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Protocol for the assessment of child malnutrition status using World Health Organization standard measurements in Niger State East Senatorial District, Nigeria

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Zullaihat Muhammad Abdullahi¹, Michael O Otutu¹, Ezekiel U Nwose^{1,2}

¹Public & Community Health Department, Novena University, Ogume Nigeria;

²University Of Southern Queensland, Toowoomba Australia

Zullaihat Muhammad Abdullahi: PhD Scholar & PI;



Ezekiel U Nwose

University Of Southern Queensland

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Abstract

This article presents the methodological framework that was utilized to explore the relationship between 'maternal knowledge and practices' versus the 'nutritional status of under-five children' in Niger East Senatorial District, Nigeria. The purpose of this study is to assess malnutrition status among children (0-59 months old) using the standard measures of World Health Organization

Introduction

- 1 Malnutrition has been known for over a thousand years (Truswell, 1981; Vega-Franco, 1999). In 2006, the global health of under-5 children came under further spotlight (WHO Multicentre Growth Reference Study Group, 2006; World Health Organization, 2006). Six countries from South Asia and Sub-Saharan Africa are speculated to account for the highest under-5 mortality rate globally, with reports that India and Nigeria alone contribute about 32% of this global burden (UNICEF et al., 2017). According to World Health Organization, over 140million are stunted, 47million are wasting, and about 38million are overweight. About 80% of global under-five deaths occur sub-Saharan Africa and Southern Asia, which includes the top six countries that account for about 50% of the global child deaths (UNICEF et al., 2017). Importantly, food security is an attributed factor (FAO et al., 2021).
The impact of malnutrition can be colossal. Figure 1 provides a glimpse of the epidemiology in Nigeria compared to the health issue at the global level. Therefore, there is need further public health research to generate empirical data, which can be used to advocate for improved health services aimed at reducing malnutrition (Bhutta et al., 2013). Figure 2 indicates the conceptual summary for how malnutrition is assessed by the fundamental underpinnings of its symptoms of overweight, stunting and wasting.

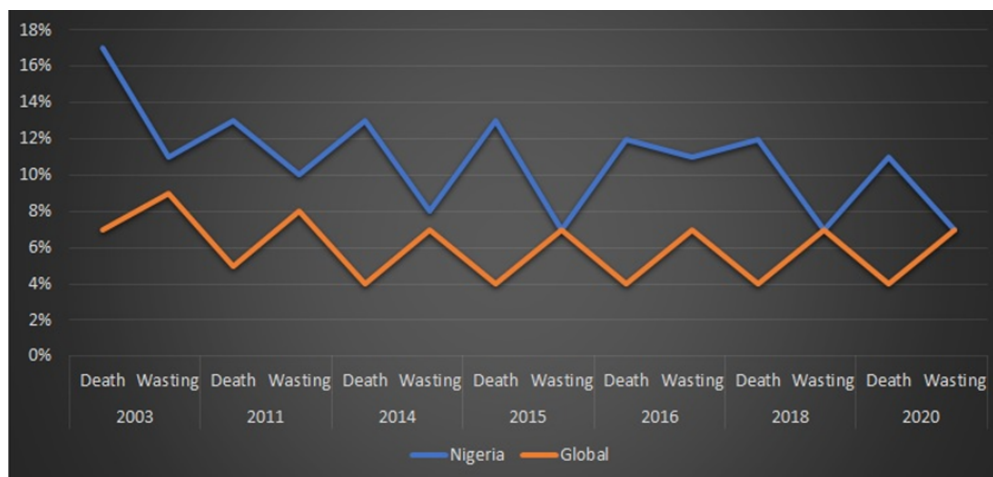


Fig 1: Prevalences of some malnutrition symptoms in Nigeria relative to global level (IHME & Global Burden of Disease, 2024)

