show that in 2023, the Njombe region reported 25,573 deliveries of which 8,297 were CS. However, in our study we included 6 out of 24 health facilities which provide CS services, we sampled two health facilities from each council. Makambako HC and St Joseph Hospital from Makambako TC, Wanging'ombe HC and Ilembula Hospital from Wanging'ombe DC, finally Njombe Town Hospital and Tanwat Hospital from Njombe TC. The selected heath facilities have average of 1226 total deliveries per month.

3.3 Study population

The study population consisted of PDW who delivered in selected health facilities in Njombe region from March to May 2024.

3.4 Sample size calculation

The sample size was calculated from the formula by using the prevalence of a 21% CS from the study done at Tosa Maganga Hospital in Iringa Region (21).

Formula for sample size calculation in a cross-sectional study with design effect

$$\mathbf{n = \frac{DE \times (Z^2) \times P(1-P)}{E^2}}$$

Where by

n= required sample size

DE = Design effect of 2 was used (21).

Z=Standard normal deviate corresponding to the Confidence level (α). At 95% level of significance, z= 1.96)

P = Estimated Prevalence of CS (0.21) (21).

E = Margin of error 5% (0.05)

$$\mathbf{n = \frac{2 \times (1.96)^2 \times 0.21 \times (1-0.21)}{(0.05)^2} = 510}$$

Adjusting for the Non-Response Rate (NNR)

Non response rate =n/1-NNR

Non-response rate of 10% was used (21)

The Actual the sample size = 510/ (1-0.1) =567.

Therefore, the total of 567 postnatal women were recruited.

3.5 Sampling procedures

We employed a three-stage cluster sampling technique, where in the first stage, a random sample of three district councils was selected by simple random sampling out of six district councils found in the Njombe region. In the second stage, six health facilities that provide CS services were selected by simple random sampling out of twenty-four health facilities. In the third stage, PDW were sampled by simple random sampling from selected health facilities based on probability proportional to size (PPS), whereby we calculated the sampling fraction (n/N), where (n) represents the desired sample size and (N) stands for the total number of deliveries across all selected health facilities for the study. Then we applied this sampling fraction by multiplying it with the number of deliveries in each specific facility in order to obtain the exact number of deliveries you need to recruit from each facility in our study. This method was done to ensure that each facility's contribution to the total number of deliveries is appropriately represented in research sample size. In every stage of sampling, we conducted simple random sampling using a random number generated by Epi Info 7.

3.6 Inclusion and Exclusion criteria

3.6.1 Inclusion Criteria

We included postnatal women who gave birth in selected health facilities from March to May 2024 and who met the following criteria:

1. They delivered in six selected health facilities and they don’t have more than 14 days after delivery.
2. They were able to respond to the questions, which means they were not critically ill patients.
3. They formally consented to participate in this study.

3.6.2 Exclusion criteria

We excluded postnatal women who gave birth in the selected health facilities from March to May 2024 who were:

1. They were not documented in postnatal register number 12.
2. They did not have RCH card number 4.

3.7.0 Study Variables

3.7.1 Dependent variables

The Dependent variables were:

1. Caesarian section which was a binary variable (CS Yes or CS No).
2. Maternal outcomes: Alive/died and post-CS maternal complications.

3. Newborn outcomes: Alive/died, post-delivery complications.

3.7.2 Independent variables

The independent variables were:

1. Social demographics, which included age, mother education, marital status, occupation, religion, residences, partner incomes, and partner education.
2. Maternal characteristics were: parity, gravidity, gestation age at delivery, abortion history, and number of children, height and previous scars also, baby sex, weight, and number of babies were documented.
3. Clinically related factors included chronic illness, HIV/AIDS, and underlying medical conditions, gestation age during labor, abortion history, caesarian section history, maternal height, and dangers signs during pregnant, total ANC visits, referral from, stage of labor.
4. Caesarian section indications were prolonged labor, obstructed labor, malpresentation, severe pre-eclampsia, fetal distress, multiple pregnancies, placenta previa, previous scars, and other indications that were required to be mentioned.
5. ANC utilization factors including booking gestation age, and the number of ANC visits.
6. Health facility-related factors include facility ownership, attending providers' qualifications, and health facility level.

3.8 Measurement of variables

3.8.1 Dependent variables

The Caesarian section is the binary outcome (CS Yes or No). We measured the CS by reviewing the patient's files, interviewing the patients, and reviewing post-natal registers at post-natal wards. Other dependent variables were maternal outcomes, including alive/died and post-delivery maternal complications, and newborn outcomes, including alive/died and post CS-delivery complications which were measured by interviewing PDW, reviewing postnatal registers, and RCH card number four.

3.8.2. Independent variables

Maternal height and baby weight were obtained from the RCH card number 4 of the mother and labor and delivery registers.

Other independent variables were assessed by interviewing the PDW using closed ended questionnaire which consisted of six sections: section one is about identification information; section two is on social demographics; section three is on ANC utilization and maternal obstetric characteristics; section four is on information during labor; section five is on health facility-related factors; and section six is on maternal and newborn outcomes. There are 54 closed-ended questions, which were to be filled out with research assistance following interviews with the women who gave birth at selected health facilities in the Njombe region.

Section one: Identification information consisted of important participant details like identification number, name of facility, level, ownership date of interview, time of interview, and interviewer name and phone number. Section two social demographics: social demographic characteristics of the mother, including maternal age, education, marital status, religion, occupation, address/residences, partner incomes and partner educations, were measured by questions 9 to 19.

Section three consisted of ANC utilization and maternal characteristics including maternal height, gestation age, parity, gravidity, abortion history, number of living children, danger signs, caesarian history, previous scars, and medically related factors like chronic medical conditions and other medical conditions. These variables were measured using questions 20 to 32.

Section four measures information during labor including gestation age during labor, medical conditions, labor stage at arrival, mode of delivery, caesarian section indications, and the CS is emergency or elective. It was measured by questions 33 to 40.

Section five consisted of health-related factors with variables including education level of health care providers, and health care financing method. It was measured by questions 41 to 44 and

Section six consisted of maternal and newborn outcomes, whereby maternal outcomes were either: alive/died, post-delivery complications where as for the newborn it was alive/died, baby sex, birth weight, number of babies, and newborn complications. These variables were measured by questions 45 and 54 by obtaining information from register and RCH card number 4.

3.9.0 Data collection and management

3.9.1. Data collection

Data was collected by six trained and experienced nurses-midwives' (one from each health facility). During data collection, PDW who were admitted in postnatal wards, delivered within fourteen days of the study, and met the inclusion criteria were interviewed. The study used the Kobo Collector toolbox with closed-ended questions for data collection. Important documents, like PDW files, partographs, labor and delivery registers, and ANC card number 4, were reviewed to obtain important obstetric information.

3.9.2 Data management

The principal investigator performed daily checks on the data to ensure its accuracy before uploading it to the final Excel sheet. Any variables with missing or incorrect information were identified and corrected by recalling the data collectors and re- reviewing the labor and delivery registers, ensuring data integrity throughout the data collection process.

Once data collection was completed, the final dataset was downloaded from Kobo Toolbox via the data extraction dropdown menu. The final dataset was then cleaned using the sort and filter functions.

3.10 Training of research assistants

Six experienced nurses-midwives' officers (researcher assistance) were recruited to assist in the data collection process. They had two days of training prior to data collection. They were trained on the study the study objectives, ethical issues, sampling procedure, and data collection tool.

3.11 Validity and reliability of the study

To ensure the validity of the study, standardized questionnaires with closed-ended questions in both Swahili and English were used during data collection. The questionnaire was revised by research supervisors from the Department of Epidemiology and Biostatistics, School of Public Health and Social Science, at MUHAS to check its contents, clarity, and comprehensiveness based on the study objectives. The modification of the data collection tool was done to fit the context and study objectives when some questions from specific objectives were not contextualized in the data collection setting.

The researcher's assistants were trained based on the study objectives, ethical issues, and data collection process. Also, the data collection tool was translated into Swahili to meet the social and cultural context of the study setting. To ensure the reliability of the study, the structured questionnaire used for the data collection process was piloted in different settings before data collection to check its effectiveness in data collection.

3.12 Pre-testing of the data collection tool

The questionnaire was pretested at three health facilities which were not included in this study, one health facility per district council. The health facilities where we conducted data collection pretesting were Makambako Town Hospital, Wanging'ombe District Hospital, and Uwemba Health Centers. A sample of approximately 10% of the study sample, which is 56 participants, was chosen.

During the pretest, careful attention was given to participants' responses. This included rephrasing two questions with confusion or ambiguity and incorrect questions on the overall questionnaire structure.

After the pretest and a thorough analysis, we found that the questions were understandable to participants. This analysis informed necessary revisions of some questions by rephrasing and adjusting response options or eliminating two redundant items. The goal was to enhance the clarity and appropriateness of the instrument for the study population. The refined questionnaire was ready for implementation in the main research study in the Njombe region.

3.13 Data analysis

Before the analysis, the data was cleaned using Microsoft Excel. The filter and sort functions were applied to logically organize the dataset, making it easier to identify outliers and incorrect entries. These discrepancies were addressed by cross-referencing the participants' details from the labor and delivery register using their unique identification numbers, allowing for the verification and correction of outlier variables. The participants whose data were not recorded in the registers, were called by the researcher to complete the missing information.

The descriptive analysis was done in Stata version 15 to describe the distribution of variables for specific objectives numbers one, two, three, and four. Summary statistics like mean and standard deviations were used for the analysis of continuous variables. Frequencies and proportions were used to describe categorical variables, and the results were presented in frequency tables and graphs.

Modified Poisson regression analyses (bivariable and multivariable) were used to assess the association between outcome and predicting variables for objective number four. The creation method for bivariable analysis was used, where variables with a p-value <0.2 in bivariable analysis were included in multivariable analysis. The variables with a p value ≤ 0.05 during multivariable analysis were considered statistically significant or associated with CS. We presented our results for four specific objectives by using tables.

3.14.0 Ethical consideration

3.14.1 Ethical clearance

We obtained ethical clearance from the MUHAS research and publication committee with certificate number of Ref. No.DA.282/298/01.C/.

3.14.2 Permission to conduct the study

We obtained data collection approval from the President's Office of Regional Administration and Local Government (PORALG) through the Regional Medical Officer (RMO) Office in the Njombe region with Ref. No. AB.301/326/01L/01 and the Council through the Council Medical Officers of Health (CMOs) in three selected district councils, which were Njombe Town Council (Ref. No. NTC/TD/82/193/1J/61), Makambako Town Council (Ref. No. AB.301/326/01L/01), and Wanging'ombe District Council (Re. No. WDC/M.10/2/27). Additionally, explicit permissions were secured from the health facilities' in-charge to conduct this study.

3.14.3 Right of participation

The participants voluntarily agreed to participate in this study once the study objectives were well explained to them by the researchers.

