

Impact of a Designed EEBF Breastfeeding Tool[®] on Promoting Early Initiation and Exclusive Breastfeeding in Selected Primary Health Centers in Ibadan

Folasire O.F.¹, Olajide M.O.¹, Alarape A.O.², Alagbo P.K.^{1,3} and Samuel F.O.¹

¹ Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Nigeria.

² Ministry of Health, Oyo State, Nigeria

³ Department of Human Nutrition and Dietetics, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.

*Corresponding author: opemipoolajide19@gmail.com Phone number: 08105088364

ABSTRACT

Background: Structured lactation education has been shown to improve early initiation and exclusive breastfeeding outcomes.

Objective: This study aimed to evaluate the influence of the designed EEBF (Early Initiation, Exclusive Breastfeeding) lactation education tool[®] on the breastfeeding knowledge and practice of EIBF and EBF described in the EEBF tool[®] among late-trimester primigravidas in selected Primary Health Centers in Ibadan.

Methodology: A pre-post longitudinal intervention was conducted among consenting late-trimester primigravidas presenting for antenatal care at the five randomly selected PHCs in Ibadan North and Akinyele LGAs over three months. The EEBF tool[®] impact was assessed through breastfeeding knowledge, attitude, and key intervention message questions collected pre-intervention, immediately post-intervention, and two weeks postpartum. Data were analyzed in SPSS v26 using descriptive statistics, chi-square, correlation, and paired t-test, with significance set at $p < 0.05$.

Results: Fifty-one primigravidas were recruited, but only 34 (66.7%) completed the study at two weeks postpartum. Most had poor general knowledge of breastfeeding (52%), poor attitude regarding breastfeeding (52.9%). For the key-intervention questions asked, most had poor pre-intervention message knowledge (58.8%). Post-intervention key message knowledge reached 100%, with a significant increase ($t = -10.521$, $p = 0.000$). At two weeks postpartum, 82.4% initiated breastfeeding within one hour, 94.1% practiced exclusive breastfeeding, and all 100% understood the maternal and child benefits of Exclusive breastfeeding.

Conclusion: The EEBF tool[®] effectively improved breastfeeding knowledge, attitudes, early initiation, and exclusive breastfeeding practices among late-trimester primigravidas, supporting its integration into antenatal and lactation education programs in primary healthcare settings in Nigeria.

Keywords: Primigravidas, Early Initiation of Breastfeeding, Exclusive Breastfeeding, Breastfeeding Knowledge, Breastfeeding Intervention

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INTRODUCTION

Early initiation of breastfeeding (EIBF) means putting the newborn to the mother's breast within the first hour of birth for immediate suckling so the infant receives colostrum, the nutrient- and antibody-

rich first milk high in protective factors (1), and EIBF contributes to successful exclusive breastfeeding (EBF) (2). The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) strongly recommend EIBF and EBF for the first six

months (3). Breast milk provides adequate proteins, carbohydrates, fats, vitamins, minerals, and water for optimal growth in the first months of life (4).

In Nigeria, early initiation of breastfeeding within one hour increased from 31.9% in 2003 to 42% in 2018 but declined to about 36% by 2023. Exclusive breastfeeding for the first six months improved from 3.9% in 2003 to 29% in 2018 and has since stagnated at roughly the same level in 2023 (5-9). Despite these gains, the rates remain below the World Health Assembly (WHA) 2025 target of 50%, highlighting persistent gaps in infant nutrition practices.

The Baby-Friendly Hospital Initiative (BFHI), launched by the WHO and UNICEF in 1991, provides a standardized, health facility-based educational framework for supporting breastfeeding and has been shown to improve early initiation and exclusive breastfeeding practices in diverse clinical settings (10). It encourages pregnant women to attend antenatal services and promotes the implementation of its ten steps (11). Despite its impact, global coverage is still low, implementation is inconsistent across facilities, and it is largely facility-dependent (3,12).

Similarly, other multidimensional quality improvement tools that combine staff training and structured lactation education videos, while successful in increasing early initiation and exclusive breastfeeding rates in hospital settings (13), are usually resource-intensive and rarely tailored to the specific learning needs of primigravidas.

