

Prevalence and determinants of surgical site infection following caesarean section in two Ghanaian hospitals: a retrospective cross-sectional and matched case-control study

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Abstract

Background

Surgical site infection (SSI) is a common complication following caesarean section (CS), contributing to maternal morbidity, prolonged hospitalisation, and increased healthcare costs. Despite rising CS rates in low- and middle-income countries, including Ghana, evidence on the prevalence and determinants of SSI remains limited and context-specific. This study assessed the prevalence of SSI following CS and examined associated risk factors in two hospitals in Ghana.

Methods

A retrospective cross-sectional study was conducted among women who underwent caesarean section at KNUST Hospital and Tain District Hospital between 1 January 2023 and 31 December 2024. A matched case–control design (1:4 ratio) was used to assess factors associated with SSI. Cases were patients diagnosed with SSI, while controls were patients without SSI matched by age category, type of surgery, and year of surgery. Data were extracted from medical records using a structured abstraction form. Descriptive statistics were used to summarise patient characteristics and estimate SSI prevalence. Conditional logistic regression was performed to identify factors associated with SSI at a 95% confidence level.

Results

A total of 1,565 caesarean section cases were analysed. The overall prevalence of SSI was 0.77% (12/1,565; 95% CI: 0.43–1.34), with slightly higher rates observed at KNUST Hospital (0.86%) compared to Tain District Hospital (0.66%). All identified infections were superficial, and none required hospital readmission. In the case–control analysis (12 cases and 48 controls), no statistically significant associations were found between SSI and sociodemographic, obstetric, or intraoperative factors (all $p > 0.05$).

Conclusion

The prevalence of surgical site infection following caesarean section in the study settings was notably low compared to regional estimates, suggesting effective infection prevention practices. However, no significant predictors of SSI were identified, likely due to the small number of cases. Strengthening postoperative surveillance and conducting larger multicentre studies are recommended to better understand the determinants of SSI and sustain improvements in maternal surgical outcomes.

Introduction

Caesarean section (CS) is a critical obstetric intervention performed to prevent maternal and neonatal morbidity and mortality when vaginal delivery poses risks. Globally, the rate of caesarean delivery has increased substantially over the past three decades, rising from approximately 7% in 1990 to over 21% in 2021, exceeding the World Health Organisation (WHO) recommended range of 10–15% for optimal maternal and neonatal outcomes [1], [2]. The use of CS provides crucial medical advantages during emergencies because it enables doctors to perform vital surgical procedures, but this technique results in various postoperative health issues, which include surgical site infection as the most widespread and important medical complication.

Surgical site infections are defined as infections occurring within 30 days after a surgical procedure and involve the incision of deep tissues at the site of operation [3]. The occurrence of surgical site infections during caesarean delivery presents a major threat because it disrupts both maternal recovery and infant care while decreasing their overall quality of life. The infections develop through bacteria which emerge from the patient's skin and genital area, showing a pattern of multiple bacterial types [4]. The impacts of surgical site infections extend beyond medical complications to cause extended hospital stays, increased readmission rates, higher medical expenses, and increased use of antibiotics, which contributes to developing antimicrobial resistance [5], [6].

Globally, the pooled incidence of SSI following caesarean delivery is estimated at approximately 5.6%, with considerable regional variation. The burden is disproportionately higher in low- and middle-income countries (LMICs), particularly in sub-Saharan Africa, where prevalence estimates range from 8% to over 15% [1], [2], [7], [8], [9]. Evidence suggests that nearly one in five women undergoing caesarean section in some African settings may develop postoperative wound infections, highlighting a significant public health concern [10].

The occurrence of SSI following CS has substantial implications for both patients and health systems. Clinically, SSIs contribute to prolonged hospitalisation, increased risk of readmission, delayed wound healing, and, in severe cases, maternal sepsis and mortality. Economically, they impose a considerable burden through increased healthcare costs, prolonged antibiotic use, and loss of productivity [5], [6]. In LMICs, where healthcare resources are often constrained, these consequences are particularly pronounced, further exacerbating inequities in maternal health outcomes.

