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Research

Effect of nutrition education intervention on the knowledge, practices, and self-efficacy of lactating mothers with infants 0-12m attending a primary healthcare centre in Mararaba, Nigeria

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Background

Inappropriate infant feeding practices contribute significantly to malnutrition among under-five children in Nigeria. Despite national efforts to promote exclusive breastfeeding and appropriate complementary feeding, structured postnatal nutrition education remains limited, especially in semi-urban settings.

Objective

This study evaluated the effect of a brief nutrition education intervention on knowledge, feeding practices, and self-efficacy among lactating mothers with infants aged 0–12 months attending a primary healthcare centre in Mararaba, Nigeria.

Methods

A quasi-experimental study involving 100 lactating mothers was conducted. Baseline data on knowledge, practices, and self-efficacy were collected using structured questionnaires. A single-session intervention covering breastfeeding and complementary feeding was delivered, and post-test data were collected three months later. Descriptive statistics and ANOVA were used to assess changes.

Results

Significant improvements were recorded in maternal knowledge, with mean scores increasing from 68% to 100% for breastfeeding and from 40% to 82% for complementary feeding ($p = 0.002$). Self-reported feeding practices also improved ($p = 0.003$). However, post-test responses on on-demand breastfeeding, exclusive breastfeeding duration, and early initiation likely reflected awareness or intention, rather than behavior, due to infant age at follow-up. In contrast, mothers reported introducing foods from at least four food groups and incorporating variety within food groups during complementary feeding, indicating meaningful dietary change. Maternal self-efficacy change was not statistically significant ($p = 0.312$), though qualitative gains were noted in confidence around meal preparation and hunger cue recognition.

Conclusions

A brief, locally delivered nutrition education session improved maternal knowledge and reported feeding practices. Scaling up such interventions within routine PHC services may support improved infant nutrition in underserved communities.

INTRODUCTION

Malnutrition remains a major cause of child mortality globally, with suboptimal breastfeeding and complementary feeding practices contributing to nearly half of all deaths in children under five (World Health Organization 2024; Gebretsadik et al. 2020). WHO and UNICEF recommend exclusive breastfeeding for the first six months of life, followed by the timely introduction of nutritionally adequate complementary foods while continuing breastfeeding up to two years and beyond (World Health Organization 2024).

In Nigeria, despite strong national and international advocacy, exclusive breastfeeding rates remain low, declining sharply from 44% in the first month to just 12% by the fifth

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month while complementary feeding practices are also inadequate with only 26% of children aged 6-23 months receiving a minimum acceptable diet and just 12.4% meeting minimum dietary recommendations (NDHS, 2024). These figures reflect not only poor maternal knowledge but also limited reach of structured nutrition education programs during the critical postnatal period.

In Nasarawa State, where this study was conducted, early initiation of breastfeeding occurs in 51% of births, and exclusive breastfeeding among infants under six months stands at 43% (NPC et al. 2024; NDHS, 2024). However, complementary feeding practices remain poor, with only 15% of children aged 6–23 months meeting minimum dietary diversity, and just 13% receiving a minimum acceptable diet.

Nutrition education is recognized as a low-cost, high-impact intervention capable of improving maternal knowledge, feeding practices and caregiver confidence (Febriyani et al. 2022; Awuuh et al. 2019). However, few studies in Nigeria have simultaneously explored the effect of such interventions on knowledge, feeding practices and self-efficacy, especially in semi-urban Primary Health Care (PHC) settings.

This study aims to evaluate the effect of a one-time, lecture-based nutrition education intervention on the knowledge, practices, and self-efficacy of lactating mothers with infants 0-12 months attending the Primary Healthcare Centre (PHC) Mararaba.

METHODS

This study employed a quasi-experimental research design. A pre-test and post-test, without a control group, were used to assess the effect of the nutrition education intervention. It was conducted among mothers of infants who sought immunization services at the Primary Healthcare Centre (PHC) in Mararaba, a semi-urban town in Karu Local Government Area of Nasarawa State in central Nigeria.

