

Influence of Maternal Nutritional Knowledge on Complementary Feeding Practices Among Mothers of Children Aged 6–23 Months in Ulanga District, Tanzania

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Abstract

This study aimed to investigate the influence of maternal nutritional knowledge on complementary feeding practices among mothers of children aged 6–23 months in Ulanga District, Tanzania. A cross-sectional study design was employed to involve a sample of 385 mothers selected through multi-stage sampling (purposive selection of wards followed by systematic household screening). Data were collected using structured questionnaires and 24-hour dietary recalls. The study assessed knowledge levels regarding the timing, frequency, and diversity of feeding, and correlated these with actual practices using World Health Organization (WHO) Infant and Young Child Feeding (IYCF) indicators. Data analysis involved inferential statistics and logistic regression. The findings provide essential data for local health interventions to improve child nutrition in the Morogoro region.

Keywords: Complementary feeding; Maternal nutritional knowledge; Dietary diversity; IYCF indicators; Ulanga District; Tanzania.

Introduction

Complementary feeding is the process of introducing solid, semi-solid, or soft foods when breast milk alone is no longer sufficient to meet the nutritional requirements of infants. This transition typically occurs between 6 and 23 months of age, a period often referred to as the "critical window" for growth. Globally, suboptimal feeding practices contribute significantly to childhood morbidity and mortality. In Tanzania, malnutrition remains a significant challenge. The 2022 Tanzania Demographic and Health Survey (TDHS) indicates that while progress has been made, stunting affects approximately 30% of children under five. In rural districts like Mahenge (Ulanga), the situation is often exacerbated by limited access to diverse foods and a lack of specific nutritional education. Maternal knowledge is a primary determinant of these practices, as mothers are the gatekeepers of household nutrition.

Despite the agricultural potential of the Ulanga District, childhood undernutrition persists. Between 58% and 64% of mothers initiate complementary feeding either too early (before 6 months) or too late, and the foods provided often lack the necessary nutrient density. There is a perceived gap between what mothers know about nutrition and what they actually practice. Currently, there is a lack of localized research in Ulanga that quantifies the statistical association between maternal knowledge and the quality of complementary feeding.

This study was crucial for the Ulanga District as it addresses the root causes of poor child feeding. By understanding the link between knowledge and practice, local governments and non-governmental organizations can create targeted nutrition campaigns based directly on findings, educate local community health workers, partner with village elders and religious leaders to shift cultural feeding norms, and secure international donor grants. The research also supports the Tanzania National Multi-Sectoral Nutrition Action Plan (NMNAP) by providing district-level evidence to guide resource allocation.

The study addressed three main research questions: what is the level of maternal nutritional knowledge regarding complementary feeding in Ulanga District; what

are the current complementary feeding practices among mothers of children aged 6–23 months; and is there a significant association between maternal knowledge and the adequacy of complementary feeding practices? The general objective was to assess the influence of maternal nutritional knowledge on complementary feeding practices among mothers of children aged 6–23 months in Ulanga District. The specific objectives were to determine the level of maternal knowledge on the timing, frequency, and diversity of complementary feeding, and to determine the association between maternal knowledge and feeding practices.

Materials and Methods

Study Area and Design

The study was conducted in Ulanga District, located in the Morogoro Region of Tanzania, which is characterized by its hilly terrain and reliance on subsistence farming. A cross-sectional study design was used to collect data at a single point of time over a period of 4 days.

Study Population and Eligibility Criteria

The study population consisted of mothers or primary caregivers of children aged 6–23 months living in Ulanga District for at least six months. To be included, participants had to be the biological mother or primary caregiver of a child aged 6–23 months, reside in the selected study wards, currently practice complementary feeding, and provide written or verbal informed consent. Healthcare professionals specialized in nutrition or pediatrics were excluded to prevent professional bias from skewing community level data.

Sampling and Sample Size

Using the Kish Leslie formula with an assumed 65% prevalence and a 5% margin of error, the required sample size was calculated as 350 mothers or caregivers. Accounting for a 10% non-response or attrition buffer typical in rural research, the final recommended sample size was determined to be 385 participants. Wards were selected purposively, while systematic household-to-household screening was employed to select individual participants across four distinct wards: Nawenge, Mahenge Town, Uponela, and Upanga. A team of 16 trained data collectors utilized a syste-

matic, household to household screening approach, aiming to interview 5 to 7 eligible mothers per day to ensure comprehensive spatial coverage within each ward. Data quality was maintained by providing a two-day training session to the 16 data collectors. Completed electronic forms on Kobo-Toolbox were reviewed daily by the principal investigator for completeness and consistency before export.