A wide range of patient-related and procedure-related factors have been associated with the development of SSI following caesarean section. These include premature rupture of membranes, prolonged labour, multiple vaginal examinations, emergency surgical procedures, obesity, anaemia, diabetes, and poor nutritional status [11], [12]. In addition, intraoperative factors such as duration of surgery, blood loss, and timing of antibiotic prophylaxis play a critical role in influencing infection risk [13]. Importantly, many of these risk factors are modifiable, underscoring the importance of context-specific evidence to guide targeted interventions.

In Ghana, despite increasing utilisation of caesarean delivery, there is limited comprehensive evidence on the burden and determinants of SSI following CS. Available studies report prevalence estimates ranging

from approximately 9.7% to 14.8%, suggesting a relatively high burden compared to global averages [14], [15]. Additionally, national data indicate that women undergoing caesarean delivery are more likely to experience prolonged hospital stays compared to those with vaginal deliveries, reflecting the potential impact of postoperative complications, including infections [16]. However, there remains a paucity of multicentre or context-specific studies that simultaneously assess prevalence, risk factors, and clinical characteristics of SSI in different levels of healthcare delivery within the country.

Furthermore, the epidemiology of surgical site infections is highly context-dependent, varying across facilities due to differences in infrastructure, infection prevention practices, patient characteristics, and postoperative care systems. Understanding these variations is essential for designing effective infection control strategies and improving maternal outcomes. Evidence from facility-level studies is therefore critical in informing both clinical practice and policy interventions, particularly in resource-constrained settings.

This study was conducted to address these gaps by assessing the prevalence of surgical site infections following caesarean section and examining the associated risk factors in two hospitals in Ghana, KNUST Hospital in Kumasi and Tain District Hospital in Nsawkaw. By employing a retrospective cross-sectional design alongside a matched case-control analysis, this study provides context-specific epidemiological evidence to inform targeted prevention strategies and contribute to the broader understanding of SSI in sub-Saharan Africa.

Methods

Study design and setting

This study employed a retrospective observational design with a mixed analytical approach. First, a retrospective cross-sectional design was used to determine the prevalence of surgical site infection (SSI) following caesarean section (CS). Second, a matched case-control design was applied to assess factors associated with the development of SSI. The study was conducted at two health facilities in Ghana: the KNUST Hospital in Kumasi (Ashanti Region) and the Tain District Hospital in Nsawkaw (Bono Region). These facilities represent different levels of healthcare delivery, with KNUST Hospital functioning as a university-affiliated facility and Tain District Hospital serving as a district-level referral centre.

Study population

The study population comprised all women who underwent caesarean section at the two hospitals between 1 January 2023 and 31 December 2024. For the case-control analysis, cases were defined as patients who developed surgical site infection within the postoperative period based on clinical diagnosis recorded in hospital records. Controls were patients who underwent caesarean section during the same period but did not develop SSI.

Eligibility criteria

For the quantitative component, all available medical records of patients who underwent caesarean section within the study period were included. Records with incomplete or missing essential clinical information were excluded. For the case–control analysis, cases included all identified SSI patients, while controls were selected from patients without SSI who met the inclusion criteria and had complete records.

Sample size and sampling procedure

A census approach was used for the cross-sectional component, where all eligible caesarean section cases within the study period were included. A total of 1,565 patients were reviewed across both hospitals.

For the case–control analysis, all identified SSI cases ($n = 12$) were included. Controls were selected using a 1:4 case-to-control ratio to improve statistical efficiency. Matching was performed based on year of surgery, type of caesarean section (elective or emergency), and age category. Within each matching stratum, controls were selected systematically from eligible non-SSI cases.