3.14.4 Handling of women who lost their babies

The women who lost their babies were counseled by the councilors and midwives from health facilities before being interviewed in order to meet their social and psychological needs.

3.14.5 Privacy during data collection

The PDW were interviewed privately in consultation rooms. The interview was completed by reviewing the closed-ended questionnaire and the files.

3.14.6 Data security and handling

The collected data were stored on well-secured computer devices with passwords and usernames, and the collected data were not shared with unauthorized individuals.

4.0 RESULTS

4.1.1 Distribution of socio-demographic characteristics of study participants

A total of 567 PDW aged 15 to 44 years old participated in the study with a response rate of 100%. Participants had a mean age of 25.77 years (SD =5.86). Majority 461 (81.2%) were aged between 21 and 35 years. In terms of maternal education level, 190(33.5%) of women had primary education, however the 212(37.4%) have partners with secondary school education. Furthermore, 225(39.7%) of PDW were single. 311(54.8%) of PDW were gravida 2 to 4, and 240(42.3%) were null paras.

Lastly, 291(51.3%) of PDW were living in rural areas, The social demographic characteristics of participants are summarized in Table 1.

Table 1: Distribution of socio-demographic characteristics of study participants (N=567)

Social demographic Characteristics	Frequency N=567	Percentage
Age (Years)		
≤20	70	12.4
21-35	461	81.2
36+	36	6.4
Mother education level		
No formal education	135	23.8
Primary	190	33.5
Secondary	161	28.4
College/University	81	14.3
Partner education level		
No formal education	78	13.8
Primary	201	35.4
Secondary	212	37.4
College/University	76	13.4
Mother occupation		
Subsistence farmers	307	54.1
Public &Private sectors employed	35	6.2
Petty business & self employed	225	39.7
Partner occupation		
Subsistence farmers	364	64.2
Public & Private sectors employed	38	6.7
Petty business & self employed	165	29.1
Maternal incomes per month (Tsh)		
No incomes	129	22.8
≤500,000/=	386	68.1
500,001/=+	52	9.2
Gravidity		
1	217	38.3
2-4	311	54.8
5+	39	6.9
Parity		
0	240	42.3
1	161	28.4
2-4	155	27.3
5+	11	2.0
Have Living children		
Yes	283	49.9
No	284	50.1
Marital status		
Divorced	87	15.3
Single	225	39.7

Married	102	18.0
Widower	153	27.0

Social demographic Characteristics	**Frequency N=567**	**Percentage**
Residences		
Rural	291	51.3
Urban	276	48.7
Councils' names		
Njombe Town Council	231	40.7
Makambako Town Council	183	32.3
Wanging'ombe District Council	153	27.0
Health facility name		
Njombe Town Hospital (Public)	207	36.5
Tanwat Hospital (Private)	24	4.2
St Joseph Hospital (Religious)	83	14.6
Ilembula Hospital (Religious)	59	10.4
Makambako HC (Public)	120	21.2
Wanging'ombe HC (Public)	74	13.1
Health facility ownership		
Public	402	70.9
Private	24	4.2
Faith based Organization	141	24.9
Health facility level		
Health Centers	175	30.9
Hospitals	392	69.1
Total	**567**	**100**

4.1.2. The Distribution of clinical characteristics of study participants

Among PDW interviewed, their gestation ages in weeks during the first ANC visits ranged from 2 to 36 weeks. The mean gestation age of PDW at first ANC visit was 15.16 weeks (SD= 5.18), where by 392(69.2 percent) of PDW stated their ANC first visit with gestation at 13 or more weeks.

Regarding gestation age during delivery, it ranged from 29 to 43 weeks. The mean gestation age at delivery was 38.12(SD= 2.05) and 392 (60.9%) of PDW had 38 to 42 gestation age in weeks at delivery.

The 332(58.6%) of PDW had height below 150 cm, and 418(73.7%) of PDW were admitted late (in active stage of labor). Table 2.

Table 2: The Distribution of clinical characteristics of study participants (N=567)

Clinical characteristics	Frequency N=567	Percentage
Gestation age during 1st ANC visit (weeks)		
0-12	175	30.9
13+	392	69.1
Abortion history		
Yes	80	14.1
No	487	85.9
Gestation age during labor (weeks)		
≤37	168	29.6
38-42	345	60.9
43+	54	9.5
Maternal Height (Cm)		
≤150	332	58.6
151+	235	41.4
Had danger signs during pregnant		
Yes	224	39.5
No	343	60.5
Had previous scar(s)		
Yes	152	26.8
No	415	73.2
Total ANC Visits		
≤3	75	13.2
4+	492	86.8
Referral admitted from		
Home	426	75.1
Referral from Dispensary	132	23.3
Referral from Health Centre	9	0.2
Labor stage at admission		
Early (Before active stage of labor)	149	26.3
Late (After active stage of labor)	418	73.7
Sex of the baby		
Male	268	47.3
Female	286	50.4
Unknown sex (Congenital disorders)	13	2.3
Number of babies born		
Single tone	528	93.1
Twins	39	6.9
Birth Weight (Kg)		
≤2.5	52	9.2
2.6-4.0	438	77.3
4.1+	77	13.5
Total	**567**	**100**

4.2. Prevalence of CS among PDW in selected health facilities in Njombe region

The study found that 45.50% (95% CI: 41%-49%) of post-natal women who gave birth in selected facilities in Njombe region underwent CS deliveries.

4.3. Indications for CS among PDW in the Njombe Region

The results of this study revealed that 155 (60.1%) of CS were elective and Tanawat Hospital reported the highest number of elective CS 12(70.5%) compared to other health facilities as shown in Table 3. The previous scar was the leading indication for CS, with 36(19.3%) of all CS done, however 37(14.3%) of CS had no maternal indications as summarized in Table 4.

Table 3: Number of elective CS at Njombe region per health facilities (n=165)

Health facilities name	Health facility level	Total CS	Number of elective CS	Percentage (%)
Njombe Town Hospital	District Hospital	70	44	62.8
Makambako HC	Health Centre	64	41	64.1
Ilembula Hospital	Hospital at district level	21	13	61.9
St Joseph Hospital	Hospital at district level	42	23	54.7
Wanging'ombe HC	Health Centre	44	22	50.0
Tanawat Hospital	Hospital at district level	17	12	70.5
Total		**258**	**155**	**60.1**

Table 4: Indications for CS among PDW who delivered in selected HFs in the Njombe region (n=258)

Variables	Total CS	Percentage
Number of CS	n=258	100
Had CS indications		
Yes	187	72.5
No	71	27.5
Common indications for CS *		
Abruption placenta	3	1.6%
Others indications**	4	2.1%
Placenta Previa	4	2.1%
Multiple Pregnancy	5	2.7%
Post term labor	6	3.2%
Prolonged Labor	7	3.7%
Cephalic disproportionality	9	4.8%
Obstructed Labor	10	5.3%
Big baby	12	6.4%
Transverse lie	13	7.0%
Severe Eclampsia	14	7.5%
Cord prolapses	15	8.0%
Mal-presentation	16	8.6%
Fetal distress	33	17.6%
Previous scars	36	19.3%

* Indications for CS (n=187)

** Others indications (Uterine rupture, Placenta accreta, and fetal abnormalities)

4.4. Newborn outcomes within 72 hours after CS deliveries

The findings revealed that 6(2.3%) of newborns delivered by CS had an Apgar score less than 3 within five minutes after birth. There were 4(1.6%) of newborn deaths following CS deliveries and 84(32.6%) of newborns delivered by CS ended with fetal complications within 72 hours after birth. The common fetal complications after CS were early neonatal sepsis, which contributed 34(40.5%) as shown in Table 5.

In term of vaginal delivery there was no any neonatal deaths, however 4(1.3%) of newborns have Apgar score less than 3 within five minutes after delivery and 46(14.9%) of newborns have complications, where by the common complication was early neonatal sepsis which as 19(41.3%) of vaginal delivered newborns complications as shown in Table 5.

Table 5: Newborns outcomes after CS delivery in Njombe region from March to May 2024 (n=258)

	Caesarian sections		Vaginal deliveries	
Newborns Outcomes after delivery	**Frequency n=258**	**Percentage**	**Frequency n=309**	**Percentage**
Still births	4	1.6	00	0.0
Live births Apgar score 5 minutes				
1-3	6	2.3	4	1.3
4-6	24	9.8	42	13.6
7-10	224	86.8	263	85.1
Had Live newborns post-delivery complications				
Yes	84	32.6	46	14.9
No	174	67.4	263	85.1
Common newborns complications	*******		********	
Birth Asphyxia	1	1.2	1	2.2
Respiratory Distress	3	3.5	1	2.2
Meconium Aspiration Syndrome	5	6.0	1	2.2
Hypoglycemia	5	6.0	1	2.2
Hypothermia	7	8.3	3	6.5
Cerebral pulse	11	13.1	10	21.7
Early neonatal jaundice	18	21.4	10	21.7
Early neonatal sepsis	34	40.5	19	41.3

***Newborns complications after CS (n=84)

****Newborns complications after Vaginal delivery (n=46)

4.5. Maternal outcomes within 72 hours after CS deliveries

We found that only 33(12.8%) of post-CS were admitted due to post-caesarian maternal complications. The most common post-caesarian section complications were post-partum hemorrhage 13(39.4%) followed by postnatal infections 10(30.3%) as shown in Table 6.

In term vaginal delivery 11(3.6%) of post-delivery women had post-delivery complications, where by the Post-partum Hemorrhage was the common complication which contributed about 6(54.5%) of all post vaginal delivery complications as shown in Table 6.

Table 6: Maternal outcomes after delivery in Njombe region from March to May 2024 (n=258)

	Caesarian sections		Vaginal deliveries	
Maternal Outcomes after delivery	**Frequency n=258**	**Percentage**	**Frequency n=309**	**Percentage**
Had maternal post-delivery complications				
Yes	33	12.8	11	3.6
No	225	87.2	298	96.4
Common maternal post-delivery complications	*****		******	
Postnatal Psychosis	1	3.0	0	0.0
Anesthetic Complications	1	3.0	0	0.0
Severe Anemia	3	9.1	1	9.1
Severe Eclampsia	5	15.2	2	18.2
Postnatal Infections	10	30.3	2	18.2
Post-partum Hemorrhage	13	39.4	6	54.5

*****Maternal complications after CS (n=33)

******Maternal complications after Vaginal delivery (n=11)

4.6.0 Factors associated with CS among PDW in Njombe region

4.6.1. Bivariable analysis of factors associated with CS among PDW in Njombe region

The variables significantly associated with Cesarean Section (CS) include marital status (Single). Single pregnant women were 1.23 times more likely to deliver by CS compared to married women (cPR=1.23[0.78-1.75]) as shown in Table 7.