Lactation education interventions generally improved knowledge, attitudes, and breastfeeding support skills, while highlighting the need for more standardized and effective educational approaches (45, 50). Furthermore, educational technologies such as video-based lactation learning tools and teach-back breastfeeding education have demonstrated positive effects on learning and breastfeeding outcomes (47, 48). However, these interventions tend to focus on isolated aspects of breastfeeding education, lack a standardized framework, and are rarely designed specifically for primigravidas in primary healthcare settings, collectively underscoring the need for a comprehensive, context-specific breastfeeding education tool.

Offentimes, Primigravidas lack experience, confidence, and knowledge about what proper breastfeeding entails (14). To promote breastfeeding and encourage mothers to comply with the WHO

recommendations (WHO, 2018), health education is needed for pregnant mothers, especially primigravidas (15).

Studies have examined rates of early initiation of breastfeeding (EIBF) (16-19), perceptions of EIBF among Healthcare Professionals (HCPs) and mothers (20-23), and compliance with BFHI steps (24). However, few have explored how accurate information and benefits can be effectively passed to mothers and HCPs before and immediately after delivery (25-27). The BFHI steps 2 and 3 emphasize equipping HCPs with correct knowledge and ensuring proper dissemination (28). Yet, even Baby-Friendly hospitals often fail to teach mothers all ten steps for successful breastfeeding (11).

In a study conducted on early initiation of breastfeeding in India (29), less than half of new mothers practiced EIBF. Delay was associated with cesarean delivery, birth weight, and maternal awareness. The study highlighted the need for better antenatal counseling and healthcare professionals' training to facilitate EIBF, even after cesarean delivery.

Mothers may face breastfeeding challenges such as poor infant attachment or positioning, inverted nipples, receded infant jaw, cleft palate, or infant refusal to feed due to health conditions, all of which can cause early discontinuation (30). Thus, this study and the development of the EEBF lactation education tool[©] were guided by the Theory of Planned Behaviour, which suggests that improved knowledge influences attitudes and behavioural intentions, thereby promoting health practices. Evidence shows that increased breastfeeding knowledge is associated with positive attitudes and improved breastfeeding outcomes (32, 33). Accordingly, this intervention sought to enhance primigravidas' knowledge of early initiation and exclusive breastfeeding to support adoption of key practices (34).

This study therefore assessed the influence of the designed EEBF lactation education tool[©] on the knowledge and practice of early initiation and exclusive breastfeeding among late-trimester primigravida women in selected primary health centres in Ibadan.

METHODS

Study Design and Location

A pre- and post-longitudinal intervention study design was used. This study is part of a larger study that involved designing the EEBF breastfeeding tool[®], validating the tool, and training HCPs at selected primary health centres (Agbowo, Ajibode,

Ojoo, Moniya, Idi-ogungun Primary Health Centres, Ibadan-North, and Akinyele LGAs, Ibadan, Oyo State, Nigeria).

Study Population and Sampling Technique

The study population comprised late-trimester primigravidas presenting for antenatal care at the randomly selected centres. Of the 51 participants initially recruited, 34 completed the study. Eligible participants were primigravidas who provided informed consent and attended antenatal clinics consistently. Women with HIV/AIDS, gestational diabetes mellitus, flat or inverted nipples, other medical conditions affecting breastfeeding, those booked for cesarean section, or those with multiple pregnancies were excluded. A purposive sampling technique was used, where the total sample size of the responsive primigravidas in their late trimester in all the selected primary health centers was used for the intervention.

Data Collection Tool and Procedure

The intervention utilized a structured Early Initiation and Exclusive Breastfeeding (EEBF) lactation education tool© developed using the Developing and Assessing Nutrition Education Handouts (DANEH) checklist of the Academy of Nutrition and Dietetics Foundation. The tool comprised educational materials, including videos, flipcharts, and handbills, designed to support standardized breastfeeding education for late-trimester primigravidas. Healthcare providers were oriented on the content and use of the tool and subsequently utilized the EEBF Tool© to deliver breastfeeding education during routine antenatal care sessions at the five selected PHCs over the three-month study period.

Pre-intervention data on general breastfeeding knowledge, attitude, and practice were collected from consenting late-trimester primigravidas using a semi-structured questionnaire administered at baseline. The intervention tool focused on six key messages: educating mothers on the suckling reflex, asking for their babies immediately after delivery to initiate breastfeeding within the first hour of birth, frequent and on-demand breastfeeding, proper positioning and latching, adequate maternal fluid intake, and the benefits of early initiation and exclusive breastfeeding.