Data sources and data collection

Data were obtained through a retrospective review of medical records from the obstetric theatre and labour ward registers at both hospitals. A structured data abstraction form (see Supplementary File 1) was used to extract relevant information, including sociodemographic characteristics (e.g., age), obstetric factors (e.g., parity, gestational age, antenatal care attendance), clinical conditions (e.g., hypertension, diabetes), and intraoperative characteristics (e.g., duration of surgery, estimated blood loss, antibiotic prophylaxis).

Surgical site infection was defined according to established clinical criteria documented in patient records, consistent with international definitions of SSI occurring within 30 days of surgery.

Variables

The primary outcome variable was the occurrence of surgical site infection (yes/no). Independent variables included:

- Sociodemographic factors: age
- Obstetric factors: parity, gestational age, antenatal care visits
- Clinical factors: hypertension, diabetes status
- Intraoperative factors: type of caesarean section, duration of surgery, estimated blood loss, premature rupture of membranes

These variables were selected based on prior literature and data availability within hospital records.

Bias and confounding

To minimise selection bias, all eligible cases within the study period were included in the cross-sectional analysis. In the case–control component, matching on key variables (age category, type of surgery, and year of surgery) was used to control for potential confounding. Additionally, consistent data abstraction procedures were applied across both facilities to reduce information bias. However, the retrospective nature of the study may introduce misclassification bias due to reliance on routine clinical documentation.

Statistical analysis

Data were entered, cleaned, and analysed using Stata version 17.0. Descriptive statistics were used to summarise patient characteristics, with categorical variables presented as frequencies and percentages, and continuous variables summarised using measures of central tendency and dispersion.

The prevalence of surgical site infection was calculated as the proportion of patients who developed SSI among all caesarean section cases.

For the case–control analysis, conditional logistic regression was used to estimate crude odds ratios (ORs) and 95% confidence intervals (CIs) for the association between independent variables and SSI. A backward stepwise approach was applied to assess the contribution of variables. Statistical significance was set at a p-value of ≤ 0.05 .

Ethical considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and received approval from the Committee on Human Research, Publications and Ethics (CHRPE) (Ref: CHRPE/AP/097/25) of the Kwame Nkrumah University of Science and Technology. Permission was also obtained from the management of both KNUST Hospital and Tain District Hospital before data collection. Patient confidentiality was maintained by anonymising data and excluding personally identifiable information from the dataset.

Results

Participant characteristics

A total of 1,565 women who underwent caesarean section between January 2023 and December 2024 across the two study hospitals were included in the analysis. Of these, 810 (51.8%) were from KNUST Hospital and 755 (48.2%) from Tain District Hospital (see Table 1). The majority of participants were aged 30 years or older, with a median age of 31 years (IQR: 17–48). Most women had at least one prior

birth and had attended four or more antenatal care visits. Caesarean deliveries were predominantly performed at term (37–40 weeks of gestation). There were statistically significant differences between the two hospitals in terms of age distribution, parity, antenatal care attendance, gestational age, and selected clinical characteristics, including hypertension, gestational diabetes, and HIV status (all $p < 0.05$).

Table 1
Clinical characteristics of patients who underwent caesarean section in KNUST Hospital and Tain District Hospital

Variable	Total (n = 1565)	KNUST Hospital (n = 810)	Tain District Hospital (n = 755)	p-value
Age ≤ 20	43 (2.75)	10 (1.23)	33 (4.37)	< 0.001
Age 21–29	571 (36.49)	316 (39.01)	255 (33.77)	
Age ≥ 30	951 (60.77)	484 (59.75)	467 (61.85)	
Parity ≥ 1	1188 (75.91)	526 (64.94)	662 (87.68)	< 0.001
ANC ≥ 4 visits	1455 (92.97)	729 (90.00)	726 (96.16)	< 0.001
Gestational age 37–40 weeks	1195 (76.36)	629 (77.65)	566 (74.97)	< 0.001

Labour and surgical characteristics

Most caesarean sections were performed as emergency procedures (62.36%), with no statistically significant difference between hospitals ($p = 0.289$). The majority of surgeries lasted 31–60 minutes, and approximately one-third of patients had a history of previous caesarean section. Premature rupture of membranes occurred in a small proportion of patients and did not differ significantly between hospitals. However, estimated blood loss during surgery differed significantly ($p < 0.001$), with higher volumes more frequently recorded at KNUST Hospital (see Table 2).

