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Prevalence of Uptake of Caesarean Section under Anaesthesia Services to Prevent Control Obstetric Complications among Pregnant Females of Reproductive Age Attending Nyanza District Hospital, Rwanda

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ABSTRACT

Globally, regionally, and locally in Rwanda, mothers and newborns need to have the best anesthesia services being offered for caesarean section to prevent and control obstetric complications such as stillbirths and maternal deaths in pregnant females of reproductive age. The quality and availability of anesthesia care can vary widely, especially in resource-limited settings. According to the 2019–20 RDHS, 15% of births in Rwanda are delivered by CS. The rising rate signals the need for robust and patient-centered anesthesia care in maternal healthcare in the country. The rise in CS deliveries showcases the urgent necessity to evaluate and improve patients' satisfaction with anesthesia services regarding CS deliveries, since this impacts the mother and overall obstetric care quality. However, anesthesia care for caesarean section at Nyanza District Hospital remains unexplored. Thus, the need to determine the prevalence of uptake of Caesarean Section under Anesthesia Services to Control Obstetric Complications among Females of Reproductive Age Attending Nyanza District Hospital, Rwanda, and lastly determining the level of informed consent dissemination to next of kin/guardians of females of reproductive age attending Nyanza DH before CS services. This was a mixed concept of survey and interviews, using semi-structure questionnaire, key informant guides in descriptive cross-sectional design, and triangulation. Data was managed using SPSS, and analysis by cross-tabulation of descriptive and inferential statistics. Ethical considerations, by the MKUR School of Post-Graduate, MKU Ethical Committee, and Nyanza DH. Findings revealed that the majority 215 (62.9%) of participants ranged in 21-30 years age group. Most female respondents; 263 (76.9%) were married; 71.9% attended primary school, while 59 (17.3%) had no formal education. The prevalence of anesthesia services was 1265 (28.9%) offered to pregnant females of the reproductive age in the study area, and on informed consent uptake, only 34 (10%) of the pregnant female of reproductive age undergone caesarean sections were involved in decision-making about their anesthesia services of choice. Being involved in decision making about anaesthesia choice were significantly associated with satisfaction of anesthesia services with chi-square of 21.6 and P value of 0.0012. Regarding patients'understanding of the information given before signing the consent form, 157 (46%) of respondents had no information about anaesthesia, and only 121 (35%) understood the information provided well. Therefore, Nyanza DH administration, anesthesia team, MOH, and RBC

should synergistically partner to strengthen pre-anaesthesia services to promote maternal health services in Rwanda.

Keywords: Prevalence, Uptake, Caesarean Section, Anaesthesia Services, Prevent control, pregnant females, Obstetric Complications, Females of Reproductive, maternal deaths, still births.

1. Introduction

Worldwide, the proportion of caesarean section (CS) in prevention and control of obstetric complications such as still birth, maternal deaths, has substantially risen over the years. The rate increased from about 70% in 1990 to 21% today. This rate exceeds the World Health Organization's (WHO) recommendation of 10–15% for optimum effectiveness (Angolile et al., 2023). It is projected that by the year 2030, every third child will be born by caesarean section. Currently, an estimated 38 million procedures take place each year (Hussen et al., 2022). In LMICs, where more than 70% of people lack access to surgical care, access to and affordability of safe surgical and anesthesia care remain major issues, even though the number of CS is increasing (Ifeanyichi et al., 2021). The scarcity of anesthesiologist Doctors and nurse anesthetists exacerbate the risk of poor quality of anesthesia care (Zundert, 2023). Patient satisfaction with anesthesia service is a critical indicator of the quality and safety of obstetric care particularly in resource-poor regions with a high burden of maternal mortality (Zundert, 2023). Researches found out that anesthesia satisfaction is determined by the type of anaesthesia received, preoperative explanation of merits and demerits, involvement in decision-making about anaesthesia choice, the effectiveness of pain control, and the overall perioperative experience, including the presence of adverse events and communication with surgical team (Unal & Dennis, 2023) (Bishop et al., 2023). Spinal anesthesia (SA) is widely reported for being very effective, fast-acting, and effective at producing a sensory blockade. It is a popular choice for SA for the procedure of CS (Shaaib et al., 2023). It is widespread used due to its rapid onset, high success rate to achieve pain free blockage without side effect on the fetus making it the most preferred technique for CS (Algarni et al., 2023). This preference is further strengthened by the benefits of this procedure such as awake mother, less neonatal depression, and avoids risks of general anesthesia (Algarni et al., 2023). In Africa, General Aanesthesia (GA) was used more often for CS because of a lack of resources and training for regional techniques (Zundert, 2023).

