

The prevalence and determinants of puerperal sepsis among post-natal mothers attending at Hoima regional referral hospital, Uganda

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ABSTRACT

It is estimated that 30 million patients worldwide are affected by puerperal sepsis, with nearly 6 million deaths among them. The Annual Health Sector Performance Report (AHSPR) 2021–2022 of Uganda reported that pregnancy-related sepsis contributed to 9% of maternal deaths, following hemorrhage (41%) and hypertensive disorders (14%) as the leading causes (MOH, 2022). This study assessed the prevalence and determinants of puerperal sepsis among postnatal mothers attending Hoima Regional Referral Hospital. A cross-sectional descriptive study design was used, recruiting 156 mothers, with a questionnaire as the primary data collection tool. The prevalence of puerperal sepsis was estimated at 10.9%. The most affected women were grand multiparous, with parity >4, accounting for 13 (76.4%) cases, while multiparous women constituted 2 (11.8%) cases. The condition was more frequent among unbooked mothers, representing 11 (64.7%) cases, compared to booked women: 4 (23.5%) with 1–2 ANC visits, 1 (5.9%) with 3–4 ANC visits, and 1 (5.9%) with >5 ANC visits. Mothers who delivered via cesarean section were at the highest risk, with 9 (52.9%) cases, followed by those who underwent instrumental delivery, 6 (35.3%), while only 2 (11.8%) cases occurred among vaginal deliveries. Referral status was also a significant risk factor, as 12 (70.6%) women who were referred to the hospital for delivery later developed sepsis, compared to only 5 (29.4%) non-referred cases. Considering these findings, increasing community awareness of the importance of frequent ANC visits, postpartum care, and educational interventions, as well as supporting women from low socioeconomic backgrounds, are recommended strategies for reducing puerperal sepsis.

Keywords: Puerperal sepsis, Prevalence, Determinants, Postnatal mothers, Antenatal care (ANC)

INTRODUCTION

Puerperal sepsis (PS) is a severe infection of the genital tract that occurs from the rupture of membranes or the onset of labor up to 42 days after childbirth [1]. Puerperal sepsis is diagnosed based on the presence of at least two or more clinical symptoms, including pelvic pain, high fever (oral temperature $\geq 38.5^{\circ}\text{C}$), abnormal genital discharge (purulent or foul-smelling), delayed uterine involution (less than 2 cm/day within the first eight days), sudden onset of postpartum fever, chills, sweating, generalized body pain, headache, and loss of appetite [2]. Globally, an estimated 30 million patients are affected by puerperal sepsis, with nearly 6 million deaths annually [3]. It remains one of the leading causes of maternal mortality, alongside hemorrhage, hypertensive disorders, obstructed labor, and unsafe abortions [4]. Puerperal sepsis is responsible for approximately 11% of all maternal deaths worldwide and is the third leading direct cause of maternal mortality in developing countries [3]. The International Classification of Diseases Tenth Revision (ICD-10) defines maternal death as “a death in a woman from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy” [4]. Case fatality rates of puerperal sepsis are significantly higher in low- and middle-income countries compared to developed nations, and many survivors suffer from severe morbidities, including septicemia, septic shock, peritonitis, and pelvic abscesses, which