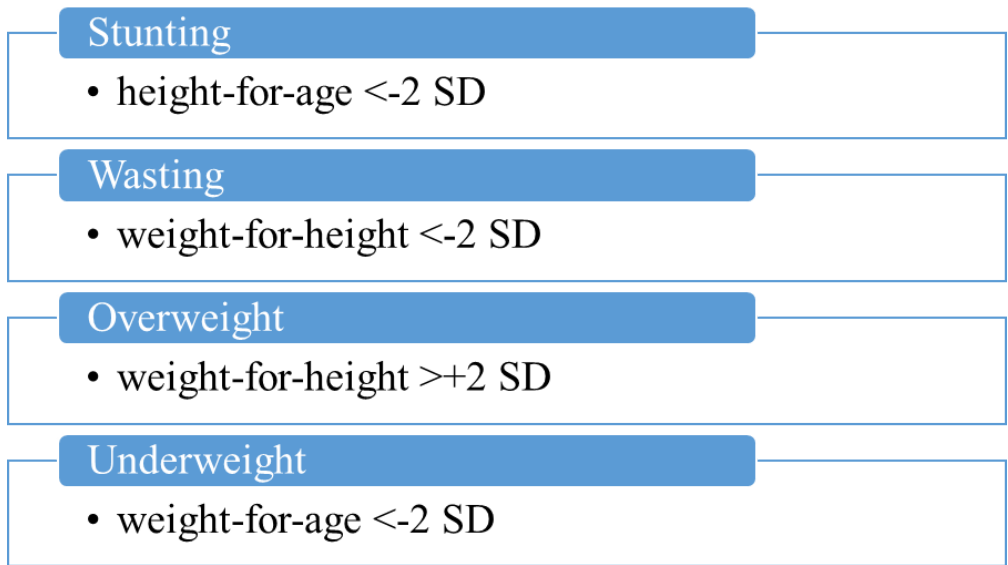


Fig 2: Concept of malnutrition and associated symptoms (World Health Organization, 2006)

Research objectives and hypotheses

2

SN	Specific objectives	Research questions	Hypothesis
1	Assess parental knowledge, attitudes and practices related to child nutritional status	What is the knowledge, attitudes, and practices of parents regarding the nutritional status and growth of their children?	Care givers with higher knowledge, attitude and practices have children with better nutritional outcomes
2	Determine nutritional status of children 0-59 months by anthropometric measurements	What is the nutritional status of children aged 0-5 years based on anthropometric measurements (height, weight, and mid-upper arm circumference)?	Children nutritional status is significantly influenced by socioeconomic and care giving practices
3	Evaluate socioeconomic factors associated with malnutrition in children 0-5 years	Which socioeconomic factors among parents show significant association with malnutrition outcomes in children 0-5 years?	Higher economic status is associated with better nutritional outcome for children
4	Assess caregivers' perception and knowledge regarding nutritional status of children 0-5 years by anthropometric measurements	How do caregivers perceive their child nutritional status compared to the actual measurement	There is a significant discrepancy between caregivers' perception and the actual nutritional status of their children
5	Examine the relationship between parental socioeconomic status, feeding practices, and nutritional status	What linkages exist between parental socioeconomic status, feeding practices, and nutritional status?	Socioeconomic status and feeding practices significantly predict children's nutritional status

Table 1: Research specific objectives and associated hypothesis

Methodology

3 This research employs a cross-sectional survey design, a widely recognized methodology in public health research due to its effectiveness in examining the relationships between various factors at a single point in time. Cross-sectional studies are observational in nature, enabling the collection of data from a target population without altering the conditions under study. This approach is particularly useful when the aim is to assess the prevalence of conditions, behaviors, or knowledge within a population and explore associations between multiple variables (Farewell & Farewell, 2016; Mann, 2003; Song & Chung, 2010).

A cross-sectional design was chosen for this study as it provides a "snapshot" of the current state of maternal knowledge, feeding practices, and the nutritional status of under-five children in the Niger East Senatorial District. Given the research's aim to identify factors influencing child malnutrition in both urban and rural settings, this design is ideal for capturing data on a wide range of variables such as socioeconomic status, maternal education, and healthcare access, all of which play significant roles in determining child nutrition outcomes (Levin, 2006). This approach is cost-effective and time-efficient, making it suitable for a large population spread across different geographical areas within a defined timeframe.

One of the key advantages of the cross-sectional design is that it allows for the identification of associations between different variables, such as the link between maternal knowledge and child nutritional outcomes, or the impact of breastfeeding practices on child growth and development. Although cross-sectional studies do not establish causality, they are instrumental in identifying patterns and generating hypotheses that can be explored further in longitudinal studies (Setia, 2016). For instance, this study can highlight potential risk factors for malnutrition, which can later inform intervention strategies or more in-depth studies.

The cross-sectional design is also appropriate in the context of public health challenges like malnutrition, where time-sensitive data is often required to inform policy decisions and community health interventions. As malnutrition among children remains a pressing issue in Nigeria, particularly in regions like Niger State, a cross-sectional study enables the rapid collection of data that can be immediately utilized for public health planning and resource allocation (Creswell & Hirose, 2019; Setia, 2016). Furthermore, the survey design supports the use of both quantitative and qualitative data collection methods, such as structured questionnaires and focus group discussions, providing a holistic understanding of the research problem.

The use of a cross-sectional design is further supported by the fact that it allows for the collection of data from a large sample size, enhancing the generalizability of the findings. This is particularly important for a study like this, which seeks to explore maternal knowledge and child nutrition across multiple Local Government Areas in Niger East Senatorial District. By capturing data from diverse socioeconomic and geographic contexts, the study can provide a more comprehensive understanding of child nutrition in the region (von Hippel et al., 2003).