However, due to training and infrastructural development, there is a shift towards the neuraxial technique, especially spinal anesthesia. In fact, it has become the gold standard for obstetric procedure owing its many benefits, along with rapid onset and high maternal satisfaction (Charles et al., 2025). Rwanda did not have any anesthesia training program before the 1994 genocide against the Tusi, and there was a total lack of skilled manpower in this field. In 2006, the first organized anesthesia training course was initiated that was aimed at producing a group of competent anesthesia practitioners able to meet the growing demand for surgical services (Zundert, 2023). Around 15% of births in Rwanda are via CS and this highlights the importance of strengthening anesthesia care in the country to reduce maternal mortality rate and improve patient satisfaction. In Rwandan hospitals, according to anaesthesia protocols, before anaesthesia, Anaesthetists must explain the proposed technique, and the merits and demerits of regional and general anaesthesia technique to the patient. This is done to improve the safety and the satisfaction of patient undergoing anaesthesia for CS by mentioning the possible complications of the technique and the expected recovery period (Ferede et al., 2022). Furthermore, the procedure for obtaining anaesthesia informed consent involves the patient or their representative signing the form. Despite these protocols, the

actual practice in these hosBeroopitals remains unknown and need to be explored. This study therefore sought to assess the prevalence of caesarean section dissected under anaesthesia and anaesthesia consent information given to surgical females of reproductive age attending Nyanza District Hospital.

2. Material And Methods

2.1.0 Material

2.1.1 Prevalence of Caesarean Section under Anaesthesia Services to Control and Prevent Obstetric Complications among Females of Reproductive Age

Globally, cesarean section rates have seen a substantial rise over the years for its vital roles in preventing and control of obstetric complications such as still birth, maternal deaths among pregnant females. It is anticipated that theis will persist and escalate throughout the current decade (Betrán et al., 2021). Significant variations in cesarean section rates exist globally and within nations to prevent and control obstetric complications. To illustrate, the proportion of births delivered by caesarean section ranged from a low of 5% in sub-Saharan Africa to a high of 63% in Eastern Asia, with intermediate rates of 54% in Latin America and the Caribbean, 50% in Western Asia, 48% in Northern Africa, 47% in Southern Europe, and 45% in Australia and New Zealand (Zundert, 2023).

In SSA, some places still have very low rates; for example, in many countries there is a national CS rate of less than 5%, indicating inequity in access (Abubakar et al., 2023). However, due to several medical and social considerations, an increasing number of Rwanda females of reproductive age delivering regularly between 2005 and 2010 had a caesarean section. Currently, 15% of deliveries in Rwanda are by Caesarean section (Angolile et al., 2023). The safety of CS, however, relies heavily on the anesthesia services provided, as anesthesia quality impacts maternal satisfaction and outcomes (Zundert, 2023). Ffinancial constraints and a shortage of human resources have limited access to safe and quality anaesthetic services. For instance, some countries with populations exceeding 5 million are reported to have only a handful of physician anaesthetists (Muhammad, 2020). A landmark seven-day prospective observational study across 22 African countries found that of 3,709 patients undergoing caesarean delivery to prevent obstetric complications such as still birth, maternal deaths , SA was performed in 80% of cases, while GA accounted for 20% (Gerber et al., 2024).

In Rwanda specifically, recent hospital-based studies reveal that spinal anesthesia accounts for the vast majority of anesthesia administered for caesarean deliveries. A 2024 cross-sectional study conducted at a referral hospital in Kigali found that among 385 parturients, 361 (93.8%) received spinal anesthesia, while only 6.2% underwent general anesthesia (Habimana et al., 2024). This pattern is consistent with earlier data from Rwanda Military Hospital, where spinal anesthesia was performed in 93.8% of caesarean cases between May and October 2020 (Habimana et al., 2021). However, anesthesia practice in Rwanda varies by clinical setting and patient population. While urban referral centers report SA use exceeding 90%, rural district hospitals such as those in Nyanza remain largely unexplored, with existing studies focusing primarily on perioperative management and outcomes rather than anesthesia techniques (Habimana et al., 2024). Given the resource-limited context of rural facilities, anesthesia provision likely differs from urban centers, yet this gap in the literature remains unaddressed.

2.1.4 Level of Informed Consent Information Provided To Females with Reproductive before Anesthesia Administration

Informed consent means that the patient is briefed on the procedure as well as its risks, benefits, and alternatives, which is the ethical and legal requirement for any procedure involving anesthesia, especially

elective CS (Angolile et al., 2023). Enough time must be given for the discussion to permit patients to ask questions and receive answers that they understand. This can enhance shared decision-making and reduce preoperative anxiety (Ferede et al., 2022). Patients who are well informed will follow instructive measures during surgery and will be able to manage postoperative expectations. Involving patients in their own care delivery positively impacts the quality of care they are perceived to receive, which relates to satisfaction with anesthesia services (Idris et al., 2020). Patient satisfaction is also affected by anesthesia education. Those with a higher educational background or who receive detailed information during pre-anesthesia have a better understanding and higher satisfaction (Jaju et al., 2022). Developed nations, obtaining consent for anesthesia like that for a CS is a highly standardized procedure, featuring good communication (Ji et al., 2022). According to a Saudi study, the majority of patients were adequately counseled on the rationale for cesarean section and the attendant risks and benefits (Tripathy et al., 2020). Hhaving standardized consent which clearly states anesthetic choices improve patient understanding and satisfaction (Alnashri et al., 2023).