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may lead to chronic pelvic inflammatory disease and infertility if treatment is delayed or inadequate [5]. Failure to treat puerperal sepsis can result in life-threatening complications such as wound infections, mastitis, urinary tract infections, septicemia, septic shock, and even secondary infertility [6]. However, proper infection control, early diagnosis, appropriate treatment, and prophylactic antibiotics during labor and delivery can significantly reduce the risk of puerperal sepsis. Historically, case fatality rates from PS were as high as 20% before the introduction of antibiotics but have now declined to as low as 2% with effective antimicrobial therapy [7]. According to the WHO, puerperal sepsis accounts for 15% of maternal deaths globally [2]. In Sub-Saharan Africa, it is the second leading cause of maternal mortality after hemorrhage. In Uganda, studies have reported puerperal sepsis as the leading cause of maternal mortality, accounting for 30.9% of pregnancy-related deaths [5]. Other studies have found its prevalence at 24.0% [8] and 27% [9]. Several factors have been associated with puerperal sepsis, including premature rupture of membranes, pelvic inflammatory disease, infected episiotomy wounds, sexually transmitted infections, anemia, obstructed labor, cesarean section, multiparity, prolonged labor, frequent vaginal examinations with poor hygiene, lack of aseptic techniques, rural residence, lack of formal education, and low income Kitessa et al., [11] Most research on postpartum infections has been conducted in high-income countries, where factors such as poor hygiene, socioeconomic status, and prolonged labor have been linked to puerperal sepsis. However, these determinants may differ in low-resource settings due to variations in healthcare systems and patient environments [12]. Many maternal deaths due to puerperal infections could be prevented with timely intervention between delivery and the postpartum period. Despite its high mortality and morbidity rates, maternal sepsis remains an under-researched and under-prioritized issue compared to other leading causes of maternal death [13]. Early detection and timely treatment of sepsis are critical in reducing avoidable maternal morbidity and mortality [14]. Understanding the burden of puerperal sepsis and its determinants is crucial for developing effective prevention strategies. The Annual Health Sector Performance Report (AHSR) 2021–2022 of Uganda revealed that pregnancy-related sepsis contributed to 9% of maternal deaths, following hemorrhage (41%) and hypertensive disorders (14%) [14]. Given the significant impact of puerperal sepsis on maternal health, this study aims to determine its prevalence and associated risk factors among postnatal mothers attending Hoima Regional Referral Hospital (HRRH). Findings from this study will help guide interventions to reduce maternal morbidity and mortality related to puerperal sepsis.

METHODOLOGY

Study Design

This study utilized a cross-sectional design to determine the prevalence and determinants of puerperal sepsis among postnatal mothers attending Hoima Regional Referral Hospital (HRRH).

Study Site and Setting

The study was conducted at HRRH, a public health facility located in Hoima City, Hoima District, Uganda. The hospital is approximately 200.4 km by road from Kampala, the capital city of Uganda. Hoima District extends westward to the shores of Lake Albert and the border of the Democratic Republic of the Congo. It is bordered to the north by Buliisa District, to the northeast by Masindi District, to the east by Kyankwanzi District, and to the south by Kibaale and Ntoroko Districts. HRRH serves a population of over 53 million people residing in Hoima City, the majority of whom are Banyoro. As a regional referral hospital, HRRH receives referrals from neighboring district hospitals. The hospital has multiple departments, including the Department of Obstetrics and Gynecology, which has a postnatal ward where the study participants were recruited. This unit admits mothers after delivery, either by vaginal birth or cesarean section.

Study Population

The study participants included postpartum mothers admitted at HRRH.

Inclusion Criteria

The study included all postpartum mothers admitted to the postnatal ward at HRRH who consented to participate.

Exclusion Criteria

Women were excluded from the study if they were severely ill, mentally unstable, referred due to puerperal sepsis, or declined to provide consent.

Sample Size Determination

The sample size was calculated based on a Tanzanian study that reported a puerperal sepsis prevalence of 11.5% [2]. Using the modified Daniel's formula:

$$N = \frac{Z^2 P (1-P)}{E^2}$$

Where:

- N = Required sample size

- Z = Level of significance at 95% Confidence Interval ($Z = 1.96$)

- P = Prevalence of puerperal sepsis = 11.5% (0.115)

- E = Margin of error (5%, taken as 0.05)

$$N = \frac{3.8416 \times 0.115 \times (1 - 0.115)}{0.0025}$$

$$N = 156$$

Thus, the required sample size for the study was 156 participants.

Sampling Technique

Participants were enrolled consecutively until the required sample size was achieved.

Study Instruments

Data was collected using structured questionnaires.

Validity of Study Instruments

Pretested questionnaires were used. Pretesting was conducted at Kikube Health Center IV to identify and correct potential errors before actual data collection.

Data Collection Procedure

Participants were recruited consecutively. Postnatal women were educated and counseled about the study. Those who agreed to participate signed a consent form before completing a questionnaire containing all the relevant variables needed to answer the study objectives.

Data Analysis

Data collected from the questionnaires was stored securely and only accessible to the principal investigator. It was entered into Microsoft Excel 2010 and then imported into SPSS for analysis. Baseline characteristics were analyzed using univariate analysis and summarized as means and medians for continuous variables. Proportions, percentages, and frequencies were used for categorical variables. The findings were presented in tables.

