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Sepsis among postpartum mothers aged 15-35 years admitted to Mubende Regional Referral Hospital. A cross-sectional study.

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Abstract

Background:
Postpartum (puerperal) sepsis is a life-threatening infection of the genital tract occurring between childbirth and 42 days postpartum. This study assesses the factors contributing to sepsis among postpartum mothers aged 15-35 years at Mubende Regional Referral Hospital.

Methodology:
A cross-sectional study was carried out to collect data through quantitative approaches to capture complementary data of the topic at a given point of time without a follow up of 50 participants using convenience sampling. Data were collected using standardized, structured interviewer-administered questionnaires following informed consent.

Results:
Findings showed that the majority of the participants, 26(52%), were aged between 20-25 years, while the least common age group was 30-35 years, 4(8%). Socio-economically, the most affected mothers are those living in rural areas, with over 50% travelling long distances to find the hospital for help and antenatal care. Moreover, (84%) use boda-boda as their primary means of traveling to health facilities, while (56%) have their husbands as their primary decision-makers regarding their health care seeking. Further, the majority of the group 40(80%) had an emergency cesarean, and 30(60%) reported to have waited between 30 minutes to 2hours to be seen by a health care provider upon arrival at the hospital.

Conclusion:
Residence in rural areas predisposes economically challenged mothers to limited access to emergency care when needed. In addition, long distances delay the delivery of care, thus predisposing mothers to sepsis in the long run.

Recommendation:
Access to healthcare services in rural areas should be improved, ensuring health centers have enough essential drugs, and strengthening health education for mothers on wound care and hygiene. Health workers need to improve health education for mothers on postpartum care, hygiene, wound care, and proper use of medication, especially for mothers with low levels of education.

Keywords: *Socio-economic and maternal factors, sepsis, postpartum mothers, Mubende Regional Referral Hospital*
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Background
Postpartum (puerperal) sepsis represents a critical, life-threatening reproductive tract infection that manifests between childbirth and 42 days following delivery, serving as a primary driver of maternal mortality globally. This condition frequently arises as a healthcare-associated complication following surgical interventions, resulting in severe clinical morbidity, extended hospital stays, and a high frequency of patient transfers to intensive care units (ICUs).

In the United States, maternal sepsis historically complicated roughly 0.04% of all deliveries, accounting for more than 20% of pregnancy-related fatalities and ranking as the leading cause of maternal mortality between 2003 and 2011. Conversely, advanced healthcare systems have successfully managed to suppress the severe sepsis mortality rate below 5% (ranging between 4.4% and 4.6%), primarily due to widespread antibiotic availability, enhanced social infrastructure, and rigorous clinical infection control protocols.

However, resource-limited settings face a disproportionate burden. In sub-Saharan Africa—the region with the most severe maternal mortality indicators worldwide—sepsis claims approximately 130,000 maternal lives each year. Rapid, accurate diagnosis alongside timely therapeutic intervention is mandatory to mitigate both maternal and fetal

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morbidity and mortality. Consequently, localized case evaluations are essential to isolate high-probability risk factors driving sepsis onset and to refine management models within developing nations.

A systematic review and meta-analysis focusing on sub-Saharan Africa established a pooled maternal sepsis prevalence of 19.21%. Data indicate that in 2017 alone, an estimated 5.7 million women developed sepsis during pregnancy, delivery, or throughout the postpartum window. Puerperal sepsis is currently classified as the sixth highest driver of disease burden among women of reproductive age (15–44 years), accounting for 11% of global maternal deaths and jumping to 15% of all maternal deaths when isolating developing nations.

In East Africa specifically, about 39% of postpartum mothers are estimated to acquire puerperal sepsis annually. Regional epidemiological profiles show distinct national variations, with prevalence rates standing at 29% in Kenya, 32% in Tanzania, and 31% in Rwanda. Within Uganda, puerperal sepsis has emerged as the most prominent driver of maternal mortality, accounting for 30.9% of recorded deaths.

Globally, sepsis impacts an estimated 30 million patients annually, resulting in nearly 6 million fatalities, meaning it is responsible for one out of every ten maternal deaths worldwide. It ranks as the third most frequent cause of direct maternal mortality in low- and middle-income nations, disproportionately impacting highly vulnerable groups, including individuals living with HIV/AIDS. The case fatality rate for puerperal sepsis can peak as high as 8%, leaving survivors to cope with severe, long-term health complications.