Maternal characteristics also found to be associated with CS, were PDW who started their first ANC visit after 13 weeks of gestation were 1.47 times more likely to deliver by CS compared to those who started before 12 weeks (cPR=1.47[1.17-1.84]) as shown in Table 8.

Delivery and newborns factors showed association with CS, whereby PDW whose gestational age exceeded 43 weeks were 1.47 times more likely to deliver by CS compared to those with gestational age below 37 weeks (cPR=1.47[1.01-1.49]), Pregnant women referred from health centers were 1.77 times more likely to deliver by CS compared to those who delivered at home (cPR=1.77[1.51-2.51]). Furthermore, Late arrival during labor (after active labor began) increased the likelihood of CS by 1.37 times compared to arriving early (before active labor) (cPR=1.37[1.08-1.74]), and delivering babies weighing above 4.0 kg increased the likelihood of CS by 51% times compared to delivering babies weighing 2.5 kg or less (cPR=1.51[1.30-1.75]) as showed in Table 9.

In term of health facilities related factors, PDW who delivered in private facilities were 1.12 more likely to delivered by CS with (cPR=1.12[0.76-1.65]) as shown in Table 10.

Table 7: Bivariable analysis of social demographic characteristics associated with CS among PDW in Njombe region from March to May 2024 (N=567)

Social demographic characteristics	Frequency N=567	%CS	cPR (95% CI)	*P-value*
Age (Years)				
21-35	461	30(6.5)	Ref.	
≤20	70	21(30.0)	4.61(2.50-8.50)	0.651
36+	36	17(47.2)	7.26(4.50-11.50)	0.664
Mother education level				
No formal education	135	75(55.6)	Ref.	
Primary	190	75(39.5)	0.07 (0.05-0.10)	0.401
Secondary	161	67(41.6)	0.74(0.59-0.94)	0.513
College/University	81	41(50.6)	0.91(0.70-1.18)	0.487
Partner education level				
No formal education	78	34(43.6)	Ref.	
Primary	201	91(45.3)	1.03(0.77-1.39)	0.818
Secondary	212	95(44.8)	1.02(0.76-1.37)	0.859
College/University	76	38(50.0)	1.14(0.81-1.60)	0.423
Mother occupation				
Subsistence farmers	307	178(60.0)	Ref.	
Public/Private sector employed	35	10(28.6)	0.47(0.35-1.54)	0.421
Petty business/ self employed	225	70(31.1)	0.51(0.30-0.80)	0.914
Partner occupation				
Subsistence farmers	364	142(39.0)	Ref.	
Public/Private sector employed	38	25(65.8)	1.68 (1.20-2.40)	0.421
Petty business/self employed	165	101(61.2)	1.56(1.20-2.00)	0.951
Marital status				
Married	225	84(37.3)	Ref.	
Divorced	87	34(39.1)	1.04(1.16-2.08)	0.243
Single	102	47(46.1)	1.23(0.78-1.75)	<0.001
Widower	153	93(60.8)	1.63(0.80-1.74)	0.296
Maternal income per month (Tshs)				
No incomes	129	58(45.0)	Ref.	
≤500,000/=	386	171(44.3)	0.97(0.78-1.22)	0.891
500,001/=	52	29(55.8)	1.24(0.91-1.68)	0.369
Residence				
Rural	291	122(41.9)	Ref.	
Urban	276	136(49.3)	1.17(0.90-1.50)	0.080
Council				
Njombe TC	231	190(82.2)	Ref.	
Makambako TC	183	92(50.3)	0.61(0.40-0.90)	0.056
Wanging'ombe DC	153	79(51.6)	0.62(0.40-0.95)	0.279

Table 8: Bivariable analysis of maternal characteristics associated with CS among PDW in Njombe region from March to May 2024 (N=567)

ANC characteristics	Frequency N=567	% of CS	cPR (95% CI)	*P-value*
Gestation age during 1st ANC visit (weeks)				
0-12	175	60(34.3)	Ref.	
13+	392	198(50.5)	1.47(1.17-1.84)	0.001
Gravidity				
1	217	93(42.9)	Ref.	
2-4	311	147(47.3)	1.10(0.90-1.33)	0.321
5+	39	18(46.2)	1.07(0.74-1.56)	0.695
Parity				
0	240	106(44.2)	Ref.	
1	161	82(50.9)	1.15(0.93-1.41)	0.374
2-4	155	63(40.7)	0.92(0.72-1.16)	0.496
5+	11	7(63.6)	1.43(0.90-2.30)	0.326
Abortion history				
No	487	217(44.6)	Ref.	
Yes	80	41(51.3)	0.86(0.68-1.10)	0.347
Had previous scar(s)				
No	415	188(45.3)	Ref	
Yes	152	152(100)	2.20(0.20-3.80)	0.834
Have Living children				
Yes	283	127(44.9)	Ref.	
No	284	131(46.1)	1.02(0.85-1.23)	0.761
No	343	149(43.4)	Ref.	
Yes	224	109(48.7)	1.12(0.90-1.40)	0.312
Maternal height (cm)				
151+	332	173(52.1)	Ref.	
≤150	235	83(35.3)	0.67(0.50-0.90)	0.033

Table 9: Bivariable analysis of Delivery related characteristics associated with CS among PDW in Njombe region from March to May 2024 (N=567)

Labor related characteristics	Frequency N=567	% of CS	cPR (95% CI)	*P-value*
Gestation age during delivery (weeks)				
≤37	168	99(58.9)	Ref.	
38-42	345	112(32.5)	0.55 (0.50-0.76)	<0.001
43+	54	47(87.0)	1.47(1.01-1.49)	<0.001
Total ANC Visits				
4+	492	221(44.9)	Ref.	
≤3	75	37(49.3)	1.09(0.70-1.16)	0.461
Referral from				
Home	426	194(45.5)	Ref.	
Referral from Dispensary	132	56(42.4)	0.95(0.74-1.16)	0.231
Referral from Health Centre	9	8(80.9)	1.77(1.51-2.51)	<0.001
Labor stage at admission				
Early (Before active labor begin)	149	53(35.6)	Ref.	
Late (After active labor)	418	205(49.0)	1.37(1.08-1.74)	<0.001
Sex of the baby				
Female	286	131(45.8)	Ref.	
Unknown sex (Congenital disorders)	13	13(100)	2.18(1.50-3.00)	0.244
Male	268	114(42.5)	0.92(0.70-1.20)	<0.001
Baby weight (Kg)				
≤2.5	52	24(46.2)	Ref.	
2.6-4.0	438	180(41.1)	0.88(0.65-1.21)	0.231
4.1+	77	54(70.1)	1.51(1.30-1.75)	0.012
Number of babies born				
Single tone	528	247(46.8)	Ref.	Ref.
Twins	39	11(28.2)	0.60(0.40-0.90)	<0.001

Table 10: Bivariable analysis of Facilities related characteristics associated with CS among PDW in Njombe region from March to May 2024 (N=567)

Facilities related characteristics	Frequency N=567	% of CS	cPR (95% CI)	*P-value*
Health facility name				
NjombeTC Hospital	207	102(49.3)	Ref.	Ref.
Tanwat Hospital	24	13(54.2)	1.09(0.74-1.62)	0.633
St Joseph Hospital	83	32(38.5)	0.78(0.57-1.06)	0.314
Ilembula Hospital	59	27(45.8)	0.92(0.68-1.26)	0.646
Makambako HC	120	47(39.2)	0.79(0.61-1.03)	0.480
Wanging'ombe HC	74	37(50.0)	1.01(0.77-1.32)	0.913
Health facility level				
Health centers	392	183(46.7)	Ref.	
Hospitals	175	75(42.9)	0.91(0.75-1.22)	0.400
Facility ownership				
Public	402	193(48.0)	Ref.	
Private	24	13(54.2)	1.12(0.76-1.65)	0.055
Religious	141	52(36.9)	0.76(0.60-0.97)	0.030
Attending Clinician qualifications				
Medical Specialist	10	7(70.0)	Ref.	
Assistance Medical Officer	300	51(17.0)	0.24(0.10-0.50)	0.041
Medical Officer	257	121(47.1)	0.67(0.86-1.30)	0.213
Health financing methods				
Cash payment	186	100(53.8)	Ref.	
Community Health Insurance	46	26(56.5)	1.05(0.78-1.40)	0.131
Cost sharing	60	26(43.3)	0.80(0.85-1.10)	0.187
Exemption	103	43(41.8)	0.77(0.99-1.01)	0.066
National Health Insurance	172	63(36.6)	0.68(1.30-2.10)	<0.001

4.6.2 Multivariable analyses of factors associated with CS among PDW in Njombe region

Variables with a p value of <0.2 in bivariable analysis were added to the multivariable analysis using the robust (modified) Poisson model.

The variables which showed to be significantly associated with CS include marital status, Gestation age at ANC first visit, gestation age at delivery, maternal height, where the mother admitted from, health facility ownership, health financing method, babies' sex, babies birth weight, and the number of babies delivered.

Regarding social demographic characteristics, marital status was found to be associated with CS, where single PDW were 1.25 times more likely to be delivered by CS, compared to married women (aPR = 1.25 [95% CI: 1.01–1.74]).

Regarding the ANC services -related characteristics, Gestation age above 13 weeks during the first ANC visit and maternal height were found to be associated with CS, whereby PDW who have a height ≤150 cm were 1.24 times more likely to undergo CS deliveries compared to women with a height above 151 cm (aPR = 1.24 [95% CI: 0.90-1.60]).

The PDW who started the ANC first visits with a gestation age above 13 weeks were 1.51 times more likely to undergo CS compared to women who started the ANC first visit with a gestation age below 12 weeks (aPR = 1.51 [95% CI: 1.10-2.08]).

The PDW who delivered the male babies were 1.10 times more likely to undergo CS deliveries than women who delivered female babies (aPR = 1.10 [95% CI: 1.80-1.40]).

The babies' birth weight was statistically significantly associated with the CS delivery, as the PDW who delivered babies with more than 4.1 kg were 1.67 times more likely to undergo CS deliveries compared to babies with birth weights below or equal to 2.5 kg (aPR = 1.67 [95% CI: 1.07–2.27]).

PDW whose gestation age was more than 43 weeks during labor and delivery period were 1.49 times more likely to undergo CS delivery compared to post-natal women whose gestation age was below 37 weeks during labor (aPR = 1.49 [1.25-1.73]).

Furthermore, PDW who delivered twins' deliveries were 1.15 more likely to have CS deliveries compared to single-tone deliveries (aPR = 1.15 [95% CI: 1.03–1.68]).

Health facility-related characteristics, including where the women were admitted during labor, facility ownership, and health care financing method, showed a significant association with CS deliveries, whereas PDW who were referred from health centers to hospitals were 2.10 times more likely to undergo CS deliveries than those who came from home (aPR = 2.10 [95% CI: 1.50–3.80]).

