بسم الله الرحمن الرحيم

University of Dongola
Faculty of Medicine and Health Sciences

Department of Community Medicine

Research Proposal on:

Knowledge, Attitudes, and Practices Regarding Calcium Supplementation among Pregnant Women in Dongola Maternity Hospital, 2026

A Proposal Submitted in Partial Fulfillment for the Requirements of the Degree of Bachelor of Medicine & Bachelor Surgery (MBBS)

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1. Introduction

1.1 Background

Pregnancy is a period of increased nutritional demand, and adequate calcium intake is important for fetal skeletal development and maternal health. Calcium requirements and absorption increase as pregnancy progresses, particularly during the second and third trimesters. When dietary intake is inadequate, supplementation may help meet maternal and fetal needs and support healthy pregnancy outcomes (1).

Calcium supplementation has received particular attention because of its role in preventing hypertensive disorders of pregnancy, including gestational hypertension and pre-eclampsia. Evidence from systematic reviews and clinical studies indicates that calcium supplementation can reduce the risk of pre-eclampsia, with the greatest benefit observed among pregnant women whose usual dietary calcium intake is low and among those at increased risk of hypertension (2). Supplementation may also reduce serious maternal complications and may contribute to lower rates of preterm birth and low birth weight, although the magnitude of benefit can vary according to the population, baseline calcium intake, dose, and adherence (3).

The World Health Organization recommends 1.5–2.0 g of elemental calcium daily for pregnant women in populations where dietary calcium intake is low. The recommended dose is generally divided into several administrations to improve tolerance and absorption and is prescribed according to national antenatal-care guidance. Calcium should also be appropriately scheduled in relation to iron supplements because taking the two supplements together may reduce iron absorption. For this reason, clear instructions from healthcare providers are essential (4). Emerging studies are examining lower-dose or simplified calcium regimens

because they may be easier for pregnant women to follow; however, these approaches should be interpreted in accordance with current national and international recommendations (5).

Several factors may affect calcium-supplementation practices. Women may forget multiple daily doses, experience nausea, constipation, abdominal discomfort, or difficulty swallowing tablets, or face problems related to cost and irregular availability. Confusion about the timing of calcium and iron tablets can also reduce correct use. In addition, beliefs within the family or community and insufficient counseling by healthcare professionals may influence attitudes and adherence (6). Research from low-resource settings suggests that structured education, simplified instructions, supportive counseling, and involvement of family or adherence partners may improve supplement use (5).

Therefore, assessing knowledge, attitude, and practice regarding calcium supplementation during pregnancy is important for identifying gaps between recommendations and actual behavior. Such findings may guide targeted antenatal education, improve counseling about dose and timing, and support interventions designed to increase appropriate calcium use and promote maternal and fetal health.

1.2 Problem Statement

In an ideal antenatal-care system, pregnant women would receive comprehensive counseling on nutrition and the safe use of calcium supplements, including their benefits, timing, side effects, and interaction with iron. However, antenatal care in resource-limited settings such as Sudan may give limited attention to nutritional counseling and monitoring of supplement use, resulting in inadequate knowledge, misconceptions, and poor adherence among pregnant women. These challenges may increase the risk of calcium-related maternal and fetal complications. Therefore, assessing pregnant women’s knowledge, attitudes, practices, and associated factors

regarding calcium supplementation is essential for strengthening antenatal education and improving maternal and fetal health outcomes

1.3 Justification

Calcium supplementation is an essential component of antenatal care, supporting maternal health and fetal skeletal development. However, its benefits may be limited by inadequate knowledge, unfavorable attitudes, poor adherence, incorrect timing, and potential interactions with iron supplements. In Sudan, calcium-supplementation practices may also be influenced by sociocultural beliefs, family support, access to antenatal care, supplement availability, cost, and the quality of healthcare counseling. Despite its importance, limited evidence exists regarding pregnant women's knowledge, attitudes, and practices toward calcium supplementation in the study area. Therefore, this study will address this gap and generate locally relevant evidence to strengthen antenatal education, improve supplementation practices, and support the prevention of maternal and fetal complications.