Within the Ugandan clinical landscape, surgical site infections (SSIs) are among the most prevalent post-operative complications, leading to increased healthcare costs, prolonged admissions, and elevated mortality rates. A landmark regional study conducted in Bushenyi, Western Uganda, revealed a post-operative SSI rate of 25.3%, with a significantly higher prevalence observed following emergency surgeries compared to elective procedures, pointing to cesarean sections as a primary driver of postpartum sepsis.

In Uganda, the incidence of postpartum sepsis varies significantly across regional health centers. For instance, while Western Uganda demonstrates a high prevalence of 39%, Hoima District reports a lower baseline of 12%. Overall, Uganda has experienced a slow but steady drop in its national maternal mortality ratio (MMR), declining from 550 deaths per 100,000 live births in 1990, to 438 in 2012, and down to 189 in 2022. This study investigates the underlying factors promoting sepsis among postpartum mothers aged 15 to 35 years at Mubende Regional Referral Hospital.

Methodology

Study Design

A cross-sectional study was carried out to collect data through quantitative approaches.

Study area

The study was conducted at the Postnatal Ward and Gynecology Ward of Mubende Regional Referral Hospital. The hospital is located in Mubende, Mubende Division, approximately 6km from the city center along the Mubende-Gulu highway.

Study Population

This study focused on postpartum mothers aged 15-49 years who delivered at Mubende Regional Referral Hospital and can read and write some English.

Sample size determination

The sample size was determined using the Kish and Leslie formula to calculate the minimum sample size from the population. Since the total number of postpartum women will be estimated to be 100, the formula was adjusted for a finite population.

$n = (Z^2PQ)/d^2$

Where: n= the desired sample size
Z = the statistical certainty (1.96) at 95% confidence level.
P = estimated proportion of contributing factors for postpartum sepsis
d = desired error.
P = 50% (0.5)
Z^2 =1.962 (3.8416)
Q = 1 – P (1-0.5) =0.5
d^2= 10% (0.1) ^2
Therefore, n = 3.8416 x 0.5x0.5 =96.04 approximately = 96
Adjustment for finite population (N=100)

Adjustment for finite population (N=100)

$$n = \frac{n_0}{1+(\frac{n_0-1}{N})} = \frac{96}{1+(\frac{96-1}{100})} = \frac{96}{1.95} = 49.2 \approx 50$$

Therefore, the estimated sample size is 50.

Sampling technique
The study used a convenience sampling technique to select respondents. Every mother available at the hospital during data collection was selected. A simple random sampling technique was used to select the respondents from the available post-partum mothers.

Sampling procedure
Mothers from the inpatient ward were selected. Data were collected within twenty working days, from Monday to Friday, for two weeks, during which every day at least 5 respondents were selected and interviewed from the available post-partum mothers at the hospital on that particular day. This helped to attain a sample size of 50 respondents after 10 working days. All eligible participants present at the study site during the data collection period were approached and obtained consent to participate in the study.

Data collection method
Data were collected using a semi-structured questionnaire on factors contributing to sepsis among post-partum mothers.

Data collection tool
The data collection process involved the use of semi-structured, self-administered questionnaires with closed-ended questions that are specifically designed to meet the objectives of the study. These questionnaires were written in simple and straightforward language to ensure that they are easily understood by both literate and illiterate patients who were participating in the study. For those individuals who were unable to read and write, an assisted questionnaire interview was employed to ensure that everyone had an equal opportunity to participate in the study and provide their responses to the questions.

Data collection procedure
An introductory letter from the research committee of Mild May Institute of Health Sciences was issued. This letter served as a means to secure permission from the hospital director at Mubende Regional Referral Hospital. Postpartum mothers were approached for informed consent, allowing them to voluntarily sign the consent forms. The participants had a right to withdraw from the study at any time if they chose to. To uphold confidentiality, unique codes were assigned to participants' information. The data collection process involved self-administered questionnaires to gather information, with a requirement for all questions in the questionnaires to be answered. For participants who were illiterate, research assistants offered guidance during the questionnaire completion process, which involved marking small boxes. Following the completion of the questionnaires, participants had an opportunity to ask questions related to the study topic, and responses were provided accordingly.

Dependent variable
Postpartum Sepsis status.

Independent variable
Socio-demographic (Age, Education, Occupation, socioeconomic status), Obstetric (Parity, Gestational age, PROM, number of vaginal exams, labor duration), Clinical/Medical (HIV status, Hb level, antibiotic prophylaxis, type of CS, duration of surgery)

Quality control
Piloting the study
A pilot study was conducted at Mubende Regional Referral Hospital, visiting the area a week before the actual research to seek and obtain permission from the hospital administration. This visit aimed to ensure that the conditions within the hospital had not changed and to rule out the presence of highly infectious diseases that could impede the facility.

