بسم الله الرحمن الرحيم

University of Dongola

Faculty of medicine and medical sciences

Proposal on:

Prevalance and Risk Factors of Cesarean Section among pregnant women Maternity Hospital Dongola, 6 north state, sudan202

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i. Introduction

a. Background:

Caesarean section (CS) is one of the most common surgical procedures in obstetric practice and is an important life-saving intervention when vaginal delivery may put the mother or fetus at risk. It may be indicated in conditions such as previous caesarean section, obstructed labour, fetal distress, abnormal fetal presentation, placenta previa and other maternal or fetal complications [1,2]. However, the increasing use of CS worldwide has become an important public health concern because unnecessary caesarean delivery may expose mothers and newborns to avoidable complications. Globally, the proportion of births delivered by caesarean section has increased substantially, from about 7% in 1990 to 21% in 2018, and WHO estimates that it may approach 30% by 2030 if current trends continue [1]. Caesarean section rates vary markedly between countries and regions, reflecting differences in access to obstetric care, referral patterns, maternal characteristics, clinical indications, health-system factors, and social and cultural influences [1,2].

In S.udan, national household survey data demonstrated an increase in caesarean section rates from 4.3% in 2006 to 6.7% in 2010 and 9.1% in 2014. Considerable geographic variation was reported, with the Northern region having one of the highest rates, reaching approximately 25.1% in 2014. Maternal age, education, antenatal care, birth order, and geographical region were among factors associated with caesarean delivery [3]

More recent evidence from Sudan also demonstrates substantial variation in hospital-based caesarean rates. A 2025 study conducted at Atbara Maternity Hospital reported that 39.69% of deliveries were by caesarean section. Previous caesarean delivery and rural residence were the main determinants after multivariable analysis [4].

Local evidence from Dongola Maternity Hospital is also available. A study of primi gravidae with unengaged fetal head reported differences in mode of delivery between clinical groups and highlighted the relevance of obstetric factors in determining delivery mode [5]. Another study at the same hospital reported 3,674 deliveries during a six-month period, demonstrating the importance of the hospital as a maternity service and research setting in Northern State [6].

Despite these findings, there is limited recent information specifically describing the prevalence of caesarean section and the factors associated with it among women delivering at Dongola Maternity Hospital. Determining

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the local prevalence and associated factors may help identify women at higher likelihood of caesarean delivery, support appropriate obstetric decision -making, and provide updated evidence for maternity services in Dongola and Northern State.

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Problem statement:

Caesarean section can be lifesaving when medically indicated, but increasing or inappropriate use may expose mothers and newborns to unnecessary surgical risks and increase healthcare costs and workload [1,2]. At the same time, insufficient access to caesarean delivery can contribute to preventable maternal and neonatal morbidity and mortality. Therefore, understanding the local pattern of caesarean delivery is important for achieving an appropriate balance.

In Sudan, caesarean section rates differ considerably between regions, and the Northern region has historically reported higher rates than several other regions [3]. Recent evidence from Atbara also demonstrated a high hospital-based rate and identified previous caesarean delivery and rural residence as important determinants [4]. However, these findings cannot be assumed to represent women delivering at Dongola Maternity Hospital because patient characteristics, referral patterns, clinical practices, and available services may differ.{12&13}

There is therefore a need to determine the current prevalence of caesarean section and identify its associated maternal, obstetric, fetal, and sociodemographic factors among women delivering at Dongola Maternity Hospital, Northern State, Sudan, in 2026.

b. Justification:

Caesarean section is an important obstetric intervention when medically indicated; however, increasing rates of caesarean delivery may expose mothers and newborns to avoidable complications and increase the burden on healthcare services [1,2]. Although studies conducted in Sudan have demonstrated an increasing trend in caesarean section rates and identified several associated factors, there is limited recent evidence describing the prevalence and risk factors of caesarean section specifically among women attending Maternity Hospital in Dongola, Northern State [3]. This study is therefore justified by the need to generate local evidence on the current magnitude of caesarean section and the maternal, obstetric and fetal factors associated with it. The findings may help healthcare providers and hospital administrators better understand the local pattern of caesarean delivery, support appropriate obstetric decision-making, improve maternal and neonatal care, and provide baseline information for future studies and interventions aimed at reducing unnecessary caesarean sections while maintaining access to medically indicated procedures.{12&13&14}

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1.4. Research Question

What is the prevalence of caesarean section and what are the factors associated with caesarean delivery among women delivering at Dongola Maternity Hospital, Northern State, Sudan, in ?2026

1. What are the common indications for caesarean section among the study participants?

2. Is there an association between maternal sociodemographic characteristics and caesarean section?

3. Is there an association between obstetric characteristics and caesarean section?

4. Is previous caesarean section associated with the current mode of delivery?

5. Are maternal medical conditions associated with caesarean section?

6. What are the independent risk factors associated with caesarean section among women delivering at Dongola Maternity Hospital?