1.4 Research Objectives

- General Objective:

  To assess the knowledge, attitudes, and practices regarding calcium supplementation among pregnant women attending Dongola Obstetric Hospital, Sudan, 2026.

- Specific Objectives:
  - To assess the relationship between pregnant women's knowledge and their sociodemographic characteristics.
  - To assess the relationship between pregnant women's practices and their sociodemographic characteristics.
  - To assess the relationship between pregnant women's attitudes and their sociodemographic characteristics.

- To examine the relationship between knowledge, practices, and attitudes toward calcium during pregnancy

1.5 Research Questions

1. What is the level of knowledge, attitude, and practice regarding calcium supplementation among pregnant women attending Dongola Obstetric Hospital, Sudan, 2026?
2. What is the relationship between pregnant women's knowledge of calcium supplementation and their sociodemographic characteristics?
3. What is the relationship between pregnant women's practices regarding calcium supplementation and their sociodemographic characteristics?
4. What is the relationship between pregnant women's attitudes toward calcium supplementation and their sociodemographic characteristics?
5. What is the relationship between pregnant women's knowledge, attitudes, and practices regarding calcium supplementation during pregnancy?

2. Literature Review

Calcium supplementation is an important component of antenatal care, particularly in populations where dietary calcium intake is low. Calcium supports fetal skeletal development and maternal physiological functions, while supplementation during pregnancy has been recommended to reduce the risk of preeclampsia and related hypertensive disorders (7).

Despite these recommendations, evidence indicates that pregnant women's knowledge, attitudes, and practices regarding calcium supplementation remain inadequate in many low- and middle-income countries. A 2019 study conducted among 300 pregnant women attending Benha University Hospital in Egypt found low knowledge regarding the importance of calcium for fetal development and poor practices related to calcium intake and supplementation. The study recommended strengthening antenatal health education and improving access to calcium supplements. These findings suggest that awareness of calcium's importance for the mother may not necessarily translate into adequate knowledge about fetal benefits or appropriate supplementation practices (8).

Social and family support may play an important role in improving adherence. A 2016 study conducted in Kenya and Ethiopia found that adherence partners, particularly husbands and other family members, could help pregnant women remember to take calcium and iron–folic acid supplements (9). Similarly, a 2017 study among 1,036 pregnant women attending 16 government health facilities in Kenya reported that social support was associated with improved adherence to calcium and iron–folic acid supplementation. These findings highlight the importance of involving partners and families in antenatal education and supplementation-support strategies (5).

More recent evidence from Tanzania has provided further insight into the acceptability and practical challenges associated with calcium supplementation. A 2024 study in Dar es Salaam reported generally positive attitudes toward calcium supplementation among pregnant women and healthcare providers. However, adherence remained limited, with a median adherence of 71.3%; only 24.0% of women took at least 90% of the expected doses. Reported barriers included tablet size, perceived side effects, forgetting doses, and the burden of taking calcium several times per day. These findings demonstrate that positive attitudes alone may be insufficient to ensure optimal adherence when supplementation is inconvenient or poorly supported (6).

Evidence from Cameroon also indicates a gap between the use of calcium supplements and compliance with recommended regimens. A 2023 cross-sectional study among 1,074 pregnant women found that 72.6% reported taking calcium supplements at some point during pregnancy, but only 12% used them throughout pregnancy. Women commonly associated calcium supplementation with fetal growth and prevention of cramps, whereas very few recognized its role in preventing hypertensive disorders. Early antenatal-care initiation, attending more antenatal visits, and receiving partner support or reminders were significantly associated with calcium supplementation. These findings suggest that the timing and continuity of antenatal care, accurate health education, and family involvement may influence supplementation practices (10).