Pre-testing of the study tool.
The questionnaire was pretested using a small number, as compared to the estimated study population, before actual data collection so that modifications were made before the actual data collection to determine if information collected would be reliable and valid.

Training of research assistants.
The personnel were trained on the necessary skills. This helped in the data collection procedure.

Ample time for data collection.
For people who were able to read and understand, a total of 10-15 minutes was allocated to each individual, and for illiterates, 20-30 minutes was allocated to each individual.

Inclusion criteria
Ugandan mothers aged 15-35 years who had consented to participate in the study and could read and write English.

Data analysis and presentation
The collected data were analyzed using statistical software such as Microsoft Excel. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the data.
The results were presented in tables and graphs. The tables provided a summary of the study variables, including the frequencies and percentages of each variable. A narrative report was prepared to summarize the findings and discuss the implications of the study.

The study findings were disseminated to relevant stakeholders through publications. The results of the study were shared with the hospital administration and local leaders of the study area and explained to them, giving them measures on how to handle the findings.

Ethical consideration

With approval from the Mildmay Institute of Health Sciences Research Committee, written permission to conduct the study was obtained from the Principal of the School of Clinical Medicine, who introduced the investigator to the Medical Superintendent of Mubende Regional Referral Hospital (MRRH). The consent of the participants was sought with informed written consent before the study was conducted. The participation was voluntary and one was free to withdraw from the study at any time without any punishment, loss or benefit.

Results

Demographic characteristics and factors contributing to post-partum sepsis among mothers who have undergone cesarean section.

Table 1: Shows demographic characteristics and factors contributing to post-partum sepsis among mothers who have undergone cesarean section (n=50).

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	15–19	10	20.0
	20–25	26	52.0
	26–29	10	20.0
	30–35	4	8.0
Tribe	Muganda	27	54.0
	Munyoro	10	20.0
	Munyankole	10	20.0
	Mukiga	3	6.0
Employment Status	Housewife	4	8.0
	Farmer	34	68.0
	Small business	10	20.0
	Paid profession	2	4.0
Area of Residence	Urban (Municipality)	9	18.0
	Peri-urban (Trading Centre)	10	20.0
	Rural (Village)	30	60.0
	Refugee settlement/camp	1	2.0
Religion	Catholic	29	58.0
	Anglican	3	6.0
	Muslim	8	16.0
	Born Again	10	20.0

Table 1 shows that the majority of the participants were aged between 20-25 years, 26(52%), while the least common age group was 30-35 years, 4(8%); the majority of the participants were farmers, 24(68%), and only 2(4%) had paid professions. 20(40%) of participants came from rural areas to visit the hospital, while 1(2%) came from the settlement camps.

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Socio-economic factors contributing to post-partum sepsis among mothers who have undergone cesarean section.

Table 2: Shows socio-economic factors contributing to post-partum sepsis among mothers who have undergone cesarean section (n=50).

Variable	Category	Frequency (n)	Percentage (%)
Highest level of formal education completed	No formal education	0	0.0
	Primary level	35	70.0
	Secondary level	10	20.0
	Tertiary level	5	10.0
Primary means of transport to the health facility	Walking	2	4.0
	Boda boda	42	84.0
	Public taxi	6	12.0
	Private vehicle	0	0.0
Primary decision-maker regarding healthcare seeking	Myself	10	20.0
	Husband	28	56.0
	Parents	12	24.0
	Community elders	0	0.0
Personal source of income independent of partner	Regular salary/profit	1	2.0
	Irregular/seasonal income	20	40.0
	Depend entirely on partner	28	56.0
	Depend on parents/relatives	1	2.0
Number of people in the household	1–2 persons	14	28.0
	3–5 persons	27	54.0
	6–8 persons	8	16.0
	More than 8 persons	1	2.0

Table 2 shows that a significant number of respondents, 35(70%), had primary level as their highest level of formal education, with only 5(10%) who reached tertiary level of education; three-quarters, 42(84%), use boda boda as their primary means of traveling to the health facilities, and only 2(4%) are able to walk to the health facility. More than half (28; 56%) have their husbands as their primary decision-makers regarding their health care seeking, and 12(24%) rely entirely on their parents as their primary decision-makers regarding their health care seeking. 27(54%) of the respondents agreed that they had 3-5 persons, including children, who lived in their household, and only 1(2%) had more than 8 persons living in their household

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Maternal related factors contributing to sepsis among postpartum mothers at Mubende Regional Referral Hospital.