The PDW who delivered in privately owned health facilities were 1.13 times more likely to deliver by CS compared to women who delivered in publicly owned health facilities (aPR = 1.13[95% CI: 0.75-1.67]).

Finally, PDW who used national health insurances were 1.12 times more likely to undergo CS delivery compared to women who paid cash for labor and delivery services (aPR = 1.12 [95% CI: 1.40-1.90]). The findings of the multivariate analysis are summarized in Table 11.

Table 11: Multivariable analyses of factors associated with CS among PDW in Njombe region from March to May 2024 (N=567)

Characteristics	Frequency N=567	% of CS	cPR (95% CI)	*P-value*	aPR (95% CI)	*P-value*
Social demographic						
Marital status						
Married	225	84(37.3)	Ref.		Ref.	
Divorced	87	34(39.1)	1.04(1.16-2.08)	0.243	1.11(0.79-1.62)	0.486
Single	102	47(46.1)	1.23(0.78-1.75)	<0.001	**1.25**(1.01-1.74)	**0.041**
Widower	153	93(60.8)	1.63(0.80-1.74)	0.296	1.57(0.80-1.60)	0.466
Residence						
Rural	291	122(41.9)	Ref.		Ref.	
Urban	276	136(49.3)	1.17(0.90-1.50)	0.080	1.21(0.86-1.56)	0.743
Council						
Njombe TC	231	190(82.2)	Ref.		Ref.	
Makambako TC	183	92(50.3)	0.61(0.40-0.90)	0.056	0.69(0.80-1.31)	0.837
Wanging'ombe DC	153	79(51.6)	0.62(0.40-0.95)	0.279	0.67(0.86-1.72)	0.351
Maternal characteristics						
Gestation age during 1st ANC visit (weeks)						
0-12	175	60(34.3)	Ref.		Ref.	
13+	392	198(50.5)	1.47(1.17-1.84)	0.001	**1.51(**1.10-2.08)	**0.031**
Mother height (Cm)						
151+	332	173(52.1)	Ref.		Ref.	
≤150	235	83(35.3)	0.67(0.50-0.90)	0.033	**1.24(**0.90-1.60)	**0.001**
Delivery related factors						
Gestation age during labor (weeks)						
≤37	168	99(58.9)	Ref.		Ref.	
38-42	345	112(32.5)	0.55 (0.50-0.76)	<0.001	0.62(0.50-0.76)	<0.001
43+	54	47(87.0)	1.47(1.01-1.49)	<0.001	**1.49**(1.25-1.73)	**0.031**
Mother admitted from						
Home	426	194(45.5)	Ref.		Ref.	
Dispensary	132	56(42.4)	0.95(0.74-1.16)	0.231	0.93(0.74-1.18)	0.584
Health Centre	9	8(80.9)	1.77(1.51-2.51)	<0.001	**2.10**(1.50-3.80)	**<0.001**
Labor stage at admission						
Early (Before active labor begin)	149	53(35.6)	Ref.		Ref.	
Late (After active labor)	418	205(49.0)	1.37(1.08-1.74)	<0.001	1.29(0.83-1.43)	0.503
Sex of the baby						
Female	286	131(45.8)	Ref.		Ref	
Unknown sex (Congenital disorders)	13	13(100)	2.18(1.50-3.00)	0.244	2.05(0.87-1.27)	0.564
Male	268	114(42.5)	0.92(0.70-1.20)	<0.001	**1.10**(1.80-1.40)	**0.021**
Baby weight (Kg)						
≤2.5	52	24(46.2)	Ref.		Ref.	
2.6-4.0	438	180(41.1)	0.88(0.65-1.21)	0.231	1.01(1.02-1.80)	0.071
4.1+	77	54(70.1)	1.51(1.30-1.75)	0.012	**1.67**(1.07-2.27)	**0.002**
Number of babies born						
Single tone	528	247(46.8)	Ref.	Ref.		
Twins	39	11(28.2)	**0.60**(0.40-0.90)	<0.001	**1.15**(1.03-1.68)	**<0.001**
Health facilities related factors						
Facility ownership						
Public	402	193(48.0)	Ref.		Ref.	
Private	24	13(54.2)	1.12(0.76-1.65)	0.055	**1.13**(0.75-1.67)	**<0.001**
Religious	141	52(36.9)	0.76(0.60-0.97)	0.030	0.81**(**0.53-0.88)	0.551
Attending Clinician qualifications						
Medical Specialist	10	7(70.0)	Ref.			
Assistance Medical Officer	300	51(17.0)	0.24(0.10-0.50)	0.041	1.09(0.89-1.33)	0.364
Medical Officer	257	121(47.1)	0.67(0.86-1.30)	0.213	1.10(0.93-2.46)	0.095
Health financing methods						
Cash payment	186	100(53.8)	Ref.		Ref.	
Community Health Insurance	46	26(56.5)	1.05(0.78-1.40)	0.131	0.97(0.50-0.95)	0.023
Cost sharing	60	26(43.3)	0.80(0.85-1.10)	0.187	0.55(0.40-0.76)	0.000
Exemption	103	43(41.8)	0.77(0.99-1.01)	0.066	0.72(0.55-0.94)	0.013
National Health Insurance	172	63(36.6)	1.68(1.30-2.10)	<0.001	**1.12**(1.40-1.90)	**<0.001**

5.0 DISCUSSION

The prevalence of CS among PDWs in the Njombe region was found to be higher. The leading indications for CS were previous scars and fetal distress**.** Notably, there were the lowest percent of neonatal deaths after CS and the highest percentages of post-CS maternal and fetal complications. In the Njombe region, CS deliveries were influenced by various factors, including social demographics (marital status), antenatal care practices (timing of ANC visits), maternal height, health facility-related factors (referral from, health services financing methods, and health facility ownership), and labor and delivery characteristics (including baby sex, birth weight, twin's deliveries, and gestational age during labor).

The study revealed the highest CS prevalence among PDW who delivered in the selected health facilities in Njombe region, which is quite higher than the study done in the Iringa region of Tanzania (33) which reported the lowest prevalence; however, another study done in the Iringa region of Tanzania reported the highest prevalence of 41 percent (34). Another cross-sectional study done in Nigeria showed a prevalence of 50%, which is slightly higher than in our study (35). The highest prevalence of CS in Njombe may be explained by the highest number of previous scars, CS by maternal request, and CS without maternal or fetal indications and height below 150 cm.

More than half of the CS in the Njombe region were elective, which is quite high compared to the study done in Nigeria, which showed 35.3 percent of elective CS (35). However, the study done in Nepal reported 60 percentage of elective CS which is higher from our study (36). The higher number of elective CS in Njombe might be explained by the higher number of previous scars, who obviously end up with elective CS during delivery and maternal CS without indications.

In terms of maternal indications for CS, our study reported that most of the CS were done due to previous scars. However, this is quite lower than the study done in Nepal, which reported 48 percent of CS were done due to previous scars (36).

The results of these studies were similarly from the study done in the US, which showed that most CS deliveries were indicated due to cephalic disproportionality (37). The highest number of previous scars in Njombe region might be due to high proportion of PDW with height below 150 cm.

Despite the previous scars, another alarming maternal indication of CS revealed by our study is CS due to maternal or paternal requests, which were about 13.2 percent, which is quite high, especially in primary health care facilities compared to study done in the Netherlands, which show about 5% of CS due to maternal or partner requests (38). The increases in maternal requests can be explained by the perceptions about safety of mothers and newborns also women with underlying medical conditions.

Regarding fetal indications for CS, most of CS deliveries were done due to fetal distress, which is similar to the cross-section study that was done in Tanzania, which showed that more than 47% of CS were due to fetal distress (39). However, another cohort study done in the US showed that fetal microsomia is a leading fetal indication for CS (40, 41). The differences in maternal and fetal indications for CS across the countries may be explained by the differences in obstetric characteristics of pregnant women and the quality of obstetric health care services between the health facilities across the countries.

The CS deliveries aimed at saving the lives of mother and babies when vaginal delivery is not the best option. Some studies have been reporting that some medically unindicted CS deliveries may have negative outcomes for mothers and their newborns. Our study reported 1.6 percent of newborn deaths following CS, which is quite lower than the study done in Ethiopia, which reported 29% of fetal deaths after CS (42). A study done in Nepal reported the 0.2% prevalence of fetal deaths following CS (43). The lowest prevalence of fetal deaths in Njombe might be due to the improvement of neonatal care services, health care infrastructure, technology, and human resources across the region, which have been done by the Ministry of Health.

The findings of our study highlighted that 2.3 percent of babies born by CS have a poor Apgar score (less than 3) within 5 minutes after delivery and post-natal fetal complications of about 32.6 percent, which is quite higher as compared to a study done in Nepal, which reported the lowest prevalence of a 0.1 percent of newborns with poor Apgar score among post-cesarian

babies (36). The number of poor Apgar scores with five minutes in the Njombe region might be due to delayed arrival of pregnant women at the health facilities during labor and delivery services.

Early neonatal sepsis is the leading post-natal fetal complications among post-CS newborns delivered in the Njombe region. This is similar to the study done in Dar es Salaam, Tanzania, which documented the higher prevalence of early neonatal sepsis among post-CS-delivered newborns (44). The early neonatal sepsis among CS-delivered infants may be explained by inappropriate adherence to aseptic techniques during CS, and the risk of contamination is higher during CS than during vaginal deliveries.

We also, observed maternal outcomes following the CS; there were no maternal deaths following CS, unlike other studies that were done in the DRC Congo and highlighted 5 percent of maternal deaths following the CS (45). However, 12.8 percent of post-caesarian section women were admitted due to post-natal complications, including post-partum hemorrhage and postnatal infections. This is similar to the study done in Tanzania, Uganda, Chile, and Iran, which highlighted the higher prevalence of these complications among post-caesarian women (46, 47, 48, and 49). The similarities between these findings might be implicated by the higher risk of bleeding during and after CS deliveries, unlike normal deliveries.

Regarding social and demographic factors, our studies underscore the significance of the association of CS with marital status, and CS where by single PDW were more likely to undergo a CS delivery than married, which is similar to the study done in Ghana (50).

Other social demographic characteristics, including age, education, occupation, and residence, were protective, which is quite different from the study done in Tanzania, which shows that they have statistical significance with CS (51). This is quite different from the studies done in Ghana, which documented no associations with these variables (52, 53).

Being single was associated with CS as shown in our study may be due to the fact that our studies recruited more than 17% of single women who are prime gravida, height below 150 cm and age below 20 years old, which puts them at risk of CS deliveries.

Furthermore, the results of our studies cemented the significant association between CS and Maternal factors like gestation age at start of ANC and maternal height below 150 cm. PDW who started the ANC first visit with a gestation age above 13 weeks were more likely to undergo CS, unlike those who had a 12-week gestation age. This is similar to the study done in Ghana (54) and the study done in Pakistan, which reported the same findings (55). The association between CS and delayed to start ANC visits might be explained that PDW who delays miss important services during pregnant which increases the risk during labor and delivery period.