Table 2
Labour and surgical characteristics of patients

Variable	Total (%)	KNUST (%)	Tain (%)	p-value
Emergency CS	976 (62.36)	495 (61.11)	481 (63.71)	0.289
Duration 31–60 min	1071 (68.43)	539 (66.54)	532 (70.46)	0.109
Previous CS	527 (33.67)	271 (33.46)	256 (33.91)	0.851
PROM	43 (2.75)	22 (2.72)	21 (2.78)	0.937
Blood loss > 500 ml	166 (10.61)	157 (19.38)	9 (1.19)	< 0.001

Intrapartum care characteristics

All patients in both hospitals received standard preoperative preparations, including surgical site hair removal, skin preparation, and antibiotic prophylaxis before surgery. However, there were significant differences in the timing of antibiotic administration relative to surgical incision ($p < 0.001$), with KNUST Hospital having a higher proportion of patients receiving antibiotics within 30 minutes before incision compared to Tain District Hospital. Most surgical wounds were classified as clean, and all patients received postoperative education on surgical site care before discharge. The duration of hospital stay differed significantly between the two hospitals ($p < 0.001$), with longer stays more common at KNUST Hospital, while shorter stays were more frequent at Tain District Hospital. Table 3 presents the intrapartum care characteristics of patients who underwent caesarean section in both hospitals.

Table 3
Intrapartum characteristics of participants

Variable	Total (%)	KNUST (%)	Tain (%)	p-value
Antibiotics $\leq$ 30 min	154 (9.84)	154 (19.01)	0 (0.00)	< 0.001
Clean wounds	1554 (99.30)	803 (99.14)	751 (99.47)	0.550
Hospital stay $\geq$ 4 days	858 (54.82)	665 (82.10)	193 (25.56)	< 0.001

Prevalence of surgical site infection

A total of 12 patients developed surgical site infections (see Table 4), giving an overall prevalence of 0.77% (95% CI: 0.43–1.34). The prevalence was slightly higher at KNUST Hospital (0.86%) compared to Tain District Hospital (0.66%).

Table 4
Prevalence of surgical site infection

Facility	Total surgeries	SSI cases (%)	95% CI
KNUST Hospital	810	7 (0.86)	0.41–1.80
Tain District Hospital	755	5 (0.66)	0.28–1.58
Total	1565	12 (0.77)	0.43–1.34

Characteristics of surgical site infections

All identified infections were superficial. Most infections occurred ≥ 14 days post-surgery. Wound swabbing for microbiological culture was rarely performed, and no organisms were isolated (see Table 5). All cases were managed with oral antibiotics, and none required hospital readmission.

Table 5
Characteristics of SSI cases

Variable	Total (%)
Superficial SSI	12 (100.00)
Swab not done	11 (91.67)
Pus present	12 (100.00)
No organism isolated	12 (100.00)
Occurred $\geq$ 14 days	7 (58.33)
Readmission	0 (0.00)

Factors associated with surgical site infection

The case–control analysis compared 12 SSI cases with 48 matched controls (see Table 6). Across all examined variables, no statistically significant associations were identified between patient characteristics, obstetric factors, or intraoperative variables and the occurrence of surgical site infection (all $p > 0.05$). Although some variables showed directional trends, these were not statistically significant. For instance, patients aged 30 years or older had slightly higher odds of developing SSI compared to younger patients, while those with parity ≥ 1 had marginally lower odds. Similarly, premature rupture of membranes, duration of surgery, type of caesarean section, and estimated blood loss did not demonstrate significant associations with SSI. Table 6 presents the results of the conditional logistic regression analysis examining factors associated with the development of surgical site infection.