Figure 1: Shows how many antenatal visits the respondents attended during their last pregnancy; n=50.

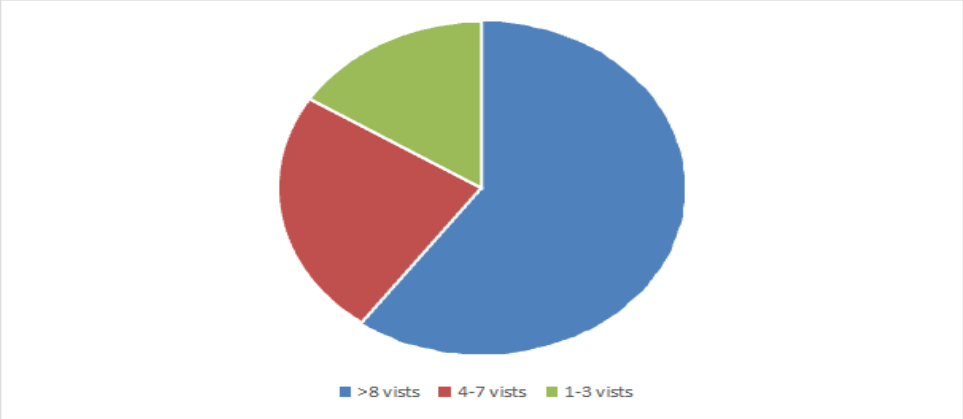


Figure 1 shows that 30(69%) attended more than 8 times during their last pregnancy,12(28%) had 4-7 visits and 8(16%) had 1-3 antenatal visits during their last pregnancy

Figure 2: Shows the percentage of the mode of delivery regarding the respondents' last pregnancy (n=50)

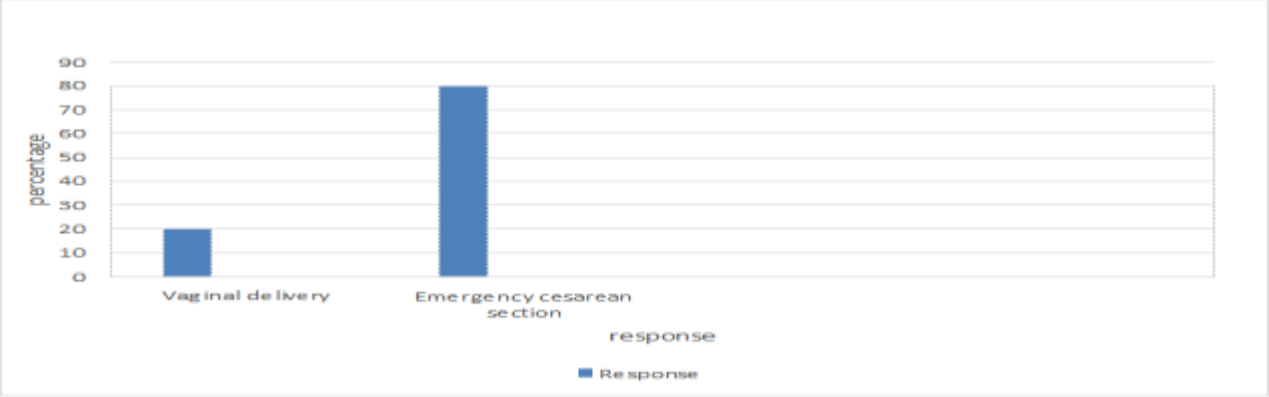


Figure 2 shows that the minority, 10(20%), of the respondents delivered their last child through vaginal delivery, and the majority of the group, 40(80%), had an emergency cesarean section.

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Figure 3 shows the respondents' responses on whether they used herbal medicine while cleaning the wound (n=50).