In LMICs, studies often reveal that patients have little knowledge of anesthesia care and many give consent based on trust rather than knowledge (Mung'ay et al., 2023). Limited healthcare resources and high patient volumes hinder proper informed consent, leaving patients unaware of the risks and benefits of their choices, which ultimately affects their satisfaction and trust in the healthcare system (Hassan et al., 2025). In SSA, a study conducted in Ethiopian healthcare by Kebede et al. 2023 found that the majority of operated women (89.4%) received information on the indication for the procedure. Among participants, only 18.6% knew the type of anesthesia planned, while only 9% were allowed to choose their anesthesia type (Kebede et al. 2023). This study pointed out an alarming finding, as many patients were not well informed about the possibility of complications that are anesthesia related (Kebede et al. 2023).

In Rwanda, hospital informed consent policies outline the procedure for obtaining anesthesia informed consent. The process involves the patient or their representative signing the form after the treating practitioner has provided a comprehensive explanation of the procedure, including its benefits and risks. The document requires signatures from the patient, the practitioner, and two witnesses, one affiliated with the hospital and another connected to the patient.

2.4 Conceptual Framework

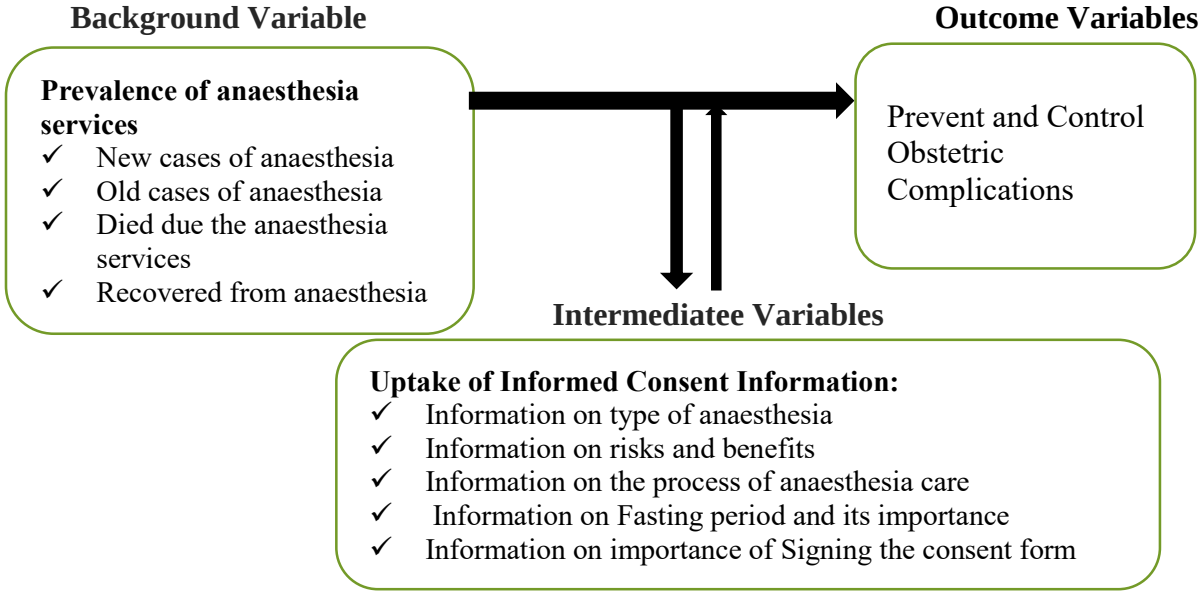


Figure 2. 1 Conceptual Framework, Source: (Silali, 2025**)**

3. Methods and Methodology

3.1 Study Design

A hospital-based, descriptive cross-sectional and triangulation designs was employed to collect data from participants. This is a mixed study of quantitative and qualitative method using surveys and interviews. The quantitative component involved administering structured questionnaires to participants and analysed numerical data to identify factors that correlate with the outcome . Qualitative component utilized Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) to explore perspectives and experiences towards anaesthesia services

3.2 Study Area

This work was carried out at Nyanza DH located in South Province, Nyanza District, Busasamana Sector and Nyanza Cell. It is a public health facility constructed in 1931 by the support of indigenous development fund. Agriculture is the main industry of the community with the purpose of cultivating cassava, commerce and breeding of small and great cattle.

It serves a population of 391,535 habitants within 10 Sectors, 51 Cells with 420 villages and technically monitors 17 Health Centers and Mpanga prison dispensary. On average of monthly 3940 outpatient visits and 1285 inpatients. The average time for an outpatient visits is 3 hours and 2min waiting for a Doctor. Nyanza hospital has 236 beds; bed occupancy rate is 77,2%. The monthly average number of patients is 3895 and average of 200 caesarean sections are done monthly in Nyanza District Hospital (Nyanza DH, 2025).

Nyanza district has 365,718 people which accounts for 12.2% of the population of the Southern Province. The district's population is female dominated with 187073 women which comprises 51.2% of the district's total population. Females are the majority is all sector of Nyanza district (NISR, 2023).