Objectives

1.5.1. General Objective

To study the prevalence and factors Associated with caesarean section among pregnant women delivering at Dongola Maternity Hospital, Northern State, Sudan, in 2026.{20–24 Sept 2026 to 03–04 Jan 2027 }

1.5.2. Specific Objectives

To determine the prevalence of caesarean section among women delivering at Dongola Maternity Hospital.

To identify the common indications for caesarean section among the study participants.

To determine the association between previous caesarean delivery and current mode of delivery.

To identify independent risk factors associated with caesarean section using multivariable analysis.

2.LITERATURE REVIEW

2.1.International

Globally, caesarean section rates have increased substantially over recent

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decades. An analysis of data from 154 countries reported that the global CS rate increased from approximately 7% of births in 1990 to 21.1% in 2018. The estimated rate varied considerably between regions, with approximately 9.2% in Africa, 23.1% in Asia, 25.7% in Europe, and 42.8% in Latin America and the Caribbean. The study projected that the global rate could reach approximately 28.5% by 2030 if current trends continue [3].

2.2.Regional

In Eastern Africa, however, hospital-based studies demonstrate considerably higher rates of CS. A 2024 systematic review and meta-analysis involving 26 studies and more than 600,000 women reported a pooled CS prevalence of 24.0% (95% CI: 22–27%) across Eastern African countries. The pooled prevalence was highest in Ethiopia at 28.3% and lowest in Uganda at 11.9% [4].

The same regional review identified several factors associated with increased likelihood of caesarean delivery. These included urban residence, higher household wealth, higher maternal educational level, advanced maternal age, previous CS, high birth weight, delivery in private health facilities, multiple pregnancy, pregnancy-induced hypertension, antepartum haemorrhage, and fetal malpresentation. These findings demonstrate that both clinical and sociodemographic characteristics contribute to variation in CS rates in Eastern Africa [4].

Globally, the caesarean section rate increased substantially from about 7% of births in 1990 to 21.1% in 2018. In 2018, the estimated rate was 9.2% in Africa, compared with 23.1% in

Asia, 25.7% in Europe, and 42.8% in Latin America and the Caribbean [3]. These differences reflect variation in access to obstetric services, maternal and fetal characteristics, socioeconomic conditions and healthcare practices.

In Eastern Africa, caesarean section rates also vary considerably between countries and healthcare settings. A recent systematic review and meta-analysis reported a pooled prevalence of approximately 24% among women giving birth in Eastern African countries, with previous caesarean section, advanced maternal age, multiple pregnancy, hypertensive disorders, fetal malpresentation and other obstetric complications identified among important associated factors

2.3 Local

In Sudan, caesarean section rates have increased over time. A

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nationwide analysis of Sudan Multiple Indicator Cluster Survey data from 2006, 2010 and 2014 demonstrated that the overall CS rate increased from 4.3% in 2006 to 6.7% in 2010 and 9.1% in 2014. The study also demonstrated substantial geographical variation. The Northern region had among the highest reported CS rates, ranging from approximately 7% to 25%, whereas Darfur had much lower rates of approximately 2–3% [6].

Among singleton births in the 2014 Sudan survey, the overall CS prevalence was 8.9%. However, the rate was considerably higher in the Northern region, reaching approximately 25.1%, compared with 20.4% in Khartoum. This finding is particularly relevant to the present study [6].

3. Materials & Methods

3.1. Study Design

An analytical cross-sectional hospital-based study will be conducted.

3.2. Study Area

The study will be conducted at Dongola Maternity Hospital in Dongola City, Northern State, Sudan. Dongola is the capital of Northern State and an important healthcare centre serving Dongola and surrounding communities. Dongola Maternity Hospital provides antenatal, intrapartum and postnatal services and receives women from Dongola and surrounding areas. Previous research at the hospital documented 3,674 deliveries during a six-month study period, demonstrating a substantial maternity workload [15].