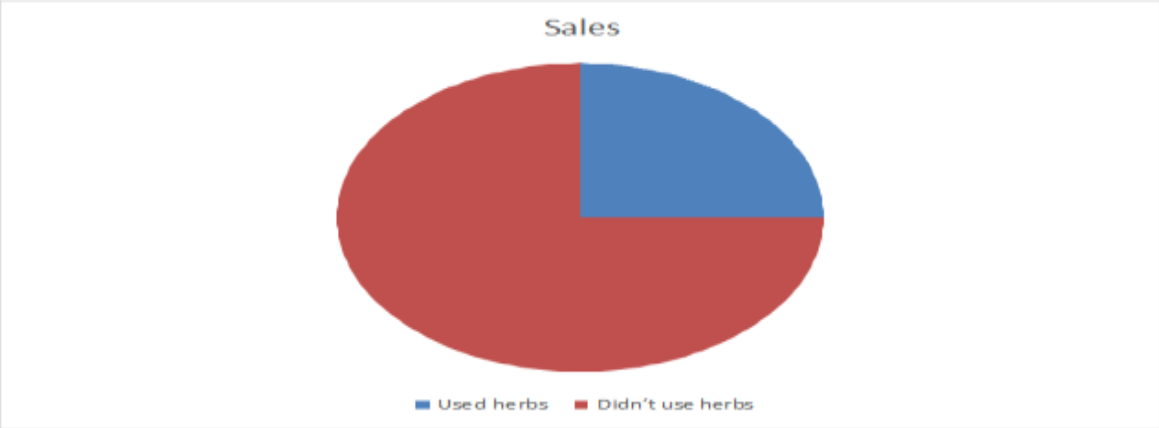


Figure 3 shows that the least number of respondents, 10(25%), reported having used herbal medicine while cleaning the wound, while most, 30(75%), did not use herbal medicine while cleaning the wound.

Health system-related factors contributing to sepsis among postpartum mothers at Mubende Regional Referral Hospital.

Table 3 shows the health system-related factors contributing to sepsis among postpartum mothers at Mubende Regional Referral Hospital. (n=50)

Variable	Category	Frequency (n)	Percentage (%)
Waiting time before being attended to by a healthcare provider	Less than 30 minutes	12	24.0
	30 minutes-2 hours	30	60.0
	2-5 hours	5	10.0
	More than 5 hours	3	6.0
Cleanliness of the labour and maternity ward	Very clean	18	36.0
	Clean	29	58.0
	Fair	2	4.0
	Very dirty	1	2.0
Instructions provided on cord care and personal hygiene before discharge	Yes, detailed instructions	10	20.0
	Yes, but very brief	32	64.0
	No instructions were given	7	14.0
	Cannot remember	1	2.0
Distance to the nearest health facility from home	Less than 5 km	38	76.0
	5–10 km	9	18.0
	11–20 km	3	6.0
	More than 20 km	0	0.0

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Table 3 show that the majority of the respondents 30(60%) reported to have waited between 30minutes to 2hours to be seen by a health care provider upon arrival at the hospital and only 3(6%) waited for more than 5 hours. 29(58%) rated the cleanliness of the labor and maternity ward as clean, and 2(4%) reported that the cleanliness was fair. 32(64%) of the respondents were given brief instructions on proper cord care and personal hygiene before discharge, whereas 7(14%) reported that no instructions were given to them. 38(76%) respondents have their nearest health facility from home to be less than 5km.

Figure 4: Shows the availability of medicines at the hospital pharmacy (n=50)



Figure 4 shows that a significant number of respondents 48(96%) reported to have not received the medications that were prescribed and the one they had to buy could not afford most of them, while the least 2(4%) reported that all the medication that was prescribed was available at the hospital pharmacy.

Discussion

Socio-economic factors contributing to post-partum sepsis among mothers who have undergone cesarean section

Results on the education level of the respondents showed that the majority have primary level as their highest level of education; this indicates that the majority of mothers with little formal education often have limited health literacy levels. These results are in line with Mohamud (2023), which states that 40% of the respondents who had the lowest level of education got sepsis.

Regarding area of residence in relation to the research findings, the most affected mothers are those living in rural areas compared to those in town, with a percentage of 70%, and this also affects their financial status since they earn a living by carrying out subsistence farming. This reduced antenatal care uptake by the mothers and delayed hospital presentation, this as well increased the risk of developing SSIs in case they are to undertake c-section during delivery. This is in line with Mwanda et al. (2024) at Mbarara Regional Referral Hospital, where 66% of the mothers develop SSIs due to increased parity in mothers living in remote areas and poor economic sustainability. This suggests that all rural areas need to be supported by setting up facilities like hospitals or health centers to extend services to the unable persons of the community.

Regarding delayed hospital presentation and distance travelled to the hospital, results found that the majority of mothers 50% travel long distances to find a hospital for help and antenatal care; hence, delayed presentation to health workers has increased the risk of getting SSIs in the mothers who undergo C-section. These findings are in line with De Nardo et al. (2016) in Tanzania, where 48% of the mothers who developed SSIs were attended to by traditional birth attendants during their antenatal period, and they were delayed in being presented to the hospital. This suggests that there is a need to create more awareness among mothers who are expecting and those planning to get pregnant about the importance of attending antenatal care at the hospital and also preparing early for delivery at the hospital to reduce the risk of SSIs. The government should also plan for rural areas by creating facilities within rural areas to reduce the distance of travel.