In the case of maternal height, PDWs who have a height below 150 cm were more likely to undergo CS deliveries compared to women with a height above 150 cm. This is concurrent with the study done in Ghana, which showed similar findings (56). However, other ANC-related variables showed no association, including parities, gravity, and number of children, abortion history, CS history, and number of ANC visits, which is different from the study done in Rwanda, which showed associations with these characteristics (57).

We also observed an association between delivery factors, including male sex, babies with more than 4.1 kg birth weight, twins' deliveries, and gestational age greater than 43 weeks during labor. Our findings are similar to the findings from the studies done in Ghana and Vietnam (45, 55). This might be explained by the twins' deliveries, big baby and gestation age above 43 weeks during labor are common risk factors for CS.

PDWs who delivered in privately owned health facilities, ones used national health insurance and ones referred to health centers, and were more likely to undergo CS. These findings were confirmed by the studies done in Tanzania, Kenya, and Haiti (47, 53). However, these findings were quite different from the studies done in Rwanda, this might be explained by the facts that most of private health facilities depend on national health insurances as the major sources of incomes through providing CS services (54).

Generally, our study underscores the complex interplay of various factors influencing CS deliveries in Njombe and highlights the need for targeted interventions to improve maternal and fetal health outcomes.

5.1 Study limitation

This study is across-sectional study, it cannot establish causality, so the observed associations do not imply direct cause-and-effect relationships.

6.0. CONCLUSION AND RECOMMENDATION

6.1. Conclusion

The prevalence of CS among PDW in selected facilities in Njombe region was found to be 45.50% (95% CI: 41%–49%). The leading indications for CS were previous scars and fetal distresses. Notably, there was a neonatal death rate of 1.6% and post-CS maternal and fetal complications of 12.8% and 32.6%, respectively.

The likelihood of undergoing a CS was influenced by various factors, including social demographics (marital status), antenatal care practices (timing of ANC visits), maternal height, health facility-related factors (referral from and type of health facility ownership), and labor and delivery characteristics (such as infant sex, birth weight, multiple pregnancies, and gestational age during labor).

6.2. Recommendations

1. The Regional Medical Officer (RMO) and District Medical Officers (DMOs) should conduct mentorship and training programs to clinicians on the proper identification and adherence to indications of CS.
2. The Medical Officer In charges (MOIs) must ensure improvement of labor and delivery services especially infection prevention during and post-CS to reduce newborn and post-CS infections.
3. RMO and DMOs should conduct regular supervision, especially in private health facilities, so as to ensure guidelines for caesarian section procedures are observed.
4. The National Health Insurance Funds (NHIF) should formulate CS guidelines in order to ensure that CS procedures are done per indications and properly documented to reduce the number of caesarian sections.

5. RMO and DMOs should improve the quality of care during CS to reduce maternal and newborn complications.

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APPENDECES

Appendix I: English Questionnaire

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

DEPARTMENT OF ECOLOGY AND BIOSTATISTICS

ENGLISH QUESTIONANNAIRE

THE PREVALENCE, OUTCOMES, AND FACTORS ASSOCIATED WITH CAESARIAN SECTIONS AMONG WOMEN WHO DELIVERED IN NJOMBE REGION FROM DECEMBER 2023 TO FEBRUARY 2024.

QUESTIONNAIRE NUMBER……...

Introduction

Questionnaire for assessment of the prevalence, outcomes, and factors associated with caesarian sections among women who delivered in the Njombe region from December 2023 to February 2024.

Instructions

This questionnaire consists of six sections: section one identification information, section two on social demographics, section three on ANC and maternal obstetric characteristics, section four on information during labor, section five on health facility related factors and section six on maternal and newborn outcomes. There are 54 closed-ended questions, which are to be filled out with research assistance following interviews with the women who gave birth at selected health facilities in the Njombe region. Tick the appropriate choice based on the participants' responses.

SECTION ONE: IDENTIFICATIONS INFORMATION

1. Participants identification number…….....

2. Health facility name…….

3. Ownership of health facility

1. Public

2. Private

3. Faith-base

4. Level of heath facility

1. Health center

2. District Hospital

3. Regional Hospital

4. Regional Referral Hospital

5. Date of interview: .....

6. Time of interview.....

7. Name of the researcher/assistance researcher……..….

8. Researcher/assistance research phone number……...

SECTION TWO: SOCIAL DEMOGRAPHIC FACTORS

9. Age (years)……

10. Religion

1. Muslim
2. Christian
3. Others

11. Education level

1. No formal education
2. Primary education
3. Secondary education
4. Colleges and universities

12. Occupation

1. Farmer
2. Housewife
3. Government employed
4. Private employed
5. Business

13. Partner education level

1. No formal education
2. Primary education
3. Secondary education
4. Colleges and universities

14. Partner occupation

1. Farmer
2. Government employed
3. Private employed
4. Business man
5. No employment

15. Mother incomes…… Tsh

16. Partner incomes ……...Tsh

17. Marital status

1. Married
2. Widower
3. Divorced
4. Single

18. District name……

19. Places

1. Rural
2. Urban

SECTION THREE: ANC AND MATERNAL OBSETRIC CHARCTERITICS

20. Gestation age during 1st ANC visit in..... Weeks

21. Parity…….

22. Gravidity…….

23. Abortion history

1. Yes
2. No

24. Number of abortions……...

25. Living children

1. Yes
2. No

26. How many living children.....

27. Counseled on danger signs during ANC visits

1. Yes
2. No

28. Did you experience any dangerous signs during pregnancy?

1. Yes
2. No

29. If yes, in question no 28 what danger signs

1. Vagina bleeding
2. Convulsion
3. Severe headache or blurred vision
4. Severe abdominal pain

5. Swelling of the upper and lower limbs
6. Limited fetal movement
7. Foul or watery discharges
8. Others (mention)

30. Caesarean Section History

1. Yes
2. No

31. How many caesarian sections? .....

32. Number of previous caesarian sections.....

SECTION FOUR: INFORMATION DURING LABOR AND DELIVERY

33. Gestation age during labor..... Weeks

34. Height in centimeters.....

35. Underlying medical conditions

1. Severe malaria
2. Tuberculosis
3. Diabetes mellitus
4. Hypertension
5. Syphilis
6. HIV/AIDS
7. None
8. Others(mention)

36. Total ANC visits during pregnancy.....

37. Arrival at the health facility when labor began

1. Early (before labor begins)
2. Late (after labor begins

38. Type of Delivery

1. Vaginal delivery
2. Caesarian section

39. Caesarian section indication

1. Prolonged labor
2. Obstructed labor
3. Mal-presentation
4. Severe pre-eclampsia
5. Fetal distress
6. Multiple pregnancies
7. Placenta Previa
8. Previous scars
9. Other mention……

40. Type of caesarian section

1. Emergency
2. Elective
3. Maternal request

SECTION FIVE: HEALTH FACILITY RELATED FACTORS

41. Counseled on the outcomes of caesarian sections

1. Yes
2. No

42. Level of education of nurses or midwives who cared for the mother during labor

1. Medical attendant
2. Enrolled Nurses
3. Assistance Nurse Officer
4. Nurse officer
5. Nurse specialist

43. Level of education of the physician who attended to the mother during labor

1. Assistance clinical officer
2. Clinical Officer
3. Assistance medical officer
4. Medical Doctor
5. Medical specialist
6. Medical super specialist

44. Mother's health financing method

1. National Health Insurance
2. Community health insurance
3. Cash payments
4. Exception
5. Cost sharing

SECTION SIX: THE MARTERNAL OUTCOMES AND NEWBORNS OUTCOMES

A: NEWBORNS OUTCOMES

45. Baby sex

1. Male
2. Female
3. Unknown

46. Baby weight .....Kg

47. Number of baby(s) born...

48. Is a baby born alive after delivery?

1. Yes
2. No

49. If yes, in question no 48 what is the baby condition? 72 hours after birth

1. Alive-discharged
2. Alive-admitted
3. Alive-referred
4. Died

50. Newborns: postnatal complications after birth

1. Neonatal sepsis
2. Respiratory distress
3. Birth trauma
4. Birth asphyxia
5. Cerebral palsy
6. Other mention
7. No complication

B: MARTERNAL OUTCOMES

51. Mother is alive within one hour after delivery.

1. Yes
2. No

52. If yes, in question no 51 what is mother condition? 72 hours after birth

1. Alive-discharged
2. Alive-admitted
3. Alive-referred
4. Died

53. Mother transfused within 72 hours after or during delivery

1. Yes
2. No

54. Which maternal postnatal complications were observed?

1. Postpartum hemorrhage
2. Post-natal infections
3. Severe anemia
4. Eclampsia
5. Anesthetics accidents
6. Urine system injury
7. Others mentions
8. No complication

Appendix II: Swahili questionnaire

CHUO KIKUU CHA FYA NA SAYANSI SHIRIKISHI MUHIMBILI

SHULE YA AFYA NA SAYANSI YA JAMII

IDARA YA EPIDEMILOJIA NA TAKWIMU

DODOSO LA KISWAHILI

UTAFITI JUU YA KUCHUNGUZA MATOKEO NA SABABU ZINAZOCHANGIA KUFANYIKA KWA UPASUAJI WA KUTOA MTOTO WAKATI WA KUJIFUNGUA KATIKA VITUO VYA HUDUMA ZA AFYA KATIKA MKOA WA NJOMBE KUANZIA APRILI MPAKA MAYI 2024

NAMBA YA DODOSO.....

Utangulizi: Dodoso hili ni kwa ajili ya kuchunguza matokeo na sababu zinazo changia kufanyika kwa upasuaji wa wanawake kwa ajili ya kutoa mtoto wakati wa kujifungua katika vituo vya kutolea huduma za afya katika mkoa wa Njombe Tanzania kuanzia mwezi Aprili mpaka Mei 2024.

Maelekezo: Dodoso hili lina sehemu sita ambazo ni sehemu ya kwanza taarifa za utambuzi, sehemu ya pili ni taarifa binafsi,sehemu ya tatu ni taarifa wakati wa ujauzito na kujifungua , sehemu ya nne sababu za vituo vya kutolea huduma za afya, sehemu ya tano ni zinazo changia kufanyika kwa upasuaji wa wanawake kwa ajili ya kutoa mtoto wakati wa kujifungua katika vituo vya kutolea huduma mkoa wa Njombe Tanzania sehemu ya sita ni matokeo ya upasuaji baada ya kujifungua kwa mama na mtoto. Lina jumla ya maswali 57 ambayo yatajibiwa na wa shiriki ambao ni akina mama waliojifungua katika hospitali zilizopo ndani ya mkoa wa Njombe

na kujazwa kwenye fomu hii na watafiti baada/wakati wa maojiano maalumu kwa kuweka alama ya vema kwenye jibu lilichaguliwa.