SAMPLE

The study population was mothers who met the following inclusion criteria during immunization visits:

- Mothers with infants aged 0–12 months residing within the PHC Mararaba service area.
- Mothers with no immediate plans to relocate during the study period and willing to participate in all the phases of the study (pre-test, education session and post-test).
- Mothers with access to a personal or shared mobile phone active for communication.

One hundred and twenty Lactating mothers with infants 0-12 months were purposely selected for this study who were thought to be more likely to find practical relevance to the knowledge shared during the education session. However, 20 of them were excluded due to non-compliance, either because initial contact attempts failed or because they became unreachable during the post-intervention follow-up.

DATA COLLECTION

Participants completed a structured, self-developed questionnaire that assessed maternal knowledge, feeding practices, confidence (self-efficacy), and perceptions of infant health. To ensure clarity and reduce respondent burden, especially as most mothers were attending with their infants, the questionnaire was administered by trained researchers who read each question aloud in the preferred language of the respondent and recorded responses. The questionnaire comprised five main parts. Part A contained questions concerning the Socio-demographic characteristics of participants. Parts B and C contained questions aimed at assessing the knowledge and evaluating the practices of lactating mothers regarding breastfeeding and complementary feeding. Part D contained questions on maternal self-efficacy and confidence in infant feeding. Part E contained questions on infant growth, health status, and developmental milestones.

Participants were divided into two groups based on whether their infants were still breastfeeding exclusively or had started complementary feeding, allowing them to answer questions most relevant to their current feeding practices and to minimize recall errors.

INTERVENTION

Participants were sent reminders one to two weeks and again one day prior to the date agreed upon by the health care workers and mothers for the nutrition education session at the health centre.

The intervention consisted of a one-time, lecture-based session lasting approximately one hour, delivered in English using simple, easy to understand terms. However, local dialect was occasionally used when referring to local food items and recipes. This method was selected to accommodate mothers' limited availability for multiple sessions.

The lecture covered key topics on importance, benefits and tips of breastfeeding and exclusive breastfeeding, recognition of hunger and satiety cues, timely introduction of complementary feeding, appropriate feeding frequency and dietary diversity, nutrient enrichment of complementary foods, identification of food allergies, healthy cooking methods to conserve nutrients, food combinations to enhance nutrient absorption, food hygiene and safety practices, nutrition for improved lactation using locally available foods; complementary food recipes and practical ideas were shared during the session. At the end of the lecture, questions were welcomed from participants and an appropriate response was given for clarification. To acknowledge participation, transport and refreshment support were provided.

POST-TEST DATA COLLECTION (3 MONTHS LATER)

Follow-up data collection was conducted using the same structured questionnaire three months after exposure to the intervention. However, for certain items, such as those relating to early infant feeding practices, the questions were rephrased at post-test to assess maternal awareness or future intentions, since actual behaviour could no longer be verified due to the child's age progression. Post-test assessments were carried out via phone calls to minimize participant dropouts, given the challenges of physical follow-up in the study area.

The pre-test and post-test responses were numerically

coded, and comparative analysis was conducted to determine the effects of the nutrition education intervention on maternal knowledge, feeding practices, self-efficacy, and infant health outcomes.

STATISTICAL ANALYSIS

Data collected from the pre-test and post-test surveys were checked for completeness and consistency and entered into SPSS Version 24. The socio-demographic characteristics, knowledge, feeding practices, self-efficacy, and infant health outcomes of the participants were reported as frequencies and percentages. The Chi-Square test was employed to determine statistically significant differences between pre-test and post-test responses across categorical variables. All hypothesis testing was done at 95% confidence interval with p-value ⩽ 0.05 considered as significant.

ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Institutional Review Board of Bingham University Karu (Approval Number: NHREC/21/05/2005/01397). Permission was also taken from medical officers of the PHC. Written consent was taken from the concerned participants.

RESULTS

Table 1 presents data on the sociodemographic characteristics of the lactating mothers participating.