In Nyanza district, 90.8% of the population lives in the rural areas while 9.2% live in towns. Majority (56.75%) of the residents of this demographic are below 25 years, indicating high fertility rates. Most people follow the Christian faith. In particular, 33.94% are Adventists, 31.21% are Catholics, 14.35% are part of ADEPR, 12.60% are Protestants, 2.34% are Muslims, and 0.32% are Jehovah Witnesses. A total of 3.38% of residents reported having no religious affiliation (NISR, 2023).

About 16.7% of the population health aged 3 years and older never attended school; 59.5% attended primary school only; 9.6% attended lower secondary school only; and 7.1% attended upper secondary school only. Lastly, university education was attained by 3.6%. The 5th Rwanda Population and Housing Census has revealed that 92.8% of births are registered nationally according to Nyanza district which has a birth registration rate of 92.0%. The performance of the urban and rural areas of Nyanza district in terms of birth registration slightly differs (NISR, 2023).

3.3 Target Population

The study population was females of reproductive age (15-49 years) who underwent caesarean sections at Nyanza District Hospital and received anesthesia services within 48hrs. This timeframe is chosen to minimize recall bias and ensure that recent and relevant experiences are captured after recovery from immediate anaesthetic effects.

Inclusion criteria were participants aged 18 years or older, who received anesthesia for their cesarean section, and be able to provide informed consent. Exclusion criteria included women with pre-existing neurological conditions or cognitive impairments that could affect their ability to provide accurate information or understand the study's purpose.

3.4 Sampling Size Determination

The calculation of the representative sample size were based on Taro Yamane formula (Yamane, 1967):

n = N/(1+N(e)2

n =N/[1+N(e2)],where

n = the sample size,

N = Total population (600) estimated number of caesarean section in 3months period,

e = error. (0.05) then

n=600/ (1+600(0.5)2

n=600/ [1+600(0.0025)]= 342

The sample size was 342 female of reproductive age dissected at Nyanza DH under anaesthesia.

Participants were recruited through a combined purposive and census sampling approach. For the census component, all eligible and accessible individuals were enrolled until the target sample size was achieved Purposive strategy were used for the qualitative study to select a diverse group of participants who can offer rich, in-depth insights into their experiences about anaesthesia services, aiming for thematic saturation rather than statistical generalizability. These included key informants such as female operated multiple times under different types of anaesthesia, Anaesthetists, gynaecologists, medical doctors, midwives, nurses working in operating rooms and administrators. This hybrid approach balanced statistical generalizability with contextual richness.

3.5 Research Tool and Instruments

Used tools are self-administered questionnairee (semi-structured) for surveys and open-ended questions to gather qualitative data. This questionnaire was developed based on existing literature and previously validated tools, then adjustments were made to align with the local context. It consists of the following content: Socio-demographic characteristics (Age, parity, education, and residence), prevalence of CS, type of anaesthesia delivered and level of informed consent information provided to patients. To facilitate comprehension and maximize participation, the instrument was initially developed in English and subsequently translated into Kinyarwanda. A back-translation procedure was then undertaken to preserve conceptual equivalence and verify accuracy.

3.6 Piloting of Research Instruments

Research instruments were piloted at Neighbouring area (Ruhango DH) with 34 mothers, which is approximately 10% of the sample size for the study. This preliminary phase aimed to evaluate the clarity, cultural appropriateness, ease of administration, timing, and consistency of data collection methods.

3.7 Testing for validity, reliability and establishment of trustworthiness

3.7.1 Reliability

Instrument reliability was ensured through multiple checks, including a preliminary pilot study. Internal consistency, as measured by Cronbach's α, reached a value of 0.8, which falls within the acceptable-to-good range for reliability. Inter-rater reliability for the qualitative data was assessed by comparing thematic coding performed independently by two coders, using Cohen's κ. A value exceeding 0.85 was obtained, indicating strong agreement.

3.7.2 Validity

For reliability and accuracy of the questionnaire, a variety of methodologies will be implemented. The validity of the content will be ascertained via expert evaluation by public health specialists and academic advisors, ensuring the tools comprehensively address crucial aspects anaesthesia care. The questionnaire

was translated into Kinyarwanda and then back-translated into English to maintain content validity. Face validity was assessed and the gathered feedback informed the optimization of the tools prior to comprehensive data acquisition.

In the qualitative component of the study, emphasis was placed on ensuring trustworthiness. This was achieved through strategies such as triangulation to enhance credibility, assessing transferability to determine the applicability of findings in similar contexts, ensuring dependability to support consistency over time, and ensuring verifiability via objective and transparent data examination.

3.8 Data Management and Analysis

Quantitative statistics obtained through structured questionnaires was coded, entered, cleaned, and managed by using Microsoft excel and the SPSS. Analysis was by Cross tabulation descriptive and inferential statistics.

