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ORIGINAL ARTICLE | COMPLEMENTARY FEEDING PRACTICES

Complementary Feeding Practices and Associated Factors Among Nursing Mothers in Southwestern Nigeria

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ABSTRACT

Background and Objectives: The period of transition from breastfeeding to other foods and liquids, is a very vulnerable period when malnutrition is likely to start in many infants and young children, if appropriate feeding practices are not employed. This study assessed using composite indices, the appropriateness of complementary feeding practices and associated factors among nursing mothers in Ijebu-Ode, Ogun State.

Methods: This descriptive cross sectional study was conducted in selected primary health facilities in Ijebu-Ode. Multi stage sampling technique was employed to select 283 mother-child pairs. Data was collected using a pre-tested interviewer administered questionnaire which included the World Health Organization Infant and Young Child Feeding Indicators (WHO IYCF) and the Infant and Child Feeding Index (ICFI).

Results: Of the total 283 mother-child pairs studied, 33.6% met minimum meal frequency, 14.5% received minimum dietary diversity (≥4 food groups) and 9.2% received minimum acceptable diet when assessed using the WHO IYCF indicators. Overall, appropriate complementary feeding was low (4.2%) and associated ($p<0.05$) with factors such as antenatal care visits, child welfare clinic attendance and mother's workplace. On the other hand, the ICFI categorized respondents into low (11.7%), medium (24.7%) and high (63.6%) ICFI scores and were associated ($p<0.05$) with mother's education and household size.

Conclusion and Global Health Implications: This study revealed a high prevalence of inappropriate complementary feeding practices. The use of composite indices reflected these practices and their associated factors holistically as they revealed different dimensions of complementary feeding. This may be useful for monitoring, evaluation, research and the required advocacy for complementary feeding.

Key words: • Appropriate complementary feeding • IYCF indicators • Feeding practices • Infant and child feeding index

1. Background and Objectives

Complementary feeding involves the introduction of appropriate and safe foods to children aged 6 months and older, in order to enable infants and young children meet evolving nutritional requirements necessary for optimal growth, development and good health.[1] It is a particularly vulnerable period in the lives of children as it represents the peak period for growth faltering, deficiency of certain micronutrients and high prevalence of some childhood illnesses like diarrhea and respiratory infections.[2]

Globally, inappropriate complementary feeding practices have been identified as a determinant of diarrhea, malnutrition outcomes and under-five mortality.[3] Proper complementary feeding reduces mortality by 6%, yet, in most developing countries, the complementary feed given to these infants and young children are usually contaminated and inadequate.[1] In Nigeria, despite the implementation of interventions such as the Baby Friendly Initiative and the National Policy on Infant and Young Child Feeding,[4] the prevalence of appropriate complementary feeding practices remains low (10%) among children 6–23 months of age.[5] The prevalence of appropriate Infant and Young Child Feeding (IYCF) practices in Nigeria among breastfed and non-breastfed children aged 6–23 months has also dropped from 30% in 2008[6] to 10% in 2013[5] and in 2018, only 11% of children age 6-23 months were fed in accordance with the criteria for a minimum acceptable diet.[7]

The World Health Organization (WHO) developed IYCF indicators to monitor and guide the feeding practices of young children.[1,8] These include amongst others: the introduction of solid, semi-solid or soft foods; minimum dietary diversity; minimum meal frequency; minimum acceptable diet; continued breastfeeding till 2 years or beyond and consumption of iron-rich or iron fortified foods. Timely introduction of appropriate and safe complementary foods to infants and young children reduces the risk of malnutrition, childhood infectious diseases and mortality.[9, 10]

Previous studies that assessed complementary feeding using the WHO IYCF indicators reported low prevalence of appropriate feeding practices in several climes. In Nigeria, from 2003 to 2013, minimum dietary diversity for children aged 6-23 months worsened from 26% in 2003 to 16% in 2013 while minimum meal frequency improved from 43% in 2003 to 56% in 2013.[11] Minimum acceptable diet worsened from 11% to 9%.[11] In Northern Ghana[12], minimum meal frequency, minimum dietary diversity and minimum acceptable diet were 58.2, 34.8 and 27.8% respectively. Only 28% met the requirement for minimum acceptable diet in Cambodia[13] and 18.8% met minimum dietary diversity in Southern Ethiopia.[14]