Table 1. Sociodemographic characteristics of lactating mothers

Variables	Frequency (n)	Percentage (%)
Mother's age (years)		
20-30	70	70
31-41	28	28
⩾42	2	2
Mother's Education completed		
Primary	3	3
Secondary	53	53
Diploma	9	9
College of Education	10	10
Bachelor's Degree	25	25
No of children in household		
1	31	31
2	27	27
3	22	22
4	11	11
>4	9	9
Mother's occupation		
Housewife/unemployed	31	31
Teacher	6	6
Health personnel	3	3
Business/Trading	31	31
Civil servant	4	4
Skilled jobs	25	25
Infant age (mo)		
< 3	22	22
3 – 5	24	24
6- 8	20	20
9 -12	34	34
Prior exposure to infant nutrition education	13	13

INTERVENTION EFFECTS

Table 2 presents the change in maternal knowledge following the intervention. Notably, mothers with infants in the complementary feeding age group showed a substantial improvement, with average scores more than doubling after the session. This trend reflects their stronger baseline knowledge in breastfeeding and thus the greater knowledge gap addressed through education.

Table 2. Knowledge score

Category	N	Pre-test Average Score (%)	Post-test Average Score (%)
Breastfeeding/mixed feeding	39	68	100
Complementary feeding	61	40	82

Significant improvements were observed in both breastfeeding and complementary feeding practices following the intervention (Tables 3 and 4). Notably, more mothers reported timely breastfeeding initiation, improved awareness of exclusive breastfeeding, and a stronger intention to adopt on-demand feeding in future practice. For complementary feeding, key improvements were recorded in timely initiation, feeding from multiple food groups, and greater variety within those groups, reflecting positive shifts in dietary practices.

Post-test variety reflects any improvement in the number of different food types introduced within each food group (e.g., adding a second grain or protein source). It does not represent maximum dietary diversity or complete adherence to optimal feeding recommendation.

Table 3. Breastfeeding practices and knowledge N=100

Variables	Pre-test %	Post-test%	Knowledge Gained
Initiation of breastfeeding within an hour after birth[1]	65.0	100.0	25.0
Ease in breastfeeding[2]	76.0	95.0	19.0
On demand breastfeeding[1]	48.0	90.0	42.0
Continued breastfeeding	100.0	100.0	0.0
Six-month length of exclusive breastfeeding[1]	71.0	100.0	29.0

[1]True practices at baseline but with post-test responses that reflect maternal knowledge or intention rather than repeated behaviour, due to infant age progression.

[2]Ease in breastfeeding refers to the mother's self-reported perception of how comfortable and manageable she found the act of breastfeeding, based on factors such as infant latching, milk flow, pain.

Table 4. Complementary feeding practices and knowledge (N=61)

Variables	Pretest %	Post-test %	Knowledge Gained
6 mo as appropriate time of introducing complementary feeding[1]	62.29	100	37.71
Appropriate frequency of complementary feed	91.8	100	8.2
Types of food introduced			
Grains, Roots and Tubers	95	100	5.0
Legumes & Nuts	13.11	95	81.89
Animal Protein (Meat, Fish, Egg)	3.28	90.16	86.88
Diary	19.67	57.38	37.71
Fruits	1.6	57.38	55.78
Vegetables	16.39	42.62	26.23
Introduced foods from ⩾4 food groups	8.19	100	91.81
Variety within food groups introduced	6.56	100	93.44
Responsive feeding	90.16%	100%	9.86

[1]True practices at baseline but with post-test responses that reflect maternal knowledge or intention rather than repeated behavior, due to infant age progression

EFFECT ON MATERNAL SELF-EFFICACY/CONFIDENCE

As shown in Table 5, mothers reported feeling more confident in key areas such as cooking nutritious meals and

recognizing hunger cues. However, the overall change in self-efficacy was not statistically significant (p = 0.312). Notable improvements were observed in confidence in introducing complementary foods (increased agreement from 20% to 100%) and confidence in food preparation (strong agreement rose from 13% to 91%).