Table 6
Conditional logistic regression of factors associated with surgical site infection

Variable	OR (95% CI)	p-value
Age ≥ 30	1.08 (0.27–4.29)	0.918
Parity ≥ 1	0.96 (0.26–3.47)	0.949
ANC ≥ 4	1.92 (0.09–39.75)	0.672
PROM	1.27 (0.05–3.01)	0.887
Emergency CS	0.88 (0.18–4.22)	0.874
Duration 31–60 min	0.49 (0.61–4.03)	0.513
Blood loss > 500 ml	0.62 (0.10–3.97)	0.182

Discussions

Principal findings

This study assessed the prevalence and determinants of surgical site infection (SSI) following caesarean section across two hospitals in Ghana using a retrospective cross-sectional and matched case–control approach. The overall prevalence of SSI was 0.77%, which is substantially lower than most estimates reported in sub-Saharan Africa and other low- and middle-income settings. Additionally, no statistically significant associations were observed between the examined sociodemographic, obstetric, and intraoperative factors and the occurrence of SSI. Despite differences in selected clinical and perioperative characteristics between the two hospitals, infection prevention practices were largely consistent, and all identified SSIs were superficial and managed without readmission.

Prevalence of surgical site infection

The observed SSI prevalence of 0.77% is markedly lower than previously reported estimates globally and regionally. A recent meta-analysis estimated a global pooled prevalence of approximately 5.6% following caesarean section, with significantly higher rates in sub-Saharan Africa, often exceeding 10% [7]. Similarly, studies conducted in African countries such as Ethiopia and Nigeria have reported SSI rates ranging between 8% and 12% [8], [18]. Within Ghana, earlier studies have documented prevalence estimates between 9.7% and 14.8% [14], [15].

The substantially lower prevalence observed in this study may reflect improvements in infection prevention and control (IPC) practices in the study settings. Both hospitals demonstrated adherence to key WHO-recommended preventive measures, including universal administration of prophylactic antibiotics, proper skin antisepsis, and maintenance of aseptic techniques during surgery. Evidence suggests that adherence to such measures can reduce SSI rates by up to 50% [13]. Furthermore, the classification of all SSIs as superficial infections and the absence of readmissions may indicate effective early detection and management of postoperative complications.

However, the low prevalence must also be interpreted cautiously. The reliance on routine hospital records may have led to underreporting of SSI cases, particularly those occurring after discharge. This is especially relevant given that more than half of the infections in this study were identified after 14 days, suggesting that some cases may have been missed if patients did not return for follow-up care. Similar concerns regarding under-detection of SSI in retrospective facility-based studies have been documented in previous research [1], [2].

Risk factors associated with surgical site infection

Contrary to existing literature, this study did not identify any statistically significant predictors of SSI following caesarean section. Numerous studies have reported associations between SSI and factors such as prolonged labour, premature rupture of membranes, emergency surgery, obesity, diabetes, and extended duration of surgery [11], [12]. The absence of statistically significant findings in the present study is therefore notable.

One plausible explanation is the limited statistical power resulting from the small number of SSI cases ($n = 12$). With such few events, the ability to detect meaningful associations is substantially reduced,

even when true relationships exist. This limitation is well recognised in epidemiological studies, where sparse outcome events can lead to wide confidence intervals and unstable estimates.

Additionally, the relatively homogeneous application of infection prevention measures across both hospitals may have attenuated variability in exposure to risk factors, thereby reducing the likelihood of detecting differences between cases and controls. It is also possible that unmeasured factors – such as provider experience, adherence to sterile protocols at the individual level, or environmental conditions within operating theatres – may play a more critical role in determining SSI risk in these settings.

Differences between study hospitals

Although the two hospitals differed significantly in certain patient characteristics and perioperative factors, including antibiotic timing and duration of hospital stay, these differences did not translate into meaningful variation in SSI prevalence. This finding suggests that core infection prevention practices may have been consistently implemented across both facilities, mitigating the potential impact of contextual differences.