The EEBF intervention was delivered by trained healthcare professionals during antenatal clinic

(ANC) sessions and included flipchart group education, video demonstrations, and take-home handbills reinforcing the key intervention messages. Educational sessions were observed by the researcher to ensure adherence to the tool's guidelines. Videos that demonstrated the intervention messages were used to further reinforce the key messages at the two-week follow-up ANC visit. Following the intervention, a structured questionnaire was administered to assess mothers' knowledge and understanding of early initiation, exclusive breastfeeding, and key intervention messages.

Data Analysis

Data were analyzed using IBM SPSS version 26. Descriptive statistics summarized demographics. Paired t-test compared pre- and post-intervention results, while chi-square examined associations between breastfeeding practices and socio-demographic factors. Significance was set at $p < 0.05$. General breastfeeding knowledge was measured with 19 questions (score range 0-19; mean 10.2 ± 3.5).

Scores ≥ 11 indicated good knowledge, while ≤ 10 indicated poor knowledge. Internal consistency was acceptable with Cronbach's alpha = 0.715. General breastfeeding attitude was assessed using 14 questions (score range 0-14; mean 8.2 ± 2.5). Scores ≥ 9 indicated good attitude, while ≤ 8 indicated poor attitude (Cronbach's alpha = 0.715). Pre-intervention knowledge was measured using 10 questions (0-10; mean 5.0 ± 2.5). Scores > 6 indicated good knowledge, ≤ 5 poor knowledge (Cronbach's alpha = 0.745). Normality testing confirmed the data were normally distributed.

Correct responses to each question scored 1; incorrect responses scored 0. Scores were summed and mean ($\pm$ SD) values calculated. Scores $\geq$ mean indicated good knowledge/positive attitude, while $<$ mean indicated poor knowledge/attitude; the same applied to intervention message assessments.

Ethical Approval

The study was approved by the Oyo State Ministry of Health Ethics Review Committee (Approval No. AD13/479/652). All ethical guidelines were followed to ensure confidentiality and protection of the participants' privacy.

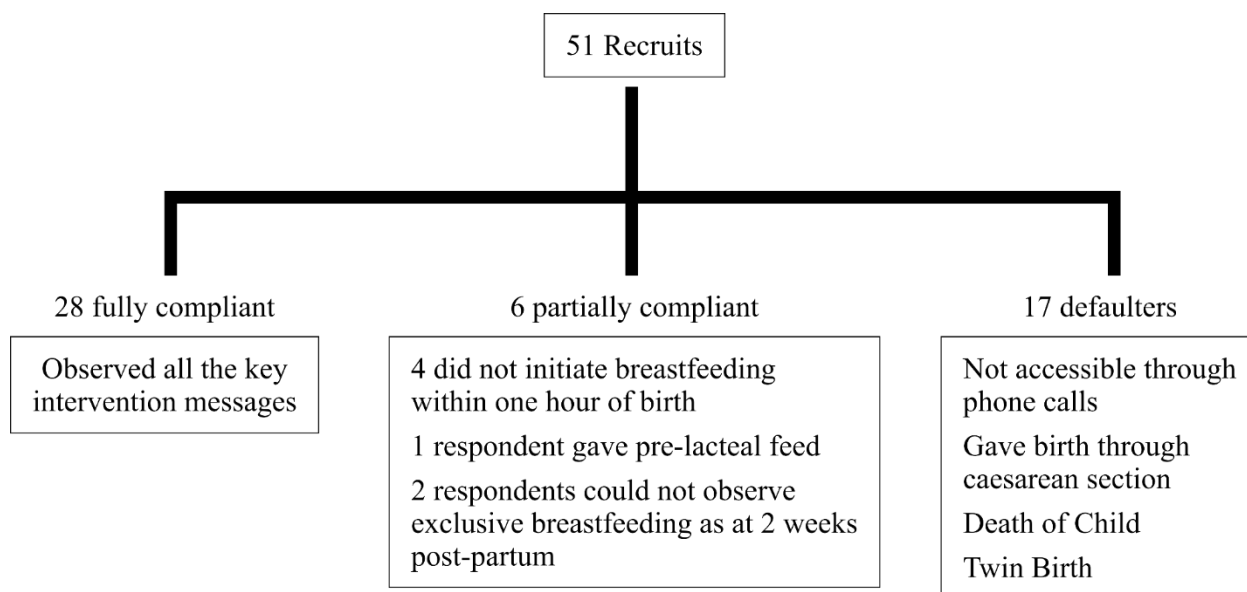


Figure 1: Flow Chart of Study Participants' Selection

RESULTS

Information on Study Participants

Table 1 Presents the Distribution of Socio-Demographic Information of Study Participants. Most of the Participants Were within the Age of 15–24 Years (62.7%), and 37.3% were 25–39 Years. The mean age was 24 ± 3.3 Years. Participants' Educational Attainment Was Distributed as Follows: Primary (5.9%), Secondary (47.1%), and Tertiary (47.1%). Most Were Married (88.2%), with 11.8%