Study Feasibility

HRRH conducts an average of 350 deliveries per month, including both vaginal and cesarean section births. Based on this number, the required sample size was achievable within the study period.

Study Limitations

A key limitation of this study was the small sample size, which made it difficult to generalize findings to the entire population of postpartum mothers admitted to the postnatal ward at HRRH.

Ethical Considerations

Informed Consent and Respect for Participants

- Participation was voluntary, and informed consent was obtained.
- Participants had the right to withdraw from the study at any time.

Risks to Study Participants

This study posed no physical risks to participants as it only involved data collection and non-invasive anthropometric measurements.

Research Benefits

The study aimed to increase awareness among healthcare providers and stakeholders. Participants could benefit if study recommendations were implemented.

Privacy and Confidentiality

- Participants were identified using numerical codes to ensure anonymity.
- All data was kept secure under lock and key throughout the research period.

Selection of Participants

A consecutive sampling method was used. No monetary or other incentives were provided to participants. Approval for the study was obtained from the Faculty of Clinical Medicine, Kampala International University – Western Campus. This approval was presented to the Medical Superintendent of HRRH, who granted permission for data collection. The study procedures did not conflict with local beliefs, traditions, or cultural values.

RESULTS

Socio-demographic and maternal factors

The Ages of participants ranged from 14 to 43 years with mean age of (28.8 ± 5.0) years. They were 72(46.2%) mothers from the village while 84 (53.8%) were from town. Most of the mothers 60 (38.5%) had attained secondary school education followed by 46 (29.5%) had primary education, most of the mothers were married 125 (80.1%) whereas 31 (19.9%) were single. Majority 82(52.6%) of the mothers were farmers while 51(32.7%) and 23 (14.7%) were civil servants and private business women respectively.

Table 1 Showing Socio-demographic characteristic

Variables	Categories	Frequency (N=156)	Percentage (%)
Age of mothers (years)	<19	20	12.8
	20-30	101	64.7
	>30	35	22.4
Residence	Town	84	53.8
	Village	72	46.2
Level of education	None	30	19.2
	Primary	46	29.5
	Secondary	60	38.5
	Tertiary	20	12.8
Occupation	Farmer	82	52.6
	Civil servant	51	32.7
	Private business	23	14.7
Marital status	Married	125	80.1
	Single	31	19.9

Prevalence of puerperal sepsis among women attending HRRH

During this study a total of 156 mothers out of which 17 women had been admitted for puerperal sepsis bringing the prevalence to 10.9%.

Table 2 showing Prevalence of puerperal sepsis

Variable	Yes n(%)	No n(%)
Presence of puerperal sepsis	17(10.9%)	139(89.1%)

Majority of the women admitted with puerperal sepsis were above thirty years of age 10(58.8%), other vulnerable group was below 19 years of age in 5 (29.4%) women, while between 20 years to 30 years of age group were 2 (11.8%) women. Most women were residents from the village 12(70.6%) while 5(29.4%) were from town, majority of women had attained only primary education 9(52.9%). Farmer women were most affected 8(47.1%) compared to civil servant and private business with 5(29.4%) and 4(23.5%) women affected respectively. Being married was high risk with 13(76.5%) women affected while 4(23.5%) single women were affected as shown in table 3 below.

Table 3 showing puerperal sepsis and social demographics

Variables	Categories	Frequency (N=17)	Percentage (%)
Age of mothers (years)	<19	5	29.4
	20-30	2	11.8
	>30	10	58.8
Residence	Town	5	29.4
	Village	12	70.6
Level of education	None	3	17.6
	Primary	9	52.9
	Secondary	2	11.8
	Tertiary	3	17.6
Occupation	Farmer	8	47.1
	Civil servant	5	29.4
	Private business	4	23.5
Marital status	Married	13	76.5
	Single	4	23.5

Obstetric factors

Highly affected women were grand multiparous having parity >4 and above in 13(76.4%) women, multi parous women were 2 (11.8%). Frequent problem was observed in un-booked population in 11(64.7%) cases while the booked women were; 4(23.5%) with 1-2 ANC visits, 1(5.9%) with 3-4 ANC visits (24.03%), and 1(5.9%) with >5 ANC visits. Mothers who delivered by caesarean section had the highest problem 9(52.9%) and others at risk were women who underwent instrumental delivery 6(35.3%) while vaginal delivery had 2(11.8%) women. Referral was another indicator of increased risk with 12(70.6%) women who were referred to the hospital for delivery developing sepsis later on while only 5(29.4%) non referrals developed sepsis. All these findings are shown in table 4 below.