3.9 Ethical Consideration

Thesis approval was obtained from the MKU School of Postgraduate Studies, with ethical clearance from the MKU Ethical Committee and permission was granted by Nyanza DH. We assured all respondents that the study served purely academic objectives and that their answers would be handled with utmost discretion. Anonymity was preserved by coding the data, which removed any possibility of tracing responses back to specific individuals. Participation was entirely voluntary, with consequences for not participating. At the beginning of the study, detailed explanations was given about study 'goals, rights of participants, and any minimal risks involved, such as the time commitment alongside the potential benefits, including contributing to the enhancement of anaesthesia sservices.

4. RESULTS

4.1.Social Demographic Profile

The response rate of this study was 100%, all 342 females of reproductive age dissected at Nyanza DH under anesthesia participated in this study. There were no missing data as all questionnaires were completed, collected, and analyzed.

Results and findings, age majority 215 (62.9%), aged 21- 30 years. Most respondents were female; 263 (76.9%) were married; 71.9% attended primary school, while 59 (17.3%) had no formal education.

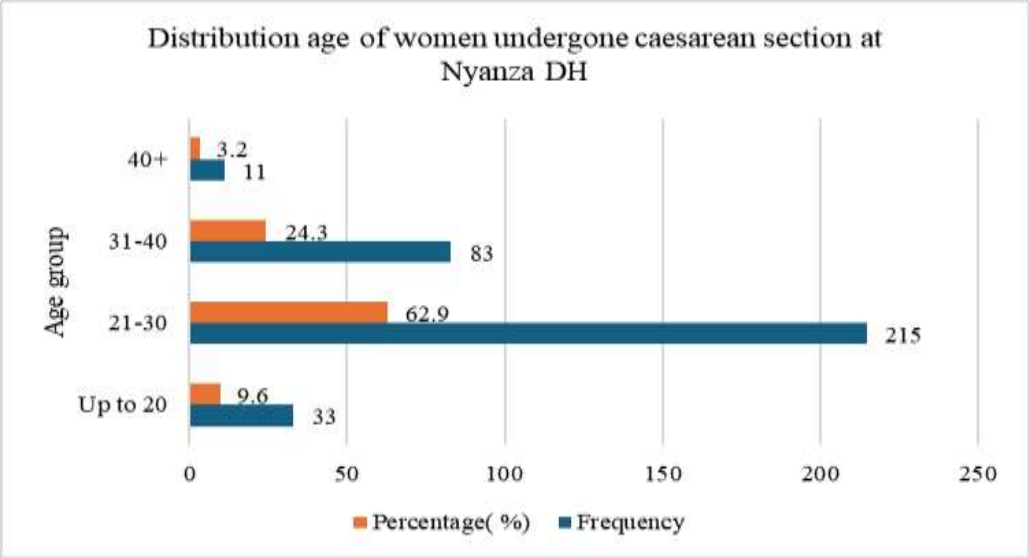


Figure4. 2 Age distribution among females of the reproductive age that undergone caesarean section under anaesthesia

Regarding marital status, the majority 263 (76.9%) were married and the second-largest category consisted of cohabiting women represented by 44 (12.9%). This distribution also indicates that the majority of respondents were in formal or recognized relationships, while a smaller proportion were unmarried or no longer in marital unions.

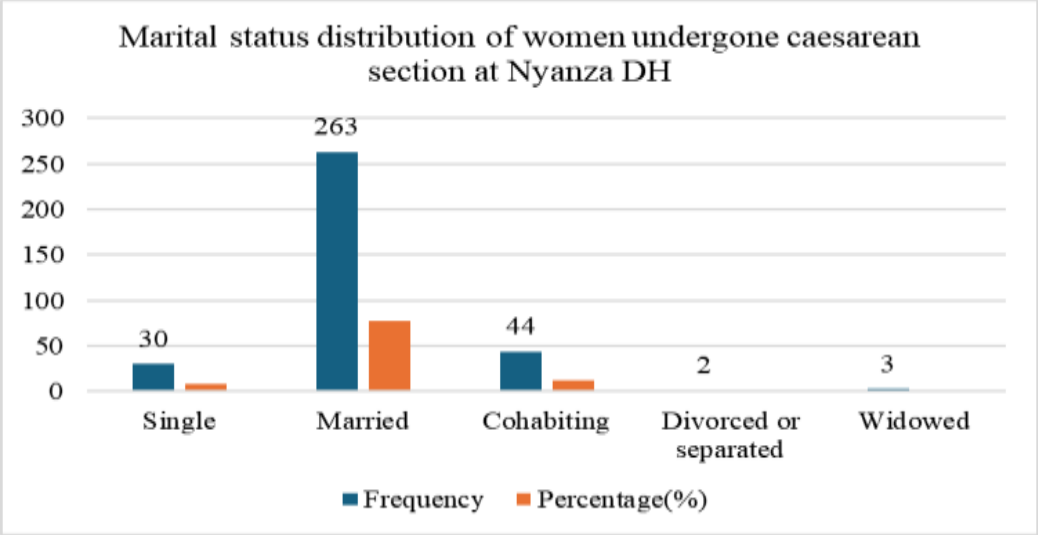


Figure4. 3 Marital status distribution of females of undergone caesarean section under the anaesthesia services.