Single or Engaged. Access to PHCs Was High (92.2%), Facilitating Breastfeeding Education, while 7.8% Had Limited Access. Presence of Social Support Was Reported by 86.3%, Allowing Mothers to Focus on Breastfeeding, versus 13.7% with No Support. Participants' Occupations Were Distributed as Follows: Office Workers (5.9%), Teachers (17.6%), Traders (17.6%), and Others (58.8%), Which Included Artisans, Students, and Unemployed Women.

Table 1: Sociodemographic Information of Study Participants

Variables	Frequency (51)	Percentage (%)
Age (years)		
15 – 24	32	62.7
25 – 39	19	37.3
Mean (SD)	24(3.3)	
Education category		
Completed Primary	3	5.9
Completed Secondary	24	47.1
Completed Tertiary	24	47.1
Marital Status		
Single	6	11.8
Married	45	88.2
Perceived ease of having access to health centres		
Yes	47	92.2
No	4	7.8
Presence of support system		
Yes	44	86.3
No	7	13.7
Occupation		
Office worker	3	5.9
Teacher	9	17.6
Trader	9	17.6
Others	30	58.8

Comparison of Pre and Post-Intervention (Immediately after the Intervention Was Delivered and at Two Weeks Postpartum) among Participants

Following the intervention, the awareness that milk production depends on infant suckling rose from 35.3% pre-test to 100% post-test. Knowledge of initiating breastfeeding within one hour increased from 44.1% to 82.4%, which translated into correct practice at two weeks postpartum. Initially, many

mothers were unsure about frequent breastfeeding and adequate fluid intake, but post-intervention, all understood their importance. Awareness of early initiation preventing postpartum haemorrhage rose to 100%. Understanding of exclusive breastfeeding benefits improved from 47.1% to 100%, with 94.1% of mothers giving only breast milk in the first two weeks, reflecting improved knowledge and practice (Table 2).

Table 2: Comparison of Pre- and Post-Survey Knowledge on Breastfeeding of Study Participants

S/N	Knowledge assessment for the primigravidas	Pre intervention		Post-intervention (1)		Post-intervention 2 (at 2 weeks post-partum)		X ²	P value
		Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)		
1.1	I know that my milk production is dependent on how my baby suck my breast	12(35.3)	22(64.7)	33(97.1)	1(2.9)	34(100)	0		
1.2	I know that I should ask for my baby immediately after birth	26(76.5)	8(23.5)	34(100)	0	32(94.1)	2(5.9)	0.828	0.363
1.3	When should a newly delivered mother put the baby to the breast	15(44.1)	19(55.9)	33(97.1)	1(2.9)	28(82.4)	6(17.6)	5.752	0.016*
1.4	How frequently should a newly delivered mother make the baby suckle on her	16(47.1)	18(52.9)	34(100)	0	34(100)	0		
1.5	Drinking lots of fluids after breastfeeding makes my milk flow better	19(55.9)	15(44.1)	34(100)	0	34(100)	0		
1.6	An important benefit of early initiation of exclusive breastfeeding is the prevention of postpartum hemorrhage for the mother	7(20.6)	27(79.4)	34(100)	0	34(100)			
1.7	I know that the more my baby suck on my nipple, the more milk will be produced	16(47.1)	18(52.9)	33(97.1)	1(2.9)	32(94.1)	2(5.9)	1.889	0.169
1.8	I know the benefits of exclusive breastfeeding	19(55.9)	15(44.1)	33(97.1)	1(2.9)	34(100)	0		
1.9	I understand the benefits of exclusive breastfeeding	16(47.1)	18(52.9)	33(97.1)	1(2.9)	34(100)	0		
1.10	I know that I should not give my baby anything other than breast milk, not even water, for the first six months	26(76.5)	8(23.5)	33(97.1)	1(2.9)	32(94.1)	2(5.9)	6.906	0.009*