Table 5. Confidence and beliefs (*n* = 100)

Variables	Pre-test		Post-test	
	Frequency	%	Frequency	%
Breastfeeding properly[a]				
Strongly agree	43	43.0	78	78.0
Agree	46	46.0	22	22.0
Disagree	9	9.0	0	0.0
Strongly disagree	2	2.0	0	0.0
Importance of exclusive breastfeeding				
Strongly agree	67	67.0	86	86.0
Agree	15	15.0	14	14.0
Disagree	13	13.0	0	0.0
Strongly disagree	5	5.0	0	0.0
Confidence in introducing complementary feeding				
Strongly agree	1	1.0	14	14.0
Agree	19	19.0	86	86.0
Disagree	5	5.0	0	0.0
Strongly disagree	75	75.0	0	0.0
Confidence in recognizing hunger cues				
Strongly agree	56	56.0	90	90.0
Agree	41	41.0	10	10.0
Disagree	3	3.0	0	0.0
Strongly disagree	0	0.0	0	0.0
Confidence in coping with breastfeeding challenges				
Strongly agree	26	26.0	65	65.0
Agree	49	49.0	33	33.0
Disagree	19	19.0	2	2.0
Strongly disagree	6	6.0	0	0.0
Confidence in cooking nutritious meals				
Strongly agree	13	13.0	91	91.0
Agree	63	63.0	6	6.0
Disagree	19	19.0	3	3.0
Strongly disagree	5	5.0	0	0.0

[a] Breastfeeding properly indicates proper positioning, latchment and sitting posture to prevent body pain

INFANT HEALTH OUTCOMES

Mothers were asked about their perception towards their infant's health. Reported infant illness in the past month was 31% at baseline and 28% post-intervention. Most mothers strongly agreed (69%) /agreed (30%) that their child was very healthy at pre-test and post-test no mother disagreed, with 88% and 12 % strongly agreeing and agreeing respectively.

DISCUSSION

SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPATING LACTATING MOTHERS

The lactating mothers in this study were mostly in the age range of 20-30 years old which is typical to be an active phase in their lives and information may be retained and used effectively. Most infants in the study were aged between 6–12 months; a critical life phase requiring complementary feeding alongside breastfeeding.

Most mothers had a secondary education, although less than half went further to obtain a diploma, degree or college certificates. Education plays a crucial role in shaping maternal attitudes, communication, information processing, and knowledge application to improve the welfare of her family. Approximately 31.0% of the mothers were first-time mothers and another 27% had two children. Family size is an important factor that influences health and socio-economic development, and a limited number of children is often correlated with better maternal and child welfare. A large proportion of the mothers reported having a source of livelihood through business, trade skills, or employment, with tailoring, hairdressing, and catering being the most common occupations. Household income was excluded from analysis due to a high rate of non-disclosure and uncertainty among respondents. This limited our ability to assess socioeconomic influences on feeding practices.

Notably, the study found that most mothers had not received formal education or counselling on breastfeeding and complementary feeding practices. This may be attributed to the secondary school curriculum's lack of content on infant feeding and limited postnatal education opportunities in local healthcare settings. However, mothers in this study initially had better knowledge of breastfeeding compared to complementary feeding, likely due to information received during antenatal sessions, which often emphasize exclusive breastfeeding over complementary feeding.

EFFECT OF NUTRITION EDUCATION ON KNOWLEDGE

Improving maternal knowledge of infant feeding requires intensive and sustained interventions from pregnancy through the postnatal period. This study demonstrated a significant improvement in mothers' knowledge following a single lecture. Average knowledge scores increased from 68% to 100% for breastfeeding, and from 40% to 82% for complementary feeding. The difference between pre-test and post-test scores was statistically significant (p=0.002). These findings align with previous studies, such as Mangwane et al. (2024), which reported an increase in maternal nutrition knowledge following education interventions, and Kajjura et al. (2019) and Jeihooni et al. (2022), who similarly observed significant improvements.

Importantly, the significant gains achieved through a single structured lecture highlight that even a one-time, well-delivered intervention can have substantial effects in a population such as the one we studied with relatively high levels of education. This supports the findings of Febriyani et al. (2022), who reported that the number of lessons does not necessarily correlate with knowledge gains when content is strategically focused. The simple, interactive approach, combined with practical examples and a question-and-answer session, likely contributed to effective knowledge retention among participants.

