UNIVERSITY OF DONGOLA

College of Medicine and Health Sciences

RESEARCH PROPOSAL

Factors Associated with Incomplete Routine Childhood Immunization Among Children Under Five Years in Dongola Locality, Northern State, Sudan: A Cross-Sectional Study, 2026

Prepared by: _____

Supervisor: _____

Department: _____

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1. Introduction / Background

Routine childhood immunization is one of the most effective public-health interventions for preventing childhood morbidity, disability, and mortality caused by vaccine-preventable diseases. High and timely vaccination coverage is essential for maintaining individual and community protection, particularly among children under five years of age. Despite the availability of effective vaccines, some children do not receive all recommended routine vaccine doses or do not receive them at the recommended ages. These children are commonly described as having incomplete or delayed immunization.

2. Problem Statement

Incomplete routine childhood immunization remains an important public-health concern because children who miss recommended doses may remain susceptible to vaccine-preventable diseases. Several factors may contribute to incomplete vaccination, including caregiver knowledge and attitudes, accessibility of health services, distance to vaccination facilities, availability of vaccines, service organization, socioeconomic circumstances, and missed opportunities for vaccination. Local evidence is needed to identify the factors associated with incomplete routine immunization in Dongola Locality so that appropriate interventions can be planned and implemented.

3. Justification / Rationale

Understanding the factors associated with incomplete routine childhood immunization in Dongola Locality can help health authorities and healthcare workers identify barriers to vaccination and improve immunization services. The findings may support targeted health education, improved follow-up of children who miss appointments, better communication with caregivers, and strengthening of routine immunization delivery. The study may also provide baseline information for future research and local immunization planning.

4. General Objective

To identify the factors associated with incomplete routine childhood immunization among children under five years in Dongola Locality, Northern State, Sudan, in 2026.

5. Specific Objectives

1. To determine the proportion of children under five years with incomplete routine childhood immunization in the study area.
2. To assess caregivers' knowledge and attitudes regarding routine childhood immunization.
3. To identify sociodemographic factors associated with incomplete childhood immunization.
4. To assess health-service and accessibility factors associated with incomplete immunization.
5. To identify common reasons reported by caregivers for missed or delayed vaccination doses.

6. Research Questions

1. What proportion of children under five years have incomplete routine childhood immunization in Dongola Locality?
2. What caregiver-related factors are associated with incomplete immunization?
3. What sociodemographic factors are associated with incomplete immunization?

4. What health-service and accessibility factors are associated with incomplete immunization?
5. What are the most commonly reported reasons for missed or delayed vaccination doses?

7. Literature Review

Previous studies from different settings have reported that childhood immunization completion can be influenced by caregiver education and knowledge, household socioeconomic conditions, place of residence, distance and transportation to health facilities, vaccination schedules, availability of services, and caregiver perceptions of vaccine safety and effectiveness. Missed appointments and inadequate follow-up can also contribute to incomplete vaccination. However, the relative importance of these factors varies between populations and health systems. Therefore, a local assessment in Dongola Locality is important to identify the factors most relevant to the local context.

8. Methodology

Study design: A community- or health-facility-based analytical cross-sectional study will be conducted.
Study area: Dongola Locality, Northern State, Sudan.
Study period: The study will be conducted during 2026 according to the approved research timetable.
Study population: Children under five years of age residing in Dongola Locality and their caregivers.
Study unit: The child-caregiver pair will constitute the primary study unit.
Inclusion criteria: Children under five years who are residents of the study area and whose caregivers provide consent to participate. Immunization records will be reviewed where available.
Exclusion criteria: Caregivers who decline participation and children whose vaccination status cannot reasonably be assessed according to the study protocol.
Sampling technique: A suitable probability sampling technique will be selected according to the available sampling frame and study setting.
Sample size: The sample size will be calculated using an appropriate formula for estimating a proportion, with assumptions based on available evidence, desired precision, confidence level, and allowance for non-response.

9. Data Collection

Data will be collected using a structured interviewer-administered questionnaire. The questionnaire will include sections on caregiver sociodemographic characteristics, child characteristics, vaccination history, caregiver knowledge and attitudes, access to immunization services, and reasons for missed or delayed doses. Where available, vaccination cards or relevant health records will be reviewed to verify vaccination status. The questionnaire will be pretested in a comparable setting and revised before final data collection.

10. Study Variables

Dependent variable: Completeness of routine childhood immunization (complete/incomplete according to the immunization schedule and operational definition adopted for the study).
Independent variables: caregiver age, education, occupation, marital status, place of residence, household characteristics, caregiver knowledge and attitudes, distance to health facility, transportation, waiting time, availability of vaccination services, vaccine availability, previous adverse

events following immunization, appointment reminders, and other relevant factors identified from the literature.

11. Data Analysis

Collected data will be checked for completeness and consistency, coded, and entered into an appropriate statistical software package. Descriptive statistics will be used to summarize the study population. Frequencies and percentages will be presented for categorical variables, while appropriate measures of central tendency and dispersion will be used for numerical variables. Associations between incomplete immunization and explanatory variables will be assessed using appropriate statistical tests. A significance level of 0.05 will be used. Where appropriate, multivariable analysis will be performed to identify factors independently associated with incomplete immunization.

12. Ethical Considerations

Ethical approval will be obtained from the relevant institutional authority before commencement of the study. Permission will be sought from the appropriate local health authorities. Informed consent will be obtained from caregivers before participation. Participation will be voluntary, and participants will have the right to withdraw at any time without affecting their access to health services. Confidentiality and privacy will be maintained, and data will be used only for the stated research purposes.

13. Expected Results

The study is expected to determine the magnitude of incomplete routine childhood immunization among children under five years in Dongola Locality and identify caregiver, sociodemographic, accessibility, and health-service factors associated with incomplete vaccination. The findings may help guide locally appropriate interventions to improve vaccination completion and reduce missed opportunities for immunization.

14. Limitations

Potential limitations may include recall bias when caregivers report previous vaccination events, incomplete availability of vaccination cards, and the cross-sectional design, which limits the ability to establish temporal causality. These limitations will be minimized through verification of vaccination records where possible, standardized data collection, and careful questionnaire design.

15. Work Plan

The proposed work plan will include: literature review and proposal development; ethical approval and administrative permissions; questionnaire development and pretesting; data collection; data entry and cleaning; statistical analysis; interpretation of findings; report writing; and dissemination of results.

16. Budget

The budget will be prepared according to the actual requirements of the study and may include transportation, printing and photocopying, stationery, communication, data collection materials, data entry/analysis, and other approved research expenses.

17. References

1. World Health Organization. Immunization, Vaccines and Biologicals. World Health Organization.
2. World Health Organization. WHO recommendations for routine immunization – summary tables. World Health Organization.
3. UNICEF. Immunization: protecting children from vaccine-preventable diseases. United Nations Children’s Fund.
4. Relevant national and state immunization guidelines and reports from the Sudan Expanded Programme on Immunization should be reviewed and incorporated in the final protocol.
5. Recent peer-reviewed studies on determinants of incomplete or delayed childhood immunization should be added after a systematic literature search.