The EBF General Knowledge, Attitude, Pre- and Post- Intervention Key Messages among the Thirty-Four Mothers (Completers)

Table 3 presents the Distribution of General Breastfeeding Knowledge, Attitude, and pre- and Post-Intervention Key Message Assessments among the 34 Completers. General Breastfeeding Knowledge Was Equally Distributed, with Half of the Participants

(50.0%) Demonstrating Poor Knowledge and Half Demonstrating Good Knowledge. More than Half (52.9%) Had Poor General Attitudes Toward Breastfeeding, while 47.1% Had Good Attitudes. Regarding Pre-Intervention Key Message Knowledge, 58.8% Had Poor Knowledge While 41.2% Had Good Knowledge. Following the Intervention, all 34 Participants (100%) Demonstrated Good Post-Intervention Knowledge of the Key Breastfeeding Messages.

Table 3: Distribution of Assessment Recorded

Categories (Participants with:)	Frequency (51)	Percentage (%)
General knowledge category		
Poor Knowledge	17	50.0
Good Knowledge	17	50.0
General attitude category		
Poor attitude	18	52.9
Good attitude	16	47.1
Pre-Intervention questions category		
Poor pre-intervention knowledge	20	58.8
Good pre-intervention knowledge	14	41.2
Post-Intervention questions category		
Good Final Post Knowledge	34	100

DISCUSSION

This is an intervention study which involved late-trimester primigravidas at five randomly selected Primary Health Centres in Ibadan North and Akinyele LGAs. The findings of this intervention study suggest that primigravidas initially had limited knowledge of breastfeeding practices, less favourable attitudes toward exclusive breastfeeding, and limited understanding of key intervention messages of the EEBF Tool[®]. Post-intervention findings demonstrate that the EEBF Tool was effective in significantly improving participants' knowledge of key intervention breastfeeding messages of the EEBF tool[®].

The positive correlation between breastfeeding knowledge and attitude observed in this study aligns with a study conducted in Ethiopia (33), where a positive correlation was recorded between the Breastfeeding Knowledge Questionnaire (BFKQ-AQ) and Iowa Infant Feeding Attitude Scores (IIFAS) scores, and found that women who attended at least four antenatal care (ANC) visits possessed increased knowledge and exhibited more positive attitudes toward breastfeeding.

The findings of this study suggest gaps in general knowledge of breastfeeding among primigravida. Similar gaps in knowledge were reported in Saudi Arabia (35) and in Ondo State (36), where most respondents demonstrated poor knowledge. In contrast, a study in Anambra (23) reported that 91.2% of mothers had good knowledge. These findings underscore the need for structured educational tools such as the EEBF tool[®], which effectively addressed these identified knowledge gaps in this study.

This need is further supported by a Nigerian study among healthcare workers (51), which reported suboptimal breastfeeding knowledge and identified important gaps in breastfeeding support and instructional practices, highlighting the importance

of structured educational resources to improve the quality and consistency of breastfeeding information provided to mothers.

The poor attitude observed in this study is similar to findings from a Hospital in Ondo State, Nigeria, where mothers showed poor attitudes toward exclusive breastfeeding (36). In contrast, studies in Saudi Arabia reported that pregnant women had positive attitudes toward breastfeeding, with one study showing 75.9% exhibiting positive attitudes (35, 37).

In this study, over half of the intervention completers had poor pre-intervention knowledge of the key messages, lower than the 85% reported in India (38). Many respondents did not know that increased infant suckling stimulates greater milk production, consistent with the findings of studies in Lebanon (39, 40, 41) and India (42), which identified knowledge gaps and misconceptions about insufficient breast milk and breast size as a determinant of milk production.

This study helped dispel the 'dry breast' myth. Many participants were uncertain about the recommended timing of breastfeeding initiation; only a few reported it should be after the first hour of delivery, and only about one-third knew it should be within the first hour. This aligns with studies in Karnataka, India, where 2.8% of primigravidas knew the correct timing (42), and in South India, where 92% were unaware (43).

The significant improvement observed in post-intervention knowledge scores provides strong evidence of the effectiveness of the EEBF tool[®] in enhancing understanding of early initiation and exclusive breastfeeding messages, which aligns with the study in India, where only 15% of the primigravidas had adequate knowledge of the intervention, but after the intervention, 90% of the mothers had good intervention knowledge assessment (38).