Finally, cross-sectional surveys are well-suited for addressing a variety of research objectives. In this study, the design allows for the simultaneous exploration of several objectives, such as assessing the level of maternal knowledge, analyzing feeding practices, and determining the nutritional status of children using World Health Organization standards (World Health Organization, 2006). This comprehensive approach aligns with recommendations in public health research, which emphasize the importance of understanding multiple determinants of health simultaneously (Aschengrau & Seage, 2020).

In summary, the cross-sectional survey design is highly appropriate for this study as it allows for the efficient and effective examination of the complex relationships between maternal knowledge, child-feeding practices, and nutritional outcomes. It provides a robust framework for exploring associations and identifying key variables that influence child malnutrition, thus contributing valuable data that can inform targeted interventions and policy decisions in Niger State.

The Protocol

4 **Study design:** Table 2

SN	Specific objectives	Designs	Dataset	Statistics
1	Assess parental knowledge, attitudes and practices related to child nutritional status	Descriptive	B	Frequencies, & prevalences
2	Determine nutritional status of children 0-59 months by anthropometric measurements	Descriptive	C	Frequencies & Crosstabs/Chi-square
3	Evaluate socioeconomic factors associated with malnutrition in children 0-5 years	Descriptive	D	Prevalence
4	Assess caregivers' perception and knowledge regarding nutritional status of children 0-5 years by anthropometric measurements	Cross-sectional	C	Crosstabs/Chi-square
5	Examine the relationship between parental socioeconomic status, feeding practices, and nutritional status	Correlation	E	Pearson's correlation + logistic regression

Table 2: Specific research objectives and statistical designs

Study Population: The study population consists of under-five children and their mothers or caregivers residing in Niger East Senatorial District. The district comprises eight Local Government Areas: Bosso, Paikoro, Gurara, Tafa, Chanchaga, Shiroro, Muya, and Rafi. However, due to insecurity in Shiroro, Muya, and Rafi, data collection was limited to five LGAs: Bosso, Paikoro, Gurara, Tafa, and Chanchaga. The inclusion of both urban and rural areas ensures a comprehensive understanding of child nutrition across different socioeconomic environments, in line with recommendations by the World Health Organization (World Health Organization, 2006).

The population size was substantial, with the selection of participants reflecting a wide spectrum of socioeconomic backgrounds, educational levels, and access to healthcare services. This diversity allows for a more accurate representation of the district's nutritional and health dynamics.

Recruitment: Figure 3

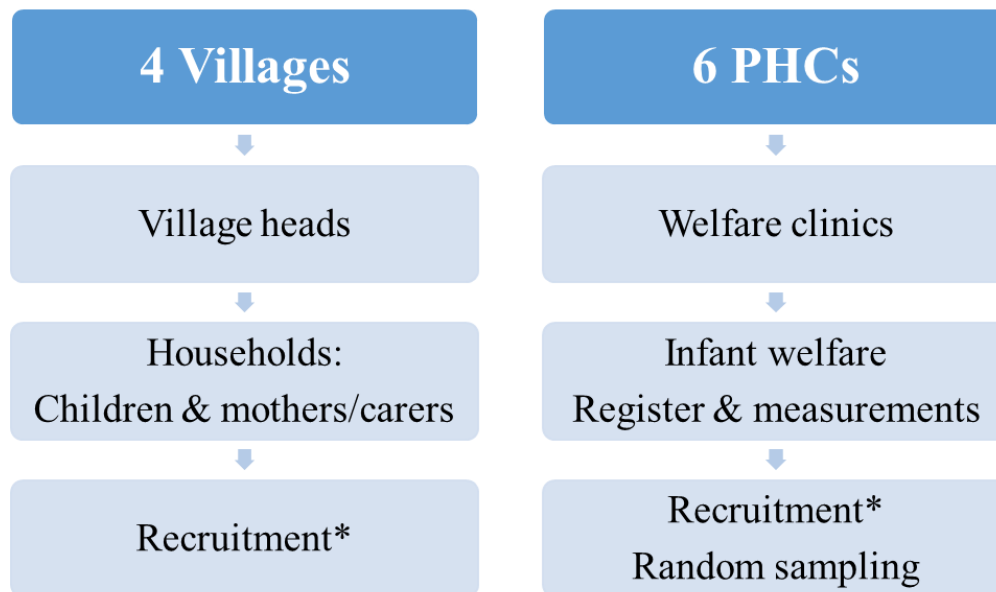


Fig 3: Dynamic flowchart of recruitment process from 2 sites Keys: PHC – primary healthcare center; *After ethical clearance and consent of the carer/parents