Regarding the formal education level of participants, the majority of our respondents attended primary school 246 (71.9%), while 59 (17.3%) have no formal education at all. Only 37(10.8%) of the respondents have pursued education beyond the primary level (secondary or university).

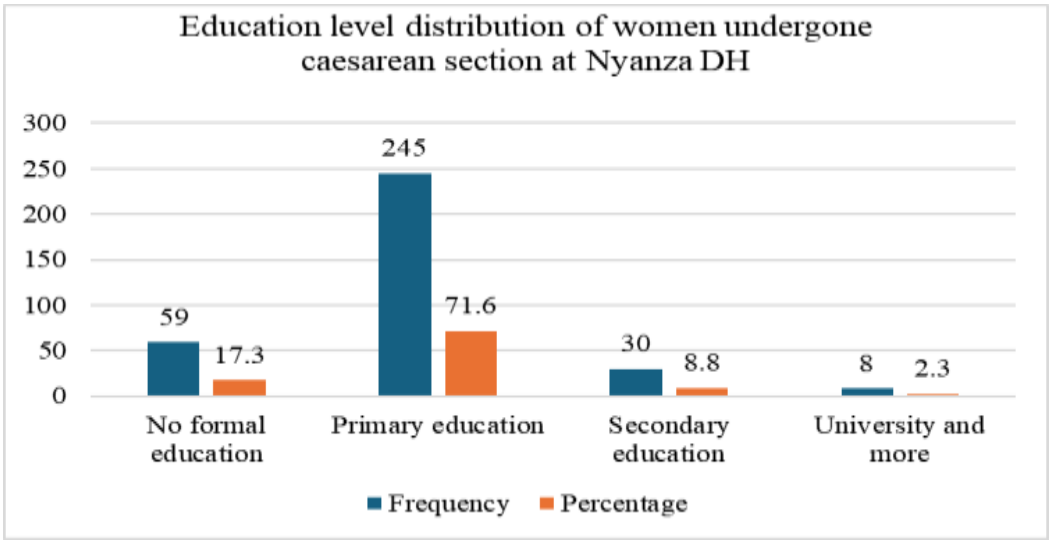


Figure4. 4 Education level distribution of women undergone caesarean section under anaesthesia at Nyanza DH

4.2 Prevalence of Caesarean Sections Dissected Under Anesthesia Services at Nyanza DH

The prevalence of anesthesia services was only 28.9% (1265) offered to females of the productive age in the study area,

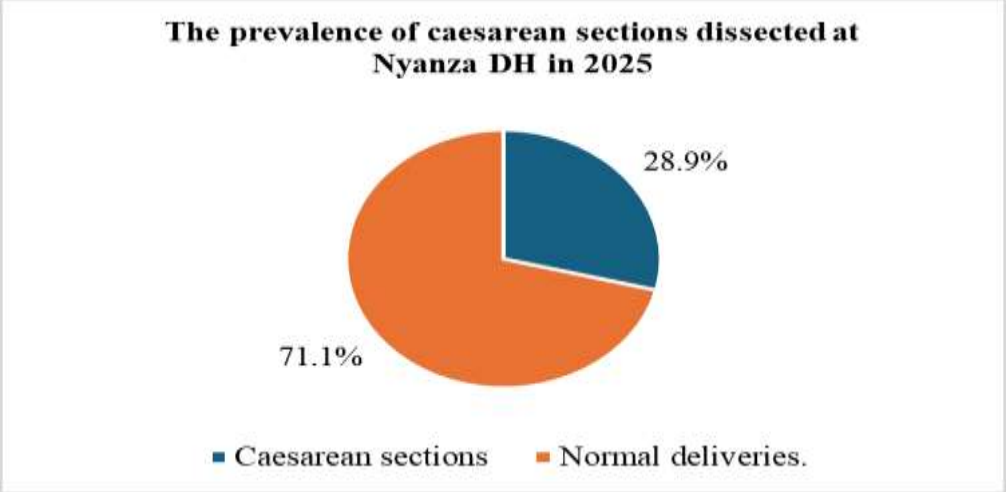


Figure4. 5 Prevalence of caesarean sections dissected under anaesthesia in the study area

4.3 Type of Anaesthesia Services offered to women undergone caesarean section at Nyanza DH

The results indicated that the majority, 95.3% (326), of pregnant females utilized spinal anesthesia services, and only 4.7% (26) utilized the General anesthesia services. The influence between the type of anesthesia used and satisfaction was significant with chi-square 21.8 and with p values of 0.012. Spinal anesthesia was significantly associated with anaesthesia satisfaction. This was also discussed in FGDs:

"I was conscious during the procedure. I heard my baby cry immediately after birth, that is a moment I will never forget, and the anesthetist were taking care of me, explaining everything. Even though I was scared, I felt safe." FGD discussion held 17 /2/ 2026.