The broader evidence also shows that calcium supplementation is particularly relevant in low-resource settings. A systematic review reported that calcium supplementation may reduce the risk of hypertensive disorders of pregnancy, especially among women with low baseline calcium intake. However, the effectiveness of supplementation depends on correct dosing, regular use, adequate counseling, and integration into routine antenatal services (11).

Although existing studies have examined calcium-related knowledge, acceptability, adherence, or social support in Egypt, Ethiopia, Kenya, Tanzania, and Cameroon, evidence from Sudan remains limited. In addition, few studies have assessed knowledge, attitudes, and practices together while also examining the social, healthcare, and behavioral factors associated with calcium-supplementation practices. Therefore, the proposed study will address this gap by assessing KAP regarding calcium supplementation among pregnant women in the selected Sudanese setting and identifying factors that may influence appropriate and consistent use.

3.Methodology

3.1 Study Design

A descriptive cross-sectional hospital-based study will be conducted at Dongola Maternity Hospital during October and November 2026.

3.2 Study Area and Setting

The study will be conducted at Dongola Maternity Hospital, Dongola, Northern State, Sudan. Dongola is the capital of Northern State in Sudan. It lies on the west bank of the Nile River, about 278 miles (448 km) northwest of Khartoum. The town is an agricultural center for the surrounding area, which produces cotton, wheat, barley, sugarcane, and vegetables. Dongola is linked by road with Wadi Halfa and Merowe and has a domestic airport.

3.3 Study Population

The study population will consist of pregnant women attending the antenatal care clinic at Dongola Obstetric Hospital during the study period.

3.3.1 Inclusion Criteria

Pregnant women at any gestational age

3.3.2 Exclusion Criteria

Seriously ill pregnant women unable to participate, or women with communication difficulties that prevent completion of the questionnaire.

3.4 Sample Size

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

$$n = Z^2pq / d^2$$

Where: **n** = required sample size, **Z** = 1.96 for a 95% confidence level, **p** = assumed proportion of patients with a good doctor–patient relationship (0.50, since no appropriate local previous study was identified), and **d** = margin of error (0.05).

After accounting for a 10% non-response rate, the adjusted sample size was calculated as: n-final = 384 / (1 − 0.10) = 427

3.5 Sampling Technique

Due to time and resource limitations, a convenience sampling technique will be used to recruit eligible pregnant women attending Dongola Maternity Hospital during the data-collection period. Participants will be enrolled based on their availability, willingness to participate, and provision of verbal consent until the required sample size is achieved. However, the non-random nature of this technique may limit the generalizability of the findings.

3.6 Methods of Data Collection

Data will be collected using a structured, interviewer-administered questionnaire. The questionnaire will include socio-demographic characteristics, obstetric information, and questions assessing knowledge, attitudes, practices, and barriers regarding calcium supplementation.

3.7 Study Variables

The dependent variables were knowledge, attitudes, and practices regarding calcium supplementation during pregnancy. The independent variables were age, educational level, occupation, monthly household income, residence, gravidity, parity, gestational age, and antenatal care attendance.

3.8 Data Analysis

Collected data will be checked for completeness, coded, entered into and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26 or higher. Descriptive statistics will be used to summarize data including frequencies, percentages, means, and standard deviations for socio-demographic characteristics. Chi-square test will be used to assess associations between categorical variables. A p-value <0.05 will be considered statistically significant.

3.9 Ethical Considerations

Ethical approval will be obtained from the Department of Community Medicine, Faculty of Medicine and Health Sciences, University of Dongola, the State Ministry of Health, and the Research and Quality Control Office of Dongola Maternity Hospital. Verbal consent will be obtained from all participants. Participation will be voluntary, and confidentiality and privacy of participants' information will be maintained.

4. Study plan

	September	October	November	December	January
proposal preparation					
Data collection					
Analysis					
report writing					
Publication					

5. The budget

Items	SD
Questionnaire	120.000
Stationery	50.000
Transportation	100.000
Data analysis	100.000
Printing	150.000
Internet/data	60.000
Binding costs	580.000

6. References

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