Knowledge (and possibly some practice) of on-demand breastfeeding increased following the intervention. On-demand breastfeeding remains a crucial practice for maintaining milk supply in accordance with infant needs and promoting healthy growth and development (Dewar 2019; Ejie et al. 2023).

Regarding exclusive breastfeeding, more than two-thirds of mothers were already practising it at baseline. Post-intervention, all mothers understood the need to exclusively breastfeed for six months, confirming findings similar to those of Sokan-Adeaga et al. (2023) in Nigeria.

EFFECT OF NUTRITION EDUCATION ON BREASTFEEDING AND COMPLEMENTARY FEEDING PRACTICES

Significant improvements were also observed in a few breastfeeding and complementary feeding behaviours. International organizations recommend initiating

breastfeeding within one hour after birth (World Health Organization 2024). In this study, more than half of the mothers breastfed their infants within an hour of delivery, consistent with findings from Abd-Alrazig et al. (2023) and Yeshaneh et al. (2021). However, this result contrasts with Akinrinmade et al. (2024), who found poor knowledge and practice of early initiation of breastfeeding among mothers. After the intervention, all mothers were aware of the need to initiate breastfeeding within one hour of birth and committed to practicing it in future deliveries. This aligns with the findings of Hien et al. (2023), who observed significant improvements in early initiation practices post-intervention.

Prior to the intervention, about a quarter of mothers reported difficulties in breastfeeding; post-intervention, this proportion dropped drastically to less than one-tenth, although all mothers were breastfeeding both at baseline and during the post-intervention interview three months later. Knowledge and awareness appeared to help mothers navigate breastfeeding challenges.

Throughout the study period, no cases of breastfeeding cessation were recorded. This is common in Nigeria, since all infants were under one year old at baseline.

Complementary feeding, practiced by more mothers at post-intervention, appeared to show improvements, though much of the change may be because older infants tend to be fed more diverse and protein-rich complementary foods. Although more than one-third of mothers initially introduced complementary foods too early or too late, post-test results revealed improved knowledge of timing in line with WHO recommendations.

This finding is consistent with reports by Usheva et al. (2021) in Europe and Hien et al. (2020), but contrasts with Bazezew et al. (2020), who found poor attitudes toward timely introduction of complementary foods among Ethiopian mothers. In this study, post-intervention, all mothers demonstrated awareness and willingness to introduce complementary foods appropriately in subsequent births, consistent with improvements reported by Hien et al. (2023).

Regarding complementary feeding frequency, a large proportion of mothers met the recommended daily meal frequency for their infants post-intervention, corroborating findings by Ahmed et al. (2022). This improvement contradicts reports by Taha et al. (2020), where many mothers did not meet minimum meal frequency standards.

Dietary diversity also improved significantly. Pre-intervention, most mothers introduced mainly grains, roots, and tubers with limited protein, fruits, or vegetables. Post-intervention, there was a noticeable increase in the inclusion of various food groups, although vegetables showed the least improvement. This pattern mirrors findings by Hien et al. (2020), Kamble et al. (2020), as well as Arumsari et al. (2023), who also observed limited protein and vegetable consumption among infants due to economic constraints.
Although this study did not measure minimum dietary diversity using a 24-hour recall, the increased introduction of various food groups post-intervention suggests a positive shift in complementary feeding practices. Comparable improvements in feeding diversity though measured through different methods have also been reported by Hien et al. (2023), Aidam et al. (2020), and Belay et al. (2022) in sub-Saharan Africa.

Mothers also showed marked improvements in providing food variety from different sources within food groups introduced and practicing responsive feeding post-intervention. Responsive feeding practices, essential for healthy eating patterns and growth, were embraced by all mothers after the intervention.

Overall, these findings confirm that nutrition education may improve complementary feeding practices, as similarly observed by Samuel, Akintayo and Eyinla (2021) in Ibadan, Nigeria, and by Asher et al. (2022), Mohammed et al. (2022), and Shirazi et al. (2023). Thus, even a short-duration, simple, and structured nutrition education session may significantly enhance infant feeding practices, particularly dietary diversity and food variety. However, we must emphasize that our study design did not allow us to separate effects of the intervention from the effects of infants becoming three months older, which, in our setting, naturally leads to improvements in these variables.