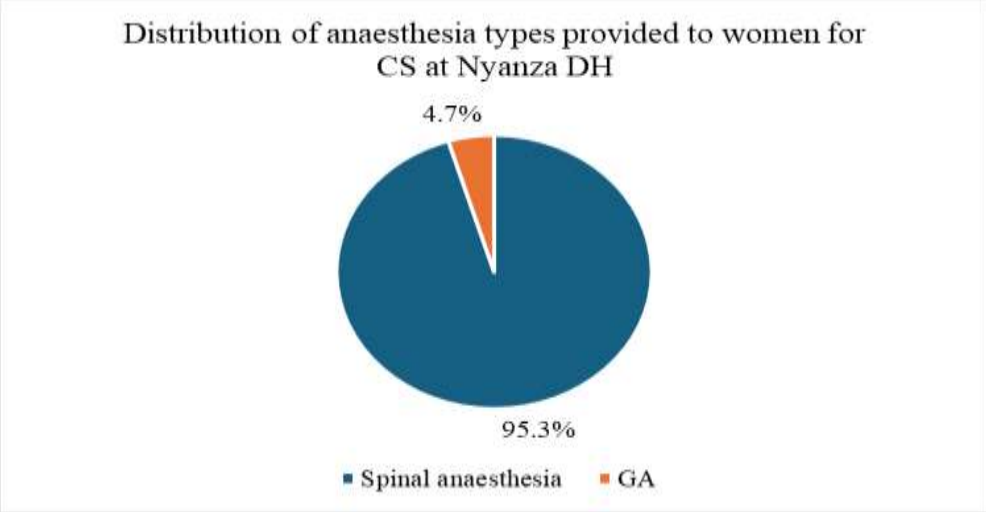


Figure4. 6 Distribution of anaesthesia services offered for caesarean sections in the study area

4.4 Level of Anaesthesia Informed Consent Information Provided to Females of Reproductive Age

Regarding informed consent information provided to patients before anaesthesia administration, only 51 (14.9%) were expalined about risks and benefits related to anaesthesia while 291 (85.1%) signed consent without such information.

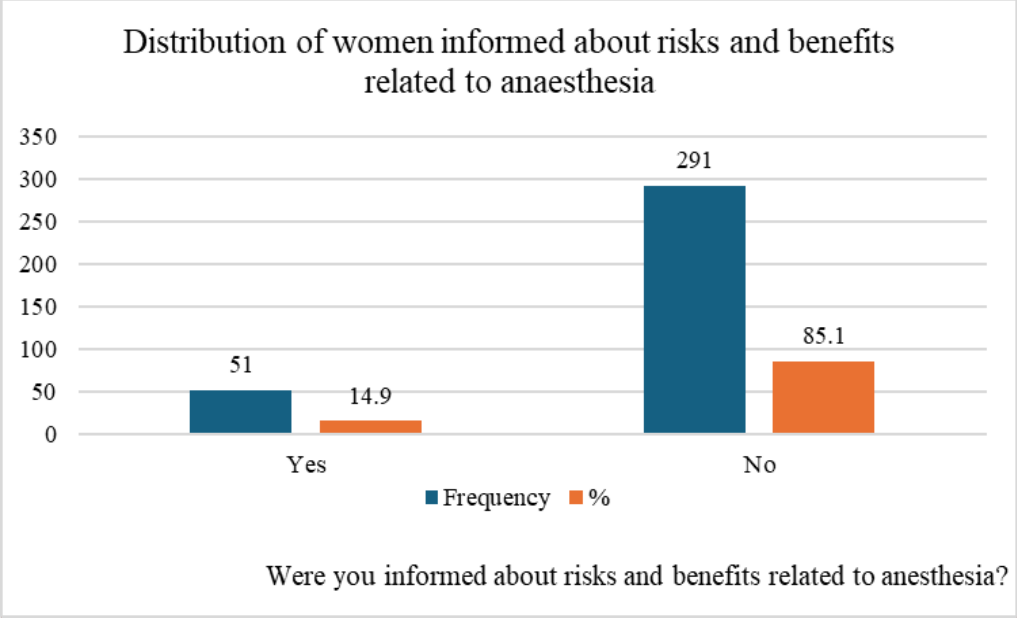


Figure4. 7 Distribution of pregnant females who were informed about risks and benefits related to anaesthesia

Regarding uptake of informed consent, only 34 (10%) of the pregnancy female of reproductive age undergone caesarean sections were involved in decision-making about their anaesthesia services of choice, whereas 308 (90%) were not involved in anesthesia choice. A significant association was found between being involved in anesthesia choice and being satisfied by the service with chi-square of 21.6 and P value of 0.0012 , 95%CI. This was also opined in FGD discussion:

"*This is my third caesarean section here. The first time, someone explained details about anaesthesia service. However, during subsequent operations, I was simply told to us and granted permission, without any explanation of the details." FGDs* held on 04 March 2026.