Notably, KNUST Hospital recorded longer postoperative hospital stays compared to Tain District Hospital. While prolonged hospitalisation is often associated with increased infection risk, the absence of higher SSI rates in this setting may reflect effective inpatient monitoring and timely intervention. Conversely, the shorter hospital stays observed at Tain District Hospital may indicate greater reliance on outpatient or community-based care, which could influence the detection and reporting of SSIs.

Implications for practice and policy

The findings of this study have important implications for maternal healthcare delivery in Ghana and similar settings. The low prevalence of SSI suggests that adherence to standard infection prevention protocols can yield significant improvements in surgical outcomes, even in resource-constrained environments. Strengthening routine IPC practices, ensuring timely antibiotic prophylaxis, and maintaining strict aseptic conditions during surgery should remain central components of obstetric care.

However, the potential for underreporting highlights the need to improve postoperative surveillance systems, particularly after hospital discharge. Establishing structured follow-up mechanisms, including community-based monitoring or digital health interventions, could enhance early detection and management of SSIs.

Furthermore, the absence of identifiable risk factors underscores the need for larger, multicentre studies with adequate statistical power to better understand the determinants of SSI in the Ghanaian context. Such studies could incorporate additional variables, including body mass index, nutritional status, and provider-level factors, to provide a more comprehensive assessment of risk.

Strengths and limitations

This study has several strengths. It utilised a relatively large sample size for the prevalence analysis and included data from two hospitals representing different levels of healthcare delivery. The use of a matched case–control design helped control for key confounding variables and enhanced the internal validity of the findings.

Nevertheless, several limitations should be acknowledged. First, the retrospective design limits the ability to establish causal relationships and is subject to information bias due to reliance on routine clinical records. Second, the small number of SSI cases reduced the statistical power of the study, limiting the ability to detect significant associations. Third, the absence of active post-discharge surveillance may have resulted in underestimation of SSI prevalence. Finally, some potentially relevant variables, such as body mass index and detailed intraoperative practices, were not consistently available in the records and could not be included in the analysis.

Conclusion

This study found a very low prevalence of surgical site infection following caesarean section in two hospitals in Ghana, with no statistically significant predictors identified. The findings suggest that effective infection prevention practices may be contributing to improved surgical outcomes. However, the potential for underreporting and limited statistical power warrants cautious interpretation. Strengthening postoperative surveillance and conducting larger multicentre studies are essential to better understand and sustain reductions in surgical site infections in similar settings.

Declarations

Consent for Publication **Not applicable.**

Conflict of Interest / Competing Interests

The authors declare no competing interests concerning the work presented in this manuscript.

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Author Contribution

MMA conceived and designed the study, conducted data collection, performed data analysis, and drafted the initial manuscript. ES and YGF supervised the study, contributed to the study design, and provided critical revisions to the manuscript. YMB contributed to data analysis and interpretation of results. MBU contributed to the conceptualisation of the study, manuscript drafting, and critical revision for important intellectual content. PG and GOT supported data collection and data management. WKA contributed to data analysis and manuscript review. All authors read and approved the final manuscript.

Data Availability

The datasets generated and analysed during the current study are not publicly available due to privacy and confidentiality considerations. However, reasonable requests for data sharing can be directed to the corresponding author. Materials, such as survey instruments, used in this research can also be made available upon request to facilitate transparency and further scholarly inquiry.