This also resonates with a study conducted in Ondo State, where 24% had poor intervention knowledge, and they recorded that 90.6% had post-intervention knowledge (36).

Existing lactation education tools differ considerably in their scope, target populations, and delivery characteristics. Video-based tools focused solely on lactation physiology, evaluated among family support networks and health students in hospital settings (46, 47), did not address the broader spectrum of breastfeeding practices necessary for first-time mothers. Similarly, teach-back breastfeeding education delivered to postpartum women in a hospital setting (48) targeted only breastfeeding self-efficacy, without extending to the antenatal period or incorporating multimodal delivery. Systematic reviews of lactation education interventions have further highlighted persistent inconsistencies in existing approaches and the need for more standardized methods (49, 50).

Additionally, a study among Nigerian healthcare workers revealed sub-sufficient breastfeeding knowledge, with fewer than one in five HCPs correctly identifying breastfeeding positions (51); reinforcing the need for tools that simultaneously build HCPs' capacity alongside maternal knowledge. In contrast, the multimodal and structured design of the EEBF Tool©, delivered by trained HCPs during antenatal care in a primary healthcare setting, achieved comprehensive improvements across breastfeeding knowledge, attitudes, early initiation, and exclusive breastfeeding practices among primigravidas, outcomes that existing individual tools did not address in totality.

Also, there is alignment with a study in India, where the primigravidas had poor knowledge before the intervention, and 85.7% had positive knowledge regarding breastfeeding after the intervention (42). This is also consistent with the study conducted in Egypt, where prior to the intervention, none of the respondents had good knowledge about breastfeeding, but 30% and 60% of the respondents had good and neutral knowledge (respectively) of breastfeeding post-intervention (15).

In the current study, the mothers' knowledge of early initiation of breastfeeding improved markedly following the intervention. This is consistent with findings from a previous intervention study where improvements in awareness were associated with appropriate breastfeeding initiation after delivery (44). The observed improvement may be attributed to the structured and theory-driven design of the intervention. By emphasizing perceived susceptibility (e.g., risk of postpartum

haemorrhage) and benefits of early initiation, the tool likely enhanced mothers' motivation and attitude towards breastfeeding.

A high proportion of participants initiated breastfeeding within one hour, higher than the 58.6% reported in a longitudinal intervention study (42). This further demonstrates the practical impact of the EEBF tool® beyond knowledge improvement, translating educational exposure into behavioural practice. However, a few mothers did not initiate breastfeeding within the recommended time due to delivery-related challenges and births occurring outside the PHCs where the intervention was conducted.

Similarly, the majority of mothers practiced exclusive breastfeeding during the early post-partum period, with only a small number introducing other feeds. These findings are comparable to those reported in another intervention study (42), suggesting that structured lactation education may positively influence breastfeeding practices. Collectively, these findings demonstrate that the EEBF Tool© effectively translated improved knowledge and attitudes into measurable breastfeeding behavioural outcomes among primigravidas.

To the best of the researchers' knowledge, this is the first intervention study in the study location to use video demonstration to describe the suckling reflex and proper breastfeeding positioning to primigravidas, representing a notable strength in its innovative and context-specific approach to lactation education.

However, some limitations should be acknowledged. Some primigravidas who attended PHCs outside their residential areas discontinued participation after delivery, making post-intervention follow-up and data collection challenging. Additionally, the frequency of antenatal visits (monthly before nine months and fortnightly only in the last two months) may have limited the reinforcement of key lessons learned. Future studies with larger sample sizes, control groups, and longer follow-up periods are recommended to further validate the effectiveness and scalability of the EEBF Tool© across diverse primary healthcare settings in Nigeria.

CONCLUSION

The EEBF tool® used to deliver lactation education significantly corrected misconceptions such as the 'dry breast' myth and improved primigravidas' knowledge of early initiation and exclusive breastfeeding, with all participants demonstrating correct knowledge of breastfeeding initiation timing post-intervention. These findings support the integration

of the tool into antenatal and lactation education in primary health centres.

RECOMMENDATIONS

The EEBF tool® effectively teaches mothers about the sucking reflex and lactation, and in view of the significant post-intervention improvement in knowledge and breastfeeding practices, should be incorporated into maternal and infant nutrition programs in Nigeria, such as ANRiN, and into the training of community health workers, nurses, and nutrition students.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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