Maternal related factors contributing to sepsis among post-partum mothers who have delivered at MRRH

Regarding the mode of delivery for the respondents' last child, the majority of the group, 40(80%), had an emergency cesarean, which is independently linked to a higher risk of postpartum infections due to potential operative contamination and poor wound healing. While a minority, 10(20%) of them delivered their last child via

vaginal delivery. This is in line with Asaasira & Faculty of Clinical Medicine and Dentistry, Kampala International University, Uganda 2025), which stated that over 52.9% of cesarean sections resulted in sepsis.

Health system-related factors contributing to sepsis among postpartum mothers.

Regarding to the results where majority of the respondents 30(60%) reported to have waited between 30minutes to 2hours to be seen by a health care provider upon arrival at the hospital and only 3(6%) waited for more than 5 hours this drastically increase the window for infections to develop into sepsis. This is in line with Alemu (2021), where 10.9% of the cases developed SSIs due to surgical skills, prolonged surgical procedure, and length of the tissues. This suggests that all medical doctors on call should have all the necessary skills and expertise to prevent SSIs among mothers who undergo C-section.

Limitations

Statistical power with a sample size of only 50 subjects, a small sample size typically coming from a single center, and the short study duration compared with the small sample size compromised the results of the findings

Conclusion

Socio-economic factors that contributed to sepsis among postpartum mothers between 13-35 years admitted to Mubende Regional Referral Hospital were: low levels of formal education and low- income status heavily affected the mothers.

Maternal-related factors that contributed to sepsis among postpartum mothers between 13-35 years admitted to Mubende Regional Referral Hospital were; Respondents who lived in rural areas and were financially unstable to get recommended antibiotics and antiseptics affected the mothers and emergency cesarean section.

Health care-related factors that contribute to sepsis among postpartum mothers between 13-35 years admitted to Mubende Regional Referral Hospital were: delays in attending to mothers, prolonged hospital stays, and lack of clear, detailed education on surgical site care and hygiene.

Implication to Health Profession Practice

The findings of this study show that health workers need to put more effort into educating mothers about postpartum care and prevention of infections. Mothers with low levels of education may not fully understand the importance of hygiene, wound care, and completing medication, so nurses and midwives should explain these issues in simple language that mothers can easily understand.

Health workers should also pay special attention to mothers from rural areas and those with low income because they may fail to buy recommended antibiotics and antiseptics or return for follow- up care. Such mothers need close monitoring and support during and after delivery.

Recommendation

Ministry of health/government, should extend health services to hard-to-reach areas; this can reduce the distance of travel and improve early presentation at the hospitals. Stocking all health centers with enough essential drugs such that, when discharging the mothers, they are given all the necessary drugs needed to prevent the use of herbal medication that induces surgical site infections.

Mubende Regional Referral Hospital should ensure that mothers are given health talks during antenatal care and during discharge after a C-section is done to create awareness among the mothers about the dangers they may encounter if they mismanage their surgical sites. The surgeon should apply all the necessary skills and expertise during surgical procedures and be tasked with overseeing the work being done by the intern doctors during surgical procedures to prevent surgical site infections.

List of abbreviations

HIV: Human Immunodeficiency Virus
Hb: Hemoglobin
IPC: Infection Prevention and Control
AOR: Adjusted Odds Ratio
MRRH: Mubende Regional Referral Hospital
MoH: Ministry of Health
PROM: Premature Rupture of Membranes
PPH: Postpartum Hemorrhage
WHO: World Health Organization
SSIs: Surgical Site Infections

Source of funding

The study was not funded.

Conflict of interest

No conflict of interest declared.

Author contributions

JS: Conceptualization, Methodology, Investigation, Writing—original draft.
JO: Data curation, Formal analysis, Visualization.
FS: Formal analysis, Visualization.
IPN: Writing review and editing
JFN: Supervision, Validation.
All authors: Approved the final version of the manuscript and agreed to be accountable for the work.

Data availability

Data are available upon request.

Informed consent

Written informed consent was obtained from all participants prior to their inclusion in the study. Participants were informed about the purpose of the study, procedures involved, potential risks and benefits, and their right to withdraw at any time without penalty.

Author biography

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