SEHEMU YA KWANZA: TAARIFA ZA UTAMBUZI

1. Namba ya mshiriki……

2. Jina la kituo……...

3. Umiriki wa kituo

1. Serikali
2. Binafsi
3. Dini

4. Ngazi ya kituo

1. Kituo cha afya
2. Hospital/Hospitali ya wilaya
3. Hospital ya rufaa
4. Hospitali ya rufaa ya mkoa

5. Tarehe ya mahojiano ……...…...……...

6. Muda wa mhojiano ……..……

7.Jina la mtafiti/matafiti msaidizi ……...….

8.Namba ya simu ya Mtafiti/Mtafiti msadidizi... ……...…..…

SEHEMU KWANZA: TAARIFA ZA KIJAMII

9.Umri wa mama kwa miaka.....

10. Dini

1. Mkristo
2. Mwislamu
3. Dini nyinginezo

11. Kiwango cha elimu

1. Hana Elimu Rasmi
2. Shule ya msingi
3. Sekondari
4. Elumu ya chuo na elimu ya juu

12. Kazi unayojishuglisha nayo

1. Mkulima/Mfugani
2. Mama wa Nyumbani
3. Mwajiriwa serikalini
4. Mwajiriwa katika sekta binafsi
5. Mfanya biashara

13. Kiwango cha elimu cha mwenza

1. Hana Elimu Rasmi
2. Msingi
3. Sekondari
4. Elumuya chuo na chuo kikuu

14. Kazi anayofanya mweza

1. Mkulima
2. Mwajiriwa serikalini
3. Mwajiriwa katika sekta binafsi
4. Mfanyabiashara
5. Hana kazi

15. Kipato mama kwa mwezi ……...…….……...Tsh

16. Kipato cha mwenza kwa mwezi.....Tsh

17. Hali ya ndoa

1. Ameolewa
2. Mjane
3. Wameachana
4. Hajaolewa

18. Wilaya anayoishi mama …….

19. Mahali iliko

1. Mjini
2. Vijini

SEHEMU YA TATU: TAARIFA ZA MAMA WAKATI WA KLINIKI

20. Umri wa ujauzito wakati wa udhurio la kwanza kliniki ya uzazi……

21. Ujauzito wa ngapi.....

22. Uzao wa ngapi……..….

23. Historia ya kutoka mimba

1. Ndiyo
2. Hapana

24. Kama jibu la swali la 23 hapo juu ni ndiyo, je ni mara ngapi ujauzito umetoka. ……

25. Je una watoto walio hai

1. Ndio
2. Hapana

26. Idadi ya watoto walio hai…….

27. Je uliwahi kupata elimu au ushauri juu ya dalili za hatari wakati wa ujauzito

1. Ndiyo
2. Hapana

28. Je uliwahi kupata dalili yoyote ya hatari wakati wa ujauzito

1. Ndio
2. Hapana

29. Kama ndiyo 28 ni ipi kati ya hizi

1. Kutokwa Damu Ukeni
2. Degedege
3. Maumivu makali ya kichwa
4. Maumivu makali ya tumbo
5. Kuvimba miguu na mikono
6. Mtoto kutocheza
7. Kutokwa na uchafu au majimaji ukeni
8. Zinginezo (taja)

30. Historia ya kujifungua kwa upasuaji

1. Ndiyo
2. Hapana

31. Idadi ya uzao kwa upasuaji.....

32. Umri wa mimba wakati wa kijifungua katika wiki……

SEHEMU YA NNE: TAARIFA ZA UZAZI WAKATI WA KUJIFUNGUA

33. Umri wa mimba wakati wa kujifungua……...

34. Urefu wa mama.....kwa sentimita

35. Matatizo mengine ya kiafya kwa mama

1. Malaria
2. Kifua kikuu
3. Sukari
4. Shinikizo la damu
5. Magonjwa ya ngono (Kaswende au Kisonono)
6. VVU/UKIMWI
7. Hakuwa na shida yoyote
8. Mengineyo ……...

36. Je umeudhuria maudhuurio mangapi wakati wa ujauzito. …….

37. Kuwahi kufika kituo kabla ya kujifungua

1. Ndiyo (Kabla ya uchungu kuanza)
2. Hapana (Baada ya uchungu kuanza)

38. Umejifungua kwa njia gani?

1. Kawaida
2. Upasuaji

39. Kituo ulichojifungulia

1. Hospitali ya wilaya/Hadhi ya wilaya
2. Hospitali ya Mkoa Hadhi ya Mkoa
3. Hospitali ya rufaa ya mkoa/Hadhi ya rufaa

40. Sababu ya upasuaji

1. Uchungu uliopitiliza mda wa kawaida
2. Pingamizi wakati wa mototo kutoka
3. Mtoto kutotanguliza kichwa
4. Shinikizo la damu lilopitiliza
5. Usumbufuwa fitasi
6. Mimba nyingi zilizo tangulia
7. Makovu yaliyo tangulia
8. Placenta previa
9. Dalili nyinginezo

41. Aina ya Upasuaji

1. Upasuaji wa kupangiwa.
2. Upasuaji wa dharula
3. Kuomba mwenyewe

SEHEMU YA TANO: TAARIFA ZA KUTUO CHA KUTOLEA HUDUMA

41.Mama ameshauriwa kuhusu faida na madhara ya kujifungua kwa upasuaji?

1.Ndiyo

2.Hapana

42. Kiwango cha elimu cha elimu cha muuguzi/mkunga aliye mhudumia mama wakati wa kujifungua

1. Mhudumu wa afya
2. Muuguzi
3. Afisa Muuguzi Msadizi
4. Afisa Muuguzi
5. Afisa Muuguzi Bingwa

43. Kiwango cha Elimu cha Dakitari cha Daktari aliye mhudumia mjamzito wakati wa kujifungua.

1. Tabibu
2. Tabibu msaidizi
3. Afisa Tibabu Msaidizi
4. Dakitari
5. Dakitari Bingwa
6. Dakitari bingwa mbobezi

44. Njia za kupata matibabu mama

1. Bima ya afya
2. Bima ya afya ya jamii
3. Pesa taslimu
4. Msamaha
5. Kuchangiwa

SEHEMU YA SITA: MATOKEO KWA MAMA NA MTOTO BAADA YA KUJIFUNGUA NA KUZALIWA

A: MATOKEO KWA MTOTO BAADA YA KUZALIWA

45. Jinsi ya mtoto

1. Kiume
2. Kike
3. Haijulikani

46. Uzito wa mtoto……Kilogramu

47. Wamezaliwa wangapi.....

48. Mtoto/Watoto wamezaliwa hai?

1. Ndiyo
2. Hapana

49. Kama ndiyo swali la 48. Hali ya mtoto masaa 72 baada ya kuzaliwa ikoje?

1. Yuko hai, Karuhusiwa
2. Yuko hai-Kalazwa
3. Yuko hai-Kapewa rufaa
4. Kafariki

50. Matatatizo ya mtoto baada ya kuzaliwa

1. Uambukizo
2. Matatizo ya upumuaji
3. Ajari baada ya kuzaliwa
4. Asphysia baada ya kuzaliwa
5. Cerebral palsy
6. 6.Mengineyo (taja)
7. Hakuwa na changamoto yoyote

B: MATOKEO KWA MAMA BAADA YA KUJIFUNGUA

51. Mama yuko hai limoja baada ya kufungua

1. Ndiyo
2. Hapana

52. Kama ni Ndiyo swali la 51 hali yake ikoje masaa 72 baada ya kujifungua?

1. Yuko hai, Karuhusiwa
2. Yuko hai-Kalazwa

3. Yuko hai-Kapewa rufaa
4. Kafariki

53. Mama kaongezewa damu ndani ya masaa 72 baada ya kujifungu?

1. Ndiyo
2. Hapana

54. Matatizo baada ya kujifungua kwa mama

1. Kuvuja damu nyingi
2. Uambukizo
3. Upungufu wa damu
4. Kifafa cha mimba
5. Matatizo ya dawa za usingizi
6. Ajari ya mfumo wa mkojo
7. Nyinginezo (taja)
8. Hakuwa na shida yoyote.

Appendix III: Consent form English version

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

DEPARTMENT OF ECOLOGY AND BIOSTATISTICS

THE PREVALENCE, OUTCOMES, AND FACTORS ASSOCIATED WITH CAESARIAN SECTIONS AMONG WOMEN WHO DELIVERED IN NJOMBE REGION FROM APRIL 2024 TO MAY 2024.

FORM NUMBER.....

Introduction

Dear madam/sir,

Greeting,

My name is Jonhas Masatu Malija, a resident perusing a Master degree in Applied Epidemiology in the Department of Epidemiology and Biostatic at Muhimbili University of Health and Allied Sciences (MUHAS). I would like to conduct the study as mentioned above as the necessary requirement for fulfillment of my postgraduate study.

Participation in this study

Purpose of the study: To assess the prevalence, outcomes, and factors associated with caesarian sections among women who delivered in the Njombe region from April to May2024.

Sponsor: Centre for Diseases Control (CDC) through Mzumbe University.

Principle investigator: Jonhas Masatu.

Procedure: There is no invasive procedure for participants.

Risk or harm: There were no harms or risks to participants during this study.

Benefits: The results of this study will help the Ministry of Health and other stakeholders to understand the prevalence, outcomes and factors associated with caesarians sections deliveries in the country, hence maintaining the recommended WHO caesarian sections rate.

Confidentiality: No names or information about participants will be exposed or shared; instead, the study will use participants' identification numbers.

Participation and withdrawal rights

The participants have the right to voluntarily participate in this study or withdraw from it without payment, and there are no restrictions or outcomes for withdrawing from the study. The participants will participate in this study by responding to 48 closed-ended questions and choosing the most correct answer.

Contact persons

For any question or inquiry in this study, you should contact the principal investigator, who is Jonhas Masatu, Muhimbili University of Health and Allied Sciences, P.O. Box 65004, Dar es Salaam, Tanzania, phone number +255718707498, email masatu.jm@gmail.com OR Core Supervisor Professor, Rose Mpembeni, +255784394636, email rcmpembeni@gmail.com, OR

Directorate of Research and Publication, Muhimbili University of Health and Allied Sciences, P.O. Box 65001, Dar es Salaam, phone number +255222152489.

Agreement to participate

I have read the contents of this form and am satisfied with them, so I agree to participate in this study.

Participant signature: ……Date……

Researcher/Researcher assistance signature.....Date.....