Child feeding practices are multidimensional and they change rapidly within short age-intervals in the first years of life. Consequently, the measurement of feeding practices in children aged 6 months and older involves assessing various dimensions of feeding simultaneously. These dimensions include continued breastfeeding, appropriate timing of introduction of complementary foods, and optimum quantity and quality of the foods consumed.[10] A few attempts at the measurement of feeding practices using composite indices have been made in some countries.[15,16,17] In Latin America, an Infant and Child Feeding Index (ICFI) was constructed and found to be both feasible and useful in summarizing key complementary feeding indicators and a variety of dimensions of age-specific feeding practices into a single variable.[15] A study in India[17] also confirmed that the index can be used to collect information on key components of young child feeding practices. This can then be incorporated into public health programs and be used for the much needed advocacy for complementary feeding. An important prerequisite for development of successful interventions to improve child nutrition is the availability and utilization of appropriate instruments to assess feeding practices and monitor the impact of programs designed to improve them.[18]

Previous studies have reported poor or sub-optimal complementary feeding practices of mothers using varied and indigenous indicators for measuring complementary practices.[2,19,20] The aim of this study was therefore to assess and compare complementary feeding practices of nursing mothers using two different indicators - the WHO IYCF Indicators and the ICFI, and to explore the factors associated with these feeding practices.

2. Methodology

2.1. Study Design and Sampling Procedure

This was a descriptive cross sectional study conducted among mothers or caregivers of children aged 6-24 months attending immunization clinics in selected primary health centers (PHCs) in Ijebu-Ode Local Government Area (LGA). A multistage sampling technique was used to select 283 mother-child pairs from approximately 50% of the PHCs within the local government area.

2.2. Study Variables

The dependent variables for this study were complementary feeding practices including minimum dietary diversity (MDD), minimum meal frequency (MMF), minimum acceptable diet (MAD) and the ICFI. Study covariates include mother's level of education, income, place of work, marital status, and household size. The independent variables include the socio-demographic characteristics of the children including sex, age and birth order of the child. The MDD, MMF and MAD were defined and estimated according to the World Health Organization (WHO) guidelines.[1] MMF was defined as the proportion of children who received complementary foods at least the minimum recommended number of times in the last 24 hours (that is, 2-3 times for 6–8 months and 3-4 times for 9–11months and 3-4 times for children aged 12–23 months in the last 24 hours). For non-breastfed children, the minimum meal frequency was 4 meals in the last 24 hours. MDD was defined as the proportion of children aged 6–23.9 months who received foods from at least four or more varieties of foods out of seven food groups in a 24-hour period.[1, 8] MAD is a composite indicator of MDD and MMF, breastfed children who meet both the MDD and the MMF are considered to have met MAD. For non-breastfed children however, the MDD component of MAD was calculated using 6 food groups (excluding dairy products) and consumption of milk feeds in the last 24 hours. Appropriate complementary feeding was defined in this study as when the child is currently breastfeeding, commenced complementary feeding at age 6 months and meets MMF and MDD. Inappropriate complementary feeding on the other hand was defined as when a child did not meet these criteria.

The Infant and Child Feeding Index (ICFI) was derived as described by Ruel and Menon.[15] The index comprises components namely: breastfeeding, bottle feeding, dietary diversity score, food group frequency score and feeding frequency score. The general scoring system was to assign a score of 'zero' (0) for a potentially harmful practice and a score of at least 'one' (1) for a positive practice. Practices were considered positive or negative on the basis of child feeding recommendations and available scientific evidence about their benefits or risks. The ICFI score was then calculated by adding up the scores obtained from each category, giving a range of 0-12. The ICFI scores obtained were categorized as low (a score of 0-4), medium (a score of 5-8) and high (a score of 9-12).[15]

2.3. Data Collection

A pre-tested semi-structured interviewer-administered questionnaire was used to collect data on socio-demographic characteristics, complementary feeding practices, 24-hour diet recall and food frequency. Two research assistants were trained on the instrument and conducted the interview along with the researchers.

2.4. Statistical Analysis

Quantitative data was entered and coded into IBM SPSS version 20 (IBM Corp., Armonk, N.Y., USA). Data cleaning was done by running the frequencies of all coded variables. Data were summarized using frequencies, percentages, means and standard deviation for descriptive statistics while inferential statistics were summarized as chi square values. Level of significance was set at 95% confidence interval and probability values <0.05. Association between socio-demographic variables and feeding practices were summarized using chi square values.