Data Collection Tools and Procedures

The primary data collection instrument was a highly structured, interviewer-administered questionnaire schedule preferred over self-administered forms due to varying literacy levels in the district. The questionnaire was adapted from the standardized WHO/UNICEF Infant and Young Child Feeding (IYCF) indicators to ensure content validity. It was translated into Kiswahili and back-translated to English to preserve conceptual meaning. To ensure clarity, validity, and reliability, the questionnaire was pre-tested in Ifakara Town to identify ambiguous questions, assess logical flow, and gauge interview duration. The composite knowledge scale was evaluated for internal consistency during the pre-test, yielding a Cronbach's alpha coefficient of 0.67, indicating acceptable reliability. Fieldwork was executed after introductions by local leaders to ensure community acceptance. Face to face interviews included a structured questionnaire and a detailed 24-hour dietary recall, requiring approximately 30 to 45 minutes per respondent.

Data Processing and Statistical Analysis

Completed questionnaire schedules were reviewed daily for accuracy and entered into IBM SPSS Statistics version 25. Data cleaning was performed via frequency distributions and cross-tabulations to address missing values and outliers. To evaluate objective I (maternal knowledge levels), a composite knowledge scoring system was developed where correct answers received 1 point and incorrect or "do not know" answers received 0 points. Overall scores were aggregated and stratified into three performance tiers based on Bloom's cut-off points: High Knowledge (80%–100% correct), Moderate Knowledge (60%–79% correct), and Poor

Knowledge (less than 60% correct).

To evaluate objective II (the association between knowledge and practices), binary logistic regression analysis was conducted. Dependent feeding practice indicators (meeting or not meeting minimum dietary diversity and minimum meal frequency) were treated as dichotomous outcomes (Appropriate vs. Inappropriate feeding practice). Before executing the binary logistic regression, multi collinearity among independent variables was assessed using the Variance Inflation Factor (VIF), with all values falling below threshold of 2.00. The goodness of fit of the final multi-variable models was verified using the Hosmer-Lemeshow test, which demonstrated adequate model fit ($p > 0.05$). Categorized maternal knowledge served as the primary independent predictor variable to calculate Odds Ratios (OR) and 95% Confidence Intervals (CI), with statistical significance set at ($p < 0.05$) with 'Poor Knowledge (<60% correct)' designated as the reference category for the independent variable, and 'Inappropriate feeding practice' as the reference for dependent variables.

Ethical Considerations

Ethical approval for this study was granted by the St. Francis university college of health and allied science with reference number of SFUCHAS/IRB/2026/042 on 24th May 2026. Administrative permissions were subsequently secured from Ethical clearance was obtained at the district level, with administrative permissions secured from the Mahenge District Executive Director (DED) and the District Medical Officer (DMO). Introductions were made to the District Commissioner (DC), Village Executive Officers (VEOs), and local leaders. Purpose and voluntary participation were explained in fluent Kiswahili, and participants provided signatures or right thumbprints verified by independent witnesses. Absolute anonymity was maintained by omitting names and tracking households with unique alphanumeric codes, with digital data hosted securely on KoboToolbox and password-protected in SPSS. At the end of each interview, mothers received nutritional counseling as a direct benefit.

Results

Socio-Demographic Characteristics of Participants

The study successfully completed interviews with 385 mothers. Socio-demographic metrics indicated high basic literacy but restricted access to higher education, with 48.6% (n = 188) having primary education as their highest milestone, 38.8% (n = 150) completing secondary education, 9.3% (n = 36) possessing no formal schooling, and only 2.8% (n = 11) attaining a college or university education. The local economy was heavily anchored in informal labor,

where the single largest occupational bracket consisted of *genge* (informal food market) vendors at 44.4% (n = 172), followed by subsistence farmers at 36.7% (n = 142), home-staying mothers at 14.7% (n = 57), and formally employed individuals at 4.4% (n = 17).

Among the infants surveyed, 51.2% (n = 197) were female and 48.8% (n = 188) were male. The infant age group was divided into early infancy (6–11 months) at 43.6% (n = 168) and toddlerhood (12–23 months) at 55.6% (n = 214).

Table 1: Socio-Demographic Characteristics of Sampled Mothers/Caregivers and Infants (N = 385)

Variable	Tier/Category	Frequency (n)	Percentage (%)
Maternal Educational Level	College or university	11	2.8
	Primary education	188	48.6
	Secondary education	150	38.8
	No education	36	9.3
Maternal Occupational Status	Employed (salaried/formal)	17	4.4
	Food vendors (<i>genge</i>)	172	44.4
	Farmers (subsistence)	142	36.7
	Home-staying mothers	57	14.7
Maternal Nutritional Knowledge	High (80%–100% correct)	69	17.8
	Moderate (60%–79% correct)	258	66.9
	Poor (<60% correct)	58	15.1
Infant Gender	Male	188	48.8
	Female	197	51.2
Infant Age Group	6–11 months	168	43.6
	12–23 months	214	55.6

Evaluation of Maternal Knowledge Levels

Maternal nutritional knowledge scores revealed that a clear majority of 66.9% (n = 258) of the mothers pos-

sessed moderate knowledge levels. High knowledge levels were achieved by only 17.8% (n = 69) of respondents, while 15.1% (n = 58) demonstrated poor nutritional knowledge.