References

1. Organisation WH, WHO Statement on Caesarean Section Rates., 2015. Accessed: Feb. 16, 2026. [Online]. Available: https://szoptatas.info/sites/default/files/WHO_Statement_on_Cesarean_Section_Rates.pdf
2. Betran A, Torloni M, Zhang J, Gülmezoglu A. WHO Statement on Caesarean Section Rates. *BJOG*. Apr. 2016;123(5):667–70. 10.1111/1471-0528.13526.
3. Berríos-Torres SI, Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection., 2017, *JAMA Surg.*, vol. 152, no. 8, p. 784, Aug. 2017. 10.1001/jamasurg.2017.0904
4. Suarez-Easton S, Zafran N, Garimi G, Salim R. Postcesarean wound infection: prevalence, impact, prevention, and management challenges. *Int J Womens Health*. Feb. 2017;9:81–8. 10.2147/IJWH.S98876.
5. M. Haque, M. Sartelli, J. McKimm, and M. Bin Abu Bakar, Health care-associated infections– an overview, *Infect. Drug Resist.*, vol. Volume 11, pp. 2321–2333, Nov. 2018, doi: 10.2147/IDR.S177247.
6. Leaper DJ, Edmiston CE. World Health Organization: global guidelines for the prevention of surgical site infection. *J Hosp Infect*. Feb. 2017;95(2):135–6. 10.1016/j.jhin.2016.12.016.
7. Farid Mojtahedi M et al. Sep., Global incidence of surgical site infections following caesarean section: a systematic review and meta-analysis, *Journal of Hospital Infection*, vol. 139, pp. 82–92, 2023, 10.1016/j.jhin.2023.05.019
8. Shiferaw WS, Aynalem YA, Akalu TY, Petrucka PM. Surgical site infection and its associated factors in Ethiopia: a systematic review and meta-analysis. *BMC Surg*. Dec. 2020;20(1):107. 10.1186/s12893-020-00764-1.
9. Getaneh T, Negesse A, Dessie G. Prevalence of surgical site infection and its associated factors after cesarean section in Ethiopia: systematic review and meta-analysis. *BMC Pregnancy Childbirth*.

- Dec. 2020;20(1):311. 10.1186/s12884-020-03005-8.
10. Say L, et al. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health*. Jun. 2014;2(6):e323–33. 10.1016/S2214-109X(14)70227-X.
 11. Dutta BK, Basumatary BK, Sarma A. Surgical Site Infection Following Caesarean Section in a Tertiary Care Hospital, *Journal of Evidence Based Medicine and Healthcare*, vol. 7, no. 1, pp. 01–05, Jan. 2020, 10.18410/jebmh/2020/1
 12. Regmi A, Ojha N, Singh M, Ghimire A, Kharel N. Risk Factors Associated with Surgical Site Infection following Cesarean Section in Tertiary Care Hospital, Nepal, *Int. J. Reprod. Med.*, vol. 2022, pp. 1–11, May 2022. 10.1155/2022/4442453
 13. Allegranzi B, et al. New WHO recommendations on preoperative measures for surgical site infection prevention: an evidence-based global perspective. *Lancet Infect Dis*. Dec. 2016;16(12):e276–87. 10.1016/S1473-3099(16)30398-X.
 14. Bediako-Bowan A, et al. Surveillance of surgical site infection in a teaching hospital in Ghana: a prospective cohort study. *J Hosp Infect*. Mar. 2020;104(3):321–7. 10.1016/j.jhin.2020.01.004.
 15. Onuzo CN, Sefogah PE, Nuamah MA, Ntummy M, Osei M-M, Nkyekyer K. Surgical site infections following caesarean sections in the largest teaching hospital in Ghana. *Infect Prev Pract*. Jun. 2022;4(2):100203. 10.1016/j.infpip.2022.100203.
 16. Service GS. Ghana Demographic and Health Survey 2022: Key Indicators Report, Accra, 2023. Accessed: Apr. 19, 2026. [Online]. Available: <https://dhsprogram.com/pubs/pdf/PR149/PR149.pdf>
 17. Korol E, et al. A Systematic Review of Risk Factors Associated with Surgical Site Infections among Surgical Patients. *PLoS ONE*. Dec. 2013;8(12):e83743. 10.1371/journal.pone.0083743.
 18. Onyegbule O, et al. Determinants of Post-Caesarean Wound Infection in Nnewi, Nigeria. *Br J Med Med Res*. Jan. 2015;5(6):767–74. 10.9734/BJMMR/2015/10297.

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