EFFECT OF NUTRITION EDUCATION ON SELF-EFFICACY/CONFIDENCE

Unlike the significant improvements observed in knowledge and, somewhat less certainly feeding practices, changes in maternal self-efficacy were on the whole not statistically significant. Although there were notable positive shifts in specific areas such as confidence in introducing complementary foods, recognizing hunger cues, and cooking nutritious meals, the overall change in self-efficacy did not reach statistical significance ($p=0.312$).

Proper breastfeeding techniques, such as ensuring correct infant latch and positioning, are critical for effective breastfeeding. While pre-test results showed a mix of strong agreement, agreement, and neutrality among mothers, post-test assessments revealed improvements, with all mothers acknowledging proper breastfeeding practices and a majority strongly agreeing. Similarly, beliefs about the importance of exclusive breastfeeding improved: although a few mothers were initially neutral or disagreed, post-intervention results showed unanimous agreement, with most strongly agreeing.

In terms of confidence in introducing complementary feeding, the number of mothers who felt confident increased substantially after the intervention. Recognition of hunger cues also improved, aligning with the observed enhancement in responsive feeding practices. Overcoming breastfeeding challenges, such as maintaining milk supply and managing latch difficulties, also showed gains.

Despite these positive trends, overall self-efficacy scores remained statistically non-significant. This finding contrasts with studies by Aghababaei et al. (2022) and Solikhah et al. (2021), who reported significant improvements in self-efficacy following nutrition education. Notably, those studies incorporated multiple education sessions and practical demonstrations; approaches absent in the present study.

Thus, a one-time, lecture-based intervention, while effective in enhancing knowledge and, possibly certain behaviours, may be insufficient to produce meaningful improvements in self-efficacy without hands-on training, peer support, and continuous reinforcement. Moreover,

contextual challenges such as limited time, resource constraints, and possible overestimation of confidence at baseline may have influenced these outcomes. Self-efficacy, by its nature, often requires longer-term interventions to observe substantial changes.

EFFECT OF NUTRITION EDUCATION ON MOTHERS' PERCEPTION OF INFANT'S HEALTH

In low-resource settings, nutrition education aimed at improving breastfeeding and complementary feeding practices has been shown to positively impact infant health outcomes. In this study, maternal perceptions of infant health and the frequency of reported infant illnesses at post-test were apparently improved compared to pre-test reports. Proper infant feeding practices, reinforced by timely nutrition education, likely contributed to the improved health outcomes seen in this study.

CONCLUSION

Poor maternal knowledge, cultural misconceptions, economic hardship, and low self-efficacy are often barriers to optimal feeding decisions. These challenges are particularly acute in semi-urban communities such as Mararaba in Nasarawa State, where this study found that mothers often face time constraints, poor access to structured health education, and weak support systems at the primary healthcare level.

This study highlights the effectiveness of a one-hour, targeted nutrition education session in enhancing maternal knowledge, infant feeding practices, and perceived infant health in a low-resource setting. However, evidence suggests that while maternal knowledge can improve rapidly with education, boosting self-efficacy or confidence often requires more sustained hands-on engagement (Rodríguez-Gallego et al., 2024; Gizaw et al., 2023). Nutrition education should be integrated into routine immunization services to complement existing antenatal programs. Periodic trainings on infant feeding counselling should be provided for PHC staff to ensure accuracy and consistency in their delivery of nutrition education to mothers.

Larger, controlled studies with longer follow-up periods are needed to evaluate the long-term sustainability of behaviour change and explore more interactive methods to improve self-efficacy.

AUTHOR CONTRIBUTIONS

HTS was involved in conceptualization, methodology, data collection and management, writing original draft, project administration, visualization. MAD and UDI were both involved in supervision, methodology, writing review and editing. MAD was also involved in conceptualization. All authors approved the final version and consent for publication.

CONFLICT OF INTEREST

The authors declare that they have no other potential conflicts of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN SCIENTIFIC WRITING

Nothing to disclose.

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