2.5. Ethical Approval

Ethical approval was obtained from the Ethics Committee of the UI/UCH Institutional Review Board, Institute of Advanced Medical Research and Training, University of Ibadan with reference number - UI/EC/16/0130. Informed consent was obtained from the mothers with an assurance of confidentiality.

3. Results

3.1. Socio-demographic Characteristics of Mother-child Pairs

The mothers were within the ages of 17-43 years with the modal age range being 25-34 years (67.8%). Majority of the mothers were married (93.6%) and most (94.0%) of the mothers had either tertiary (47.7%) or secondary (46.3%) education. Most mothers were employed (90.5%), out of which majority had their workplaces outside the home (86.3%). Approximately half of the mothers (50.4%) had an estimated monthly income of Nigeria Naira ₦10,000 – ₦50,000, (equivalent, US $23-$115) and most mothers were living in households with less than five members (60.8%). The children were within the ages of 6-24 months with the modal age being 9-11 months (42.8%). Most of the children were males (51.6%) and majority of the children (95.4%) were brought on every appointment day to the health facilities.

3.2. Complementary Feeding Practices using the WHO IYCF Indicators

A large percentage (85.5%) of the children did not receive meals comprising the recommended number of food groups in a 24h period. Similarly, 66.4% of the children were not fed the appropriate number of meals in a day as recommended for their ages. When these two indicators were brought together in a composite indicator, only 9.2% met the minimum acceptable diet recommendation. 49.1% of the mothers introduced complementary feeds either too early (32.1%) or too late (17.0%). Only 4.2% of the mothers practiced appropriate complementary feeding (Table 1). The 24h dietary recall revealed that majority of the respondents gave grains/roots/tubers (92.6%) followed by dairy products (50.9%). A lower percentage gave eggs (23%) and pulses/legumes/nuts (21.9%) while very few mothers gave Vitamin A rich fruits and vegetables (16.6%) and other fruits and vegetables (3.2%) on the preceding day of the survey.

3.3. Complementary Feeding Practices using the Infant and Child Feeding Index (ICFI)

Feeding practices assessed using the ICFI components and categories showed that more than half of the respondents had low dietary diversity scores (61.8%) while less than half had average feeding frequency scores (42.0%). Overall, 63.6%, 24.7% and 11.7% of the respondents had 'average', 'high' and 'low' ICFI scores respectively (Table 2). The mean dietary diversity and food group frequency scores were lowest among children 6-8 months (1.27±0.61) and (1.53±0.59) respectively and highest among children 12-24 months (1.66±0.76) and (2.12±0.59) respectively.

3.4. Factors associated with Complementary Feeding Practices using WHO IYCF Indicators

A cross tabulation of socio-demographic variables and complementary feeding practices revealed that variables such as mother's place of work, antenatal care use and child welfare clinic attendance showed statistically significant ($p<0.05$) associations with feeding practices (Table 3). Appropriate complementary feeding also increased with increasing level of mother's education.

3.5. Factors associated with Complementary Feeding Practices using ICFI

Complementary feeding practices scored using the Infant and Child Feeding Index categories showed statistically significant associations with mother's education and household size. High ICFI scores also increased with increasing level of mother's education (Table 4).

4. Discussion

4.1. Discussion

This study assessed the appropriateness of complementary feeding practices and associated factors among nursing mothers. The target age range for complementary feeding is generally taken to be 6 to 24 months of age, even though breastfeeding may continue beyond two years.[21] This age range was put into consideration in this study. Other studies however have assessed complementary feeding among a broader age range of under-five children.[19,22]

More than half of the mothers in this study introduced complementary foods at age 6 months (50.9%). Other studies from Ghana[23] and Eastern Ethiopia[24] have reported higher proportions of 61.2% and 66.9% respectively, while in a similar study done in India only 13% of the respondents had introduced complementary feeds at 6 months.[25] Regarding early

Table 1: Complementary feeding practices of mothers using the WHO infant and young child feeding indicators

Indicator	6-8 mo		9-11 mo		12-24 mo		6-24 mo	
	N	%	N	%	N	%	N	%
Minimum meal frequency								
Met	36	12.7	36	12.7	23	8.1	95	33.6
Not met	26	9.2	85	30