Appendix IV: Consent form swahili version

CHUO KIKUU CHA FYA NA SAYANSI SHIRIKISHI MUHIMBILI

SHULE YA AFYA NA SAYANSI YA JAMII

IDARA YA EPIDEMILOJIA NA TAKWIMU

FOMU YA MAKUBALIANO

KUSHIRIKI KATIKA UTAFITI WA KUCHUNGUZA MATOKEO NA SABABU ZINAZOCHANGIA KUFANYIKA KWA UPASUAJI WA WANAWAKE KWA AJILI YA KUTOA MTOTO WAKATI WA KUJIFUNGUA KATIKA VITUO VYA HUDUMA ZA AFYA MKOA WA NJOMBE KUANZIA MWEZI APRILI 2024 MPAKA MEI 2024.

NAMBA YA FOMU……...

Utangulizi

Mpendwa,

Salam,

Mimi naitwa Jonhas Masatu Malija ni mwanafunzi wa Shahada ya Uzamili ya Epidemilojia ya Magonjwa ya Binadamu kutoka Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, Idara ya Epidemilojia na Takwimu za Kibiolojia. Ninafanya utafiti tajwa kama hitaji la lazima ili niweze kuhitimu masomo yangu.

Utayari wa kushiriki katika utafiti huu

Lengo La utafiti: Malengo ya utafiti huu ni kuchunguza matokeo na sababu zinazochangia kufanyika kwa upasuaji wa wanawake kwa ajili ya kutoa mtoto wakati wa kujifungua katika vituo vya huduma za afya mkoa wa Njombe kuanzia mwezi Aprili 2024 mpaka Mei 2024.

Mtafiti: Jonhas Masatu.

Mfadhili: PREPFAR chini ya CDC kupitia Chuo Kikuu cha Mzumbe.

Madhara/Hasara: Hakuna madhara au hasara za mshiriki yeyote wa utafiti huu.

Faida: Matokeo ya uutafiti huu yanaweza kusadia wizara ya afya, watalaamu wa afya na wadau kutekeleza mipango na sera mbali mbali zenye lengo la kuuboresha huduma za upasuaji wa kutoa mto kwa a akina mama wajawazito nchini.

Usiri: Hakuna taarifa yoyote au majina ya mshiriki yatakayoandikwa au kutolewa kwa mtu yoyote asiye husika na taarifa zote za mshiriki ni siri baina ya mtafiti na mshiriki, zaidi mtishiriki atatatumia namba ya utambulisho.

Haki ya kushiriki Au Kutokushiriki: Wanawake waliojifungulia katika hospitali zilizopo mkoa wa Njombe wanayo haki ya kushiriki au kutoshiriki katika utafiti huu na hakuna malipo ya kushiriki au kutoshiriki katika u Watashiriki kwa kujibu maswali 57 ya kwa kuweka alama ya vema kwenye jibu analoona ni sahihi.

Mawasiliano

Kama una maswali zaidi kuhusu utafiti huu tafadhali wasiliana na mtafiti mkuu Jonhas Masatu, Chuo kikuu cha Afya na Sayansi Shirikishi Muhimbili SLP 65004 Dar es Salaam, Namba ya simu +255718707498 Barua Pepe masatu.jm@gmaail.com AU wasiliana na Msimamzi mkuu Professa Rose Mpembeni namba ya simu +255784394636 barua pepe rcmpembeni@gmail.com AU Wasialiana na Kurugenzi ya Utafitina Machapisho, Chuo kikuu cha Afya na Sayansi Shirikishi Muhimbili SLP 65001 Dar es Salaam, Simu namba +55222152489.

Ridhaa: Nimesoma fomu hii ya makubaliano na nimeelewa yote yaliyoandikwa kwenye fomu hii na ninakubali kushiriki katika utafiti huu.

Sahihi ya Mshiriki ….....Tarehe …….……

Sahihi ya Mtafiti/Mtafiti Msaidizi..... Tarehe…….....…….

Appendix V: Ethical clearance certificate

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATIONS

Ref. No.DA.282/298/01.C/ Date: 02/04/2024

MUHAS-REC-04-2024-2119
Jonhas Masatu
Shool of Public Health and Social Sciences
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: The prevalence, outcomes, and factors associated with caesarean sections among women who delivered in Njombe region

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 02/04/2024
EXPIRATION DATE OF APPROVAL: 02/04/2025

STUDY DESCRIPTION:
Purpose:
The purpose of this observation cross section study design is to assess the prevalence, outcomes, and factors associated with caesarean sections among women who delivered in the Njombe region

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015121.pdf and in the MUHAS archives.

The PI is required to:

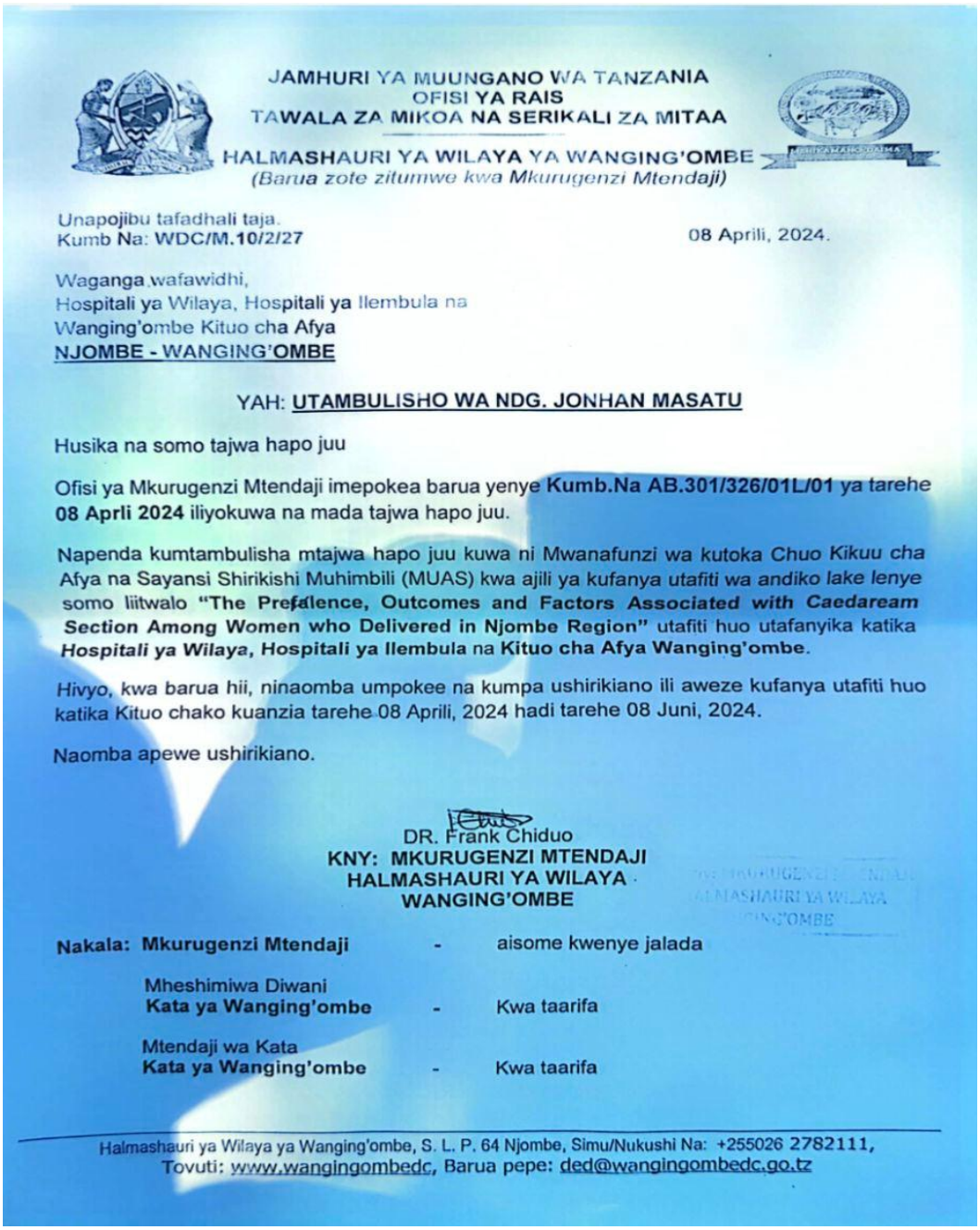
1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.



Dr. Nahya Salim Masoud,

Chairperson, MUHAS Research and Ethics Committee

Appendix VI: Data collection Permission letter from Wanging'ombe DC



JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA
HALMASHAURI YA WILAYA YA WANGING'OMBE
(Barua zote zitumwe kwa Mkurugenzi Mtendaji)

Unapojibu tafadhali taja.
Kumb Na: WDC/M.10/2/27

08 Aprili, 2024.

Waganga wafawidhi,
Hospitali ya Wilaya, Hospitali ya Ilembula na
Wanging'ombe Kituo cha Afya
NJOMBE - WANGING'OMBE

YAH: **UTAMBULISHO WA NDG. JONHAN MASATU**

Husika na somo tajwa hapo juu

Ofisi ya Mkurugenzi Mtendaji imepokea barua yenye **Kumb.Na AB.301/326/01L/01** ya tarehe **08 Aprli 2024** iliyokuwa na mada tajwa hapo juu.

Napenda kumtambulisha mtajwa hapo juu kuwa ni Mwanafunzi wa kutoka Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili (MUAS) kwa ajili ya kufanya utafiti wa andiko lake lenye somo liitwalo **"The Prefalence, Outcomes and Factors Associated with Caedaream Section Among Women who Delivered in Njombe Region"** utafiti huo utafanyika katika ***Hospitali ya Wilaya*, Hospitali ya Ilembula** na **Kituo cha Afya Wanging'ombe**.

Hivyo, kwa barua hii, ninaomba umpokee na kumpa ushirikiano ili aweze kufanya utafiti huo katika Kituo chako kuanzia tarehe 08 Aprili, 2024 hadi tarehe 08 Juni, 2024.

Naomba apewe ushirikiano.

DR. Frank Chiduo
KNY: MKURUGENZI MTENDAJI
HALMASHAURI YA WILAYA
WANGING'OMBE

Nakala: Mkurugenzi Mtendaji - aisome kwenye jalada

Mheshimiwa Diwani
Kata ya Wanging'ombe - Kwa taarifa

Mtendaji wa Kata
Kata ya Wanging'ombe - Kwa taarifa

Halmashauri ya Wilaya ya Wanging'ombe, S. L. P. 64 Njombe, Simu/Nukushi Na: +255026 2782111,
Tovuti: www.wangingombedc, Barua pepe: ded@wangingombedc.go.tz

Appendix VII: Data collection Permission letter from Njombe TC

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS –TAWALA ZA MIKOA NA SERIKALI ZA MITAA
HALMASHAURI YA MJI NJOMBE

Unapojibutafadhalitaja:
KumbNa.NTC/TD/82/193/1J/61 08/04/2024

Mganga Mfawidhi,
Hospitali ya Mji/Kituo cha Afya Njombe,
Mganga Mfawidhi,
Hosptali ya Taniwat na
Hospitali ya Wemba,
Halmashauri ya Mji,
NJOMBE.