Table 4 showing Obstetric factors

Variable	Category	Frequency (n=17)	Percentage (%)
Antenatal care attendance	None	11	64.7
	1-2	4	23.5
	3-4	1	5.9
	>5	1	5.9
Parity	1-2	2	11.8
	3-4	2	11.8
	>4	13	76.4
Delivery type	Vaginal delivery	2	11.8
	Caesarean section	9	52.9
	Instrumental	6	35.3
Referral status	No	5	29.4
	Yes	12	70.6

DISCUSSION

A total of 156 mothers participated in this study, of whom 17 were admitted for puerperal sepsis, bringing the prevalence to 10.9%. This finding is consistent with other studies, such as one conducted in Tanzania, which reported a puerperal sepsis prevalence of 11.5% (Kajeguka et al., 2020[16]). Similarly, a cohort study on the prevalence and risk factors for puerperal sepsis at Pumwani Maternity Hospital found the prevalence at 12.2% at two weeks postpartum [17].

Social Demographics

A study involving 566 participants reported that 69 women met the criteria for puerperal sepsis, corresponding to a prevalence of 12.2% at two weeks postpartum (95% CI: 9.5–14.9%). In contrast, a study conducted by Atlaw et al., found a prevalence of 17.2% (95% CI: 12.0–22.5%) in the study area [18]. In this study, puerperal sepsis was most frequently reported among women above 30 years of age (10 cases; 58.8%) and those who were grand multiparous (13 cases; 76.4%). Worldwide, particularly in underdeveloped countries, this group of women is disproportionately affected by infectious morbidities due to poverty, illiteracy, malnutrition, and poor resistance to infections. Many of these women begin pregnancy in poor health conditions, have limited access to antenatal care (ANC), and lack knowledge of contraceptive methods. This study also found that most cases of puerperal sepsis involved mothers who were referred from other health facilities (12 cases; 70.6%) and unbooked mothers (11 cases; 64.7%).

Obstetric Factors

A significant number of affected women underwent cesarean section (9 cases; 52.9%) and instrumental delivery (6 cases; 35.3%). The role of improper sterilization by unskilled personnel in increasing infection risk cannot be overlooked. Increasing concerns about hospital-acquired infections (HAIs) and healthcare-associated infections (HCAIs) have been recorded across multiple medical disciplines, even in high-income countries [19]. The implementation of effective infection control programs in all health facilities remains a strong priority for preventing these infections [20-24].

Referral Status and Puerperal Sepsis

Referral status was also identified as an independent determinant of puerperal sepsis in this study, with 12 cases (70.6%) occurring among referred mothers. Similarly, a study in Uganda found that mothers referred from other facilities were at higher risk of developing puerperal sepsis than those admitted directly to the study hospital [21-24]. One possible explanation for this is the prolonged time taken to reach a hospital and the likelihood of unsanitary vaginal examinations en-route, contributing to the development of puerperal sepsis.

CONCLUSION

The prevalence of puerperal sepsis among postnatal mothers at Hoima Regional Referral Hospital (HRRH) was found to be 10.9%. This study revealed that age over 30 years, rural residence, low education level (primary or less), cesarean section delivery, limited ANC follow-up (two visits or fewer), grand multiparity, and referral from other health institutions were significant determinants of puerperal sepsis.

Recommendations

The government and other stakeholders, such as Marie Stopes International, should conduct awareness campaigns on puerperal sepsis, emphasizing the importance of ANC services for maternal health. Pregnant women should be encouraged to attend ANC services to minimize post-delivery complications. Expectant mothers should be advised to visit hospitals earlier when labor begins to reduce the risk of complications leading to sepsis. Vaginal delivery should be prioritized in cases where cesarean sections are not medically necessary. Improved maternal care and support at both health facility and family levels should be promoted to ensure a safe and healthy postpartum period.

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