Table 2: Logistic Regression Analysis of Feeding Practice Indicators

Feeding Practice Indicator	Adjusted Odds Ratio(aOR) (95% CI)	p-value
Timely introduction (6 months)	3.15 (1.82 – 5.46)	<0.001*
Minimum meal frequency (MMF)	2.42 (1.35 – 4.31)	<0.003*
Minimum dietary diversity (MDD)	4.89 (2.76 – 8.65)	<0.001*

*Note: Statistically significant at p < 0.05.

Complementary Feeding Practices

Data regarding IYCF indicators revealed substantial gaps in dietary quality. Only 27.9% of children met the Minimum Dietary Diversity (MDD) threshold, with tubers, *ugali*, and rice serving as the predominant dietary staples. Minimum Meal Frequency (MMF) was achieved by 59.1% of the sample, while timely food introduction at exactly six months sat at 69.8%.

Logistic Regression and Association Findings

The adjusted logistic regression model demonstrated significant associations between maternal knowledge and infant feeding practices across all three evaluated indicators:

Minimum dietary diversity emerged as the single most powerful predictor of appropriate feeding practices in the study. A child who received a diverse diet was 4.89 times more likely to achieve a positive outcome compared to a child restricted to monotonous starches (aOR = 4.89, $p < 0.001$). Timely food introduction at 6 months was associated with a 3.15 times higher odds of timely food introduction (aOR = 3.15, $p < 0.001$). Meeting the daily meal count more than doubled the chances of success (aOR = 2.42, $p < 0.003$), representing the lowest relative impact among the three significant indicators.

Discussion

The findings of this cross-sectional study in Ulanga District evaluate how maternal nutritional knowledge and socio-economic factors interplay and are associated with infant complementary feeding practices. "The demographic data show low formal education levels among the participants, which may limit their access to complex nutritional information. Because 66.9% of mothers demonstrate only moderate baseline knowledge, significant room remains for structural feeding misconceptions, such as introducing solids too early or relying entirely on starchy porridges.

Furthermore, the structural realities of Ulanga's informal economy introduce severe maternal time poverty. With over 81% of caregivers working as genge food vendors or subsistence farmers, demanding physical schedules force

mothers to compromise between generating daily income and preparing resource-intensive, diverse meals. Consequently, caregivers successfully adopt accessible behavioral milestones like timely food introduction (69.8%) and minimum meal frequency (59.1%), but fail at complex indicators. This is highlighted by the critical plummet of Minimum Dietary Diversity to 27.9% due to an over-reliance on fast, filling, and inexpensive starchy staples like tubers, *ugali*, and rice.

The inferential logistic regression model provides definitive clinical evidence that dietary diversity is more strongly associated with appropriate practices than mere caloric quantity. Meeting minimum dietary diversity (MDD) was the strongest protective factor against child malnutrition in this study population. While increasing maternal knowledge is a crucial step, it remains heavily constrained by the economic and time environments of the mothers. Therefore, public health interventions must pivot away from generic theoretical instruction or written pamphlets, which are ineffective due to the high local primary or no education rate (57.9%). Instead, strategies must adopt practical, Swahili led community demonstrations, such as establishing market-based nutrition hubs or teaching low cost "One Pot" enrichment methods using accessible regional proteins (e.g., groundnut flour, dried sardines/dagaa) and indigenous green vegetables.

Study Limitations

Several inherent limitations must be acknowledged. First, because the study utilized a non-probability purposive sampling technique, the findings cannot be statistically generalized to the entire population of Ulanga District. Second, the assessment of dietary diversity and meal frequency relied on a 24-hour dietary recall, which is prone to recall and information bias if mothers have difficulty remembering exact ingredients. Third, mothers may have experienced social desirability strain, potentially leading them to over report positive behaviors to avoid feeling judged. Finally, the cross-sectional snapshot only demonstrates statistical associations and cannot infer definitive cause and effect relationships or track how feeding behaviors change seasonally with crop fluctuations.

Conclusion

This study shows that maternal feeding practices in Ulanga District are shaped by both maternal knowledge and structural economic factors, particularly informal work demands. While successful public health outreach is reflected in high rates of timely food introduction and adequate meal frequency, a critical nutritional gap persists in dietary diversity. Inferential logistic regression confirms a strong correlation between dietary quality and feeding adequacy,

with mothers possessing high nutritional knowledge demonstrating nearly fivefold higher odds of achieving minimum dietary diversity compared to those with poor knowledge. Ultimately, expanding maternal knowledge alone is insufficient if structural barriers to food preparation remain. Public health authorities must transition to practical, field-based interventions and mother-to-mother peer mentoring networks to equip busy working mothers with low-cost, accessible methods to enrich local staples.

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