YAH: UTAMBULISHO WA NDUGU JONHAN MASATU

Tafadhali husika na mada tajwa hapo juu.

2. Ofisi ya Mkurugenzi wa Halmashauri ya Mji Njombe imepokea barua toka kwa *Katibu* Tawala wa Mkoa wa Njombe yenye Kumb.Na. AB.301/326/01L/01 ya *tarehe 08 .04.* 2024 inayohusu mada tajwa hapo juu.

3. Napenda kumtambulisha kwako mtajwa hapo juu ambaye ni mwanafunzi wa kutoka Chuo kikuu cha Afya na Sayansi Shiriki Muhimbili (MUAS) kwa ajili ya kufanya utafiti wa andiko lake lenye somo liitwalo **"The Prevalence, Outcomes and Factors Associated with caesarean Section Among Women who Delivered in Njombe Region".**

4. Kwa barua hii, ninaomba umpokee na kumpa ushirikiano ili aweze kufanya utafiti huo katika Kituo chako kuanzia tarehe 08.04.2024 hadi 08.06.2024.

Ahsante kwa ushirikiano.

DKT. Jabil M.Juma
KNY : MKURUGENZI
Halmashauri ya Mji
NJOMBE.

DWH MEDICAL OFFICER P.O. BOX 577 NJOMBE

Nakala: Mkurugenzi Halmashauri ya Mji Njombe- aione kwenye jalada

---

Ofisi ya Mkurugenzi (TD), S.L.P 577 NJOMBE, Tovuti: www.njombetc.go.tz , Simu: 026-2968833

Barua pepe: td@njombetc.go.tz, Posti Kodi : 31 Barabara ya Ikisa, 59108 Mjimwema -Njombe

Appendix VII: Data collection Permission letter from Makambako TC

JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

HALMASHAURI YA MJI MAKAMBAKO

Unapojibu tafadhali taja:
Kumb. Na:MTC/P.60/2 VOL. II /195 12/04/2024

Jonhan Masatu,
S.L.P ,
MAKAMBAKO.

Yah: **UTAMBULISHO WA KUFANYA UTAFITI.**

Husika na mada tajwa hapo juu.

2. Ofisi imepokea barua yenye Kumb Na. **AB.301/326/01L/O/01** ya tarehe **08/04/2024** kutoka kwa Katibu Tawala Mkoa inayomtambulisha ndugu **JONHAN MASATU** kufanya utafiti katika Halmashauri ya Mji Makambako.

3. Hivyo kwa barua hii namtambulisha Mwanafunzi huyu kufanya utafiti wenye kichwa cha habari **"THE PREVALENCE, OUTCOMES AND FACTORS ASSOCIATED WITH CAESAREAN SECTION AMONG WOMEN WHO DELIVERED IN NJOMBE REGION"** *katika* Hospital zifuatazo;- **HOSPITAL YA MJI MAKAMBAKO, KITUO CHA AFYA MAKAMBAKO, KITUO CHA AFYA NAZARETH NA HOSPITAL YA ST JOSEPH IKELU.**

4. Aidha mwanafunzi huyu ataanza utafiti wake tarehe **08/04/2024** hadi tarehe **08/06/2024**.

5. Nakutakia kheri katika utafiti wako.

Regis Ng`itu
For: TOWN DIRECTOR
MAKAMBAKO TOWN COUNCIL
MAKAMBAKO

Kny: **MKURUGENZI HALMASHAURI YA MJI**

NAKALA KWA: Waganga wafawidhi Hospital na Vituo vya Afya husika,
MAKAMBAKO. (Tafadhali mpokee na mpeni ushirikiano)

Makambako Town Council, Sigrid Mtaa, Njombe Road, P.O. BOX. 405 Makambako,Njombe, Fax No: 026-2968891, Tel No: 026-2968892,
E-Mail: td@makambakotc.go.tz, Tovuti: www.makambakotc.go.tz

Appendix IX: Data collection Permission letter from Njombe-RAS

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

Simu Na : (026) 2782912
2782913
Nukushi : (026) 2782914
Barua pepe: rc@njombe.go.tz
ras@njombe.go.tz
ras.njombe@tamisemi.go.tz
Tovuti : www.njombe.go.tz

Ofisi ya Mkuu wa Mkoa,
8 Barabara ya Mkoani 2,
Mtaa wa Lunyanywi,
S.L.P. 668,
59180 NJOMBE.

Unapojibu tafadhali taja:-
Kumb.Na.AB.301/326/01L/01

08 Aprili, 2024

Wakurugenzi,
Halmashauri za Miji,
NJOMBE NA MAKAMBAKO.

Mkurugenzi Mtendaji,
Halmashauri ya Wilaya,
WANGING'OMBE.

Kuh: **UTAMBULISHO WA NDUGU JONHAN MASATU**

Ofisi ya Mkuu wa Mkoa imepokea barua yenye Kumb.Na. HD/MUH/T.834/2022 ya tarehe 05 Aprili, 2024 kutoka kwa Mkurugenzi wa Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili (MUHAS) iliyokuwa na mada tajwa hapo juu.

2. Napenda kumtambulisha kwako mtajwa hapo juu ambaye ni mwanafunzi wa kutoka Chuo Kikuu cha Afya na Sayansi Shiriki Muhimbili (MUHAS) kwa ajili ya kufanya utafiti wa andiko lake lenye somo liitwalo **"The Prevalence, Outcomes and Factors Associated with Caesarean Section Among Women who Delivered in Njombe Region".** Utafiti huo utafanyika katika Halmashauri yako.

3. Kwa barua hii, ninaomba umpokee na kumpa ushirikiano ili aweze kufanya utafiti huo katika Halmashauri yako kuanzia tarehe 08 Aprili, 2024 hadi 08 Juni, 2024.

4. Nakutakia utekelezaji mwema

Dkt. David Ntahindwa
Kny: **KATIBU TAWALA MKOA**

Nakala: Katibu Tawala Mkoa (Aione kwenye Jalada)
Jonhas Masatu

Appendix: X. Plagiarism certificate

turnitin

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This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

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Submission title:	Prevalence, Outcomes, and Factors Associated with Caesaria...
File name:	Jonhas_Masatu_dissertation_report_final.docx
File size:	201.72K
Page count:	57
Word count:	11,133
Character count:	63,205
Submission date:	04-Jul-2024 03:22PM (UTC+0300)
Submission ID:	2412464359



PREVALENCE, OUTCOMES, AND FACTORS ASSOCIATED WITH CAESARIAN SECTION DELIVERIES AMONG WOMEN WHO DELIVERED IN NJOMBE REGION, TANZANIA

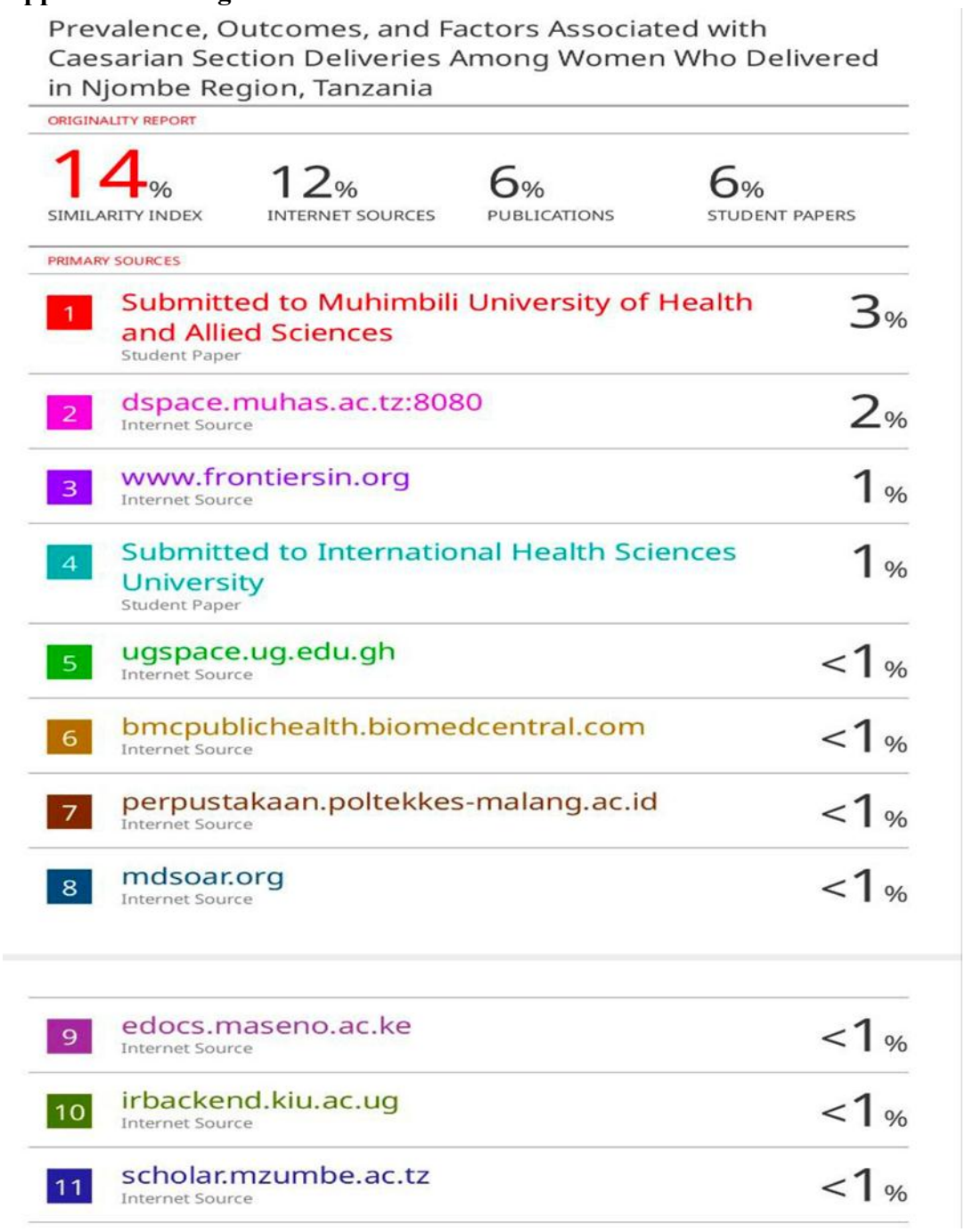
Jonhas Masatu (BScN)

Masters of Science in Applied Epidemiology

Muhimbili University of Health and Allied Sciences

28th June, 2024

Appendix XI: Plagiarism check scores



Prevalence, Outcomes, and Factors Associated with Caesarian Section Deliveries Among Women Who Delivered in Njombe Region, Tanzania

ORIGINALITY REPORT

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PRIMARY SOURCES

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