Sampling Technique: A multistage sampling technique was employed to select the participants, ensuring that the study's sample was representative of the population while addressing logistical constraints. This method involved the following stages:

1. Stratified Sampling: The district was stratified into its eight LGAs, but due to insecurity, data collection was restricted to Bosso, Paikoro, Gurara, Tafa, and Chanchaga. These LGAs represent both urban and rural communities, ensuring geographical diversity (Aday & Cornelius, 2006).
2. Simple Random Sampling: Six primary health care (PHC) centers were randomly selected within each LGA. These centers serve as focal points for health and nutrition services, providing a reliable starting point for participant recruitment.
3. Systematic Sampling: Within the selected PHCs, 100 participants were systematically selected to ensure that every n th household in the surrounding settlements was included. This method minimizes selection bias and ensures a representative sample of the population (Etikan et al., 2016; Suen et al., 2014).

Data Collection Procedure: Data collection was conducted by trained field workers, who followed standardized procedures for administering questionnaires and taking anthropometric measurements. The fieldworkers were trained in line with WHO

guidelines on anthropometry, ensuring accuracy and consistency in data collection (World Health Organization, 2006). The following steps were taken:

- Questionnaire administration: The structured questionnaires were administered in face-to-face interviews. Mothers or caregivers responded to questions about their knowledge and practices regarding child nutrition.
- Anthropometric measurements: Children's height, weight, and MUAC were measured using calibrated equipment to ensure precision. These measurements were used to assess the nutritional status of the children, with results compared to the WHO growth standards.
- Focus Group Discussions (FGDs): FGDs were conducted with a subset of participants to gain qualitative insights into maternal beliefs and practices regarding child feeding. This provided contextual understanding to complement the quantitative data.

Participants (Exclusion and Inclusion Criteria): The target participants were mothers or caregivers of children under five years of age. The selection criteria were as follows:

- Inclusion criteria: Children aged 0–59 months; Mothers or primary caregivers who had resided in the selected LGAs for at least six months; and Mothers or caregivers willing to provide informed consent for participation.
- Exclusion criteria: Children outside the 0–59 months age bracket; Mothers or caregivers who had resided in the area for less than six months; and Respondents who were unwilling or unable to provide informed consent or complete the survey.

Sampling Procedure and Sample Size: The sample size for this study is determined to be N=384, using the Cochran formula for sample size calculation in a cross-sectional study (Etikan et al., 2016). To account for potential incomplete data, the sample size was discretionarily increased to 600 respondents, ensuring a robust dataset. This is consistent with public health research standards that recommend oversampling to reduce bias and enhance the statistical power of the analysis (Ogungbenro & Aarons, 2008).

Data collection instruments included:

- Structured questionnaire: A validated questionnaire, adapted from similar studies on maternal and child health (World Health Organization, 2006), was used to gather data on maternal knowledge, child-feeding practices, and anthropometric measures. The questions were close-ended and structured using Likert Scales for ease of quantitative analysis.
- Anthropometric measurements: Children's height, weight, and mid-upper arm circumference (MUAC) were measured using standardized procedures. These anthropometric indices are reliable indicators of malnutrition (de Onis et al., 2012).

Validity and Reliability: To ensure the validity and reliability of the instruments, the questionnaire was validated through a pilot study and by subject matter experts in

child health and nutrition. Face and content validity were ensured by cross-referencing with existing validated tools (World Health Organization, 2006). Reliability was assessed through the Cronbach's alpha test, which measured the internal consistency of the knowledge and practice scales, ensuring that the results are reproducible (Kirkwood & Sterne, 2003).

Ethics

- 5 The personal data collections for the study adhered to ethical standards relevant recommendations (WHO Multicentre Growth Reference Study Group, 2006; World Health Organization, 2006). Ethics approval was sought from the Niger State Ministry of Primary Health Care, as well as from Novena University. Informed consent was obtained from all participants before data collection. Participation was voluntary, and respondents were assured of their right to withdraw at any point. Confidentiality was maintained throughout the study, with personal identifiers removed to ensure anonymity.

Conclusion – Significance of the study

- 6 This research is significant in that it provides valuable data on the factors contributing to child malnutrition in Niger East Senatorial District, which can inform targeted interventions. By examining the role of maternal knowledge and practices in child nutrition, the study offers insights that can guide health policies and nutrition programs. The findings can also be used to advocate for enhanced maternal education, better health services, and improved community-based interventions aimed at reducing malnutrition. This would feedforward to contribute towards the broader discourse on child malnutrition in sub-Saharan Africa and aligns with the global effort to meet the Sustainable Development Goal 2 (zero hunger) by 2030.

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