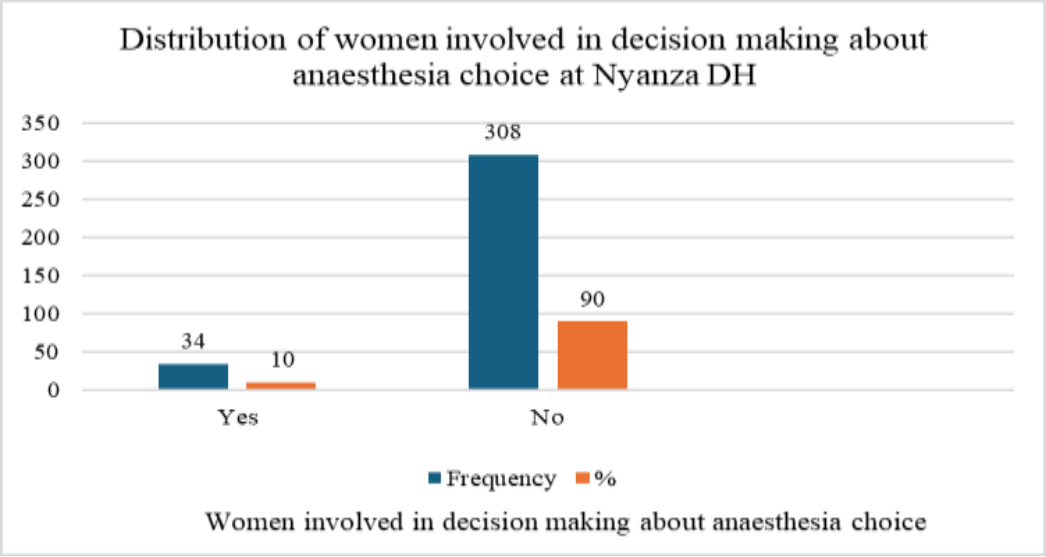


Figure4. 8 Distribution of women involved in decision-making about anaesthesia choice before signing the informed consent form

Regarding patients'understanding of the information given before signing the consent form, 157 (46%) of respondents had no information about anaesthesia, and 121 (35%) understood the information provided

well. About 39 (11.4%) partially understood, while 25 (7.3%) did not understand at all the information provided before signing the consent form.

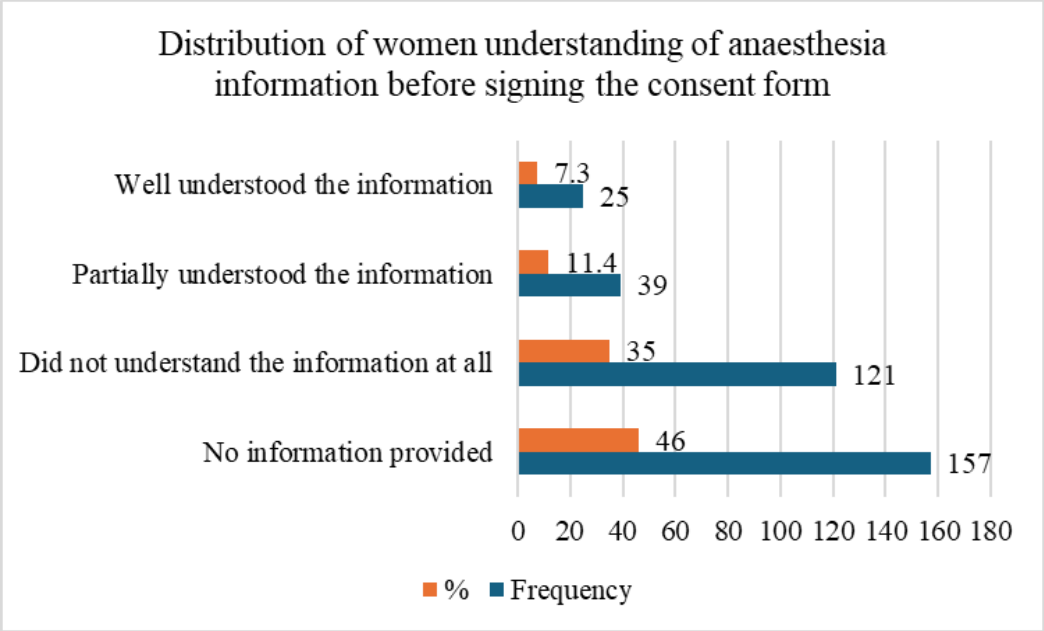


Figure4. 9 level of patients 'understanding of information provided about anaesthesia services before signing an informed consent form

5. Conclusion

Anesthesia services were offered to only 28.9% of pregnant females of reproductive age at Nyanza DH. More critically, informed consent uptake was extremely poor with only 10% of women who underwent caesarean sections were involved in decision-making regarding their choice of anesthesia. This lack of involvement underscores a serious gap in patient autonomy and informed consent practices. The findings highlight the need to improve both the provision of anesthesia services and the meaningful involvement of pregnant women in decisions about their care, particularly given the life-saving importance of preventing and controlling obstetric complications. Addressing these gaps would further improve both clinical outcomes and patient-centered care.

6. Acknowledgments

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