The hospital will serve as the study setting for identifying eligible women delivering during the study period and for collecting relevant sociodemographic, maternal, obstetric, fetal and delivery information.

3.3. Study Population

The study population will consist of pregnant women admitted to and delivering at Dongola Maternity Hospital during the study period

Inclusion Criteria

Pregnant women who deliver at Dongola Maternity Hospital during the study period.

Women with available essential maternal and obstetric information.

Women who consent to participate where primary data are required.

Exclusion Criteria

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Women who are not delivered at Dongola Maternity Hospital.

Records with insufficient essential information for determining the mode of delivery.
Women who decline participation when direct consent is required

3.4. Sample Size

The sample size will be calculated using the single population proportion formula:

$$n = Z^2 p (1 - p) / d^2$$

Where:

n = required sample size

Z = standard normal value at 95% confidence level = 1.96

p = estimated prevalence of caesarean section = 25.1%, based on the reported Northern region estimate in Sudan [3]

d = margin of error = 5% (0.05)

$n = (1.96^2 \times 0.251 \times 0.749) / (0.05^2) \approx 289$

Adding approximately 10% for possible incomplete data/non-response:

289 + 29 ≈ 318 participants.(First 10 participants use for test).

Therefore, the proposed minimum sample size will be approximately 319 women. If the total number of eligible deliveries during the study period is smaller than this number, the sample size will be reviewed according to the actual hospital delivery volume and an appropriate finite-population correction may be applied{16}.

3.5. Sampling Technique

Consecutive sampling will be used. All eligible women delivering at Dongola Maternity Hospital during the study period will be considered consecutively until the required sample size is reached.

3.6. Methods of Data Collection

Data will be collected using a structured data extraction form based mainly on hospital records and maternity registers and direct cases. The study will not depend on a questionnaire for the primary outcome. Information will include maternal sociodemographic

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characteristics, obstetric history, antenatal care, medical conditions, pregnancy characteristics, mode of delivery and indication for caesarean section.

3.7. Study Variables

Dependent Variable

Mode of delivery: caesarean section or vaginal delivery.

Prevalence of caesarean section: number of caesarean deliveries divided by total eligible deliveries × 100.

Independent Variables

Maternal age

Residence (urban/rural)

Educational level

Occupation

Gravidity

Parity

Previous caesarean section

Previous abortion or miscarriage

Number of antenatal care visits

Gestational age at delivery

Multiple pregnancy

Fetal presentation

Hypertensive disorders of pregnancy

Diabetes mellitus/gestational diabetes

Antepartum haemorrhage

Placenta previa

Previous uterine surgery

Fetal distress

Suspected macrosomia

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Other documented obstetric or maternal indications

3.8. Data Analysis

The collected data will be checked for completeness, coded and entered into SPSS for analysis. Descriptive statistics will be presented as frequencies and percentages for categorical variables and as appropriate summary measures for continuous variables. The prevalence of caesarean section will be calculated as the proportion of caesarean deliveries among all eligible deliveries.

3.9. Ethical Considerations

Ethical clearance will be obtained from the relevant Dongola University/Faculty of Medicine and Health Sciences and health authorities before commencement of the study. Permission will be obtained from Dongola Maternity Hospital. Confidentiality of participants' information will be maintained, and data will be used only for research purposes. Where direct participation or access to identifiable information requires consent, informed consent will be obtained according to the approved protocol.

3.10. Research Plan and Time-line

No.	Activity	Duration
1	Submission of Research Proposal	20–24 Sept 2026
2	Presentation of Research Proposal	27 Sept–01 Oct 2026
3	Data Collection	04–22 Oct 2026
4	Data Analysis	25 Oct–05 Nov 2026
5	Writing of Results and Discussion	08–19 Nov 2026
6	**Writing of Final Report**	**22 Nov–03 Dec 2026**
7	Submission of Research	06–10 Dec 2026
8	Research Judgement	13–24 Dec 2026
9	Research Modification	27–31 Dec 2026
10	Research Discussion	03–04 Jan 2027

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3.11. Budget Breakdown

Item	Estimated Cost (SDG)
Printing and data collection forms	150.000
Transportation	100.000
Data collection and communication	50.000
Data entry, analysis and stationery	100.000
Training and field materials	100.000
Contingency	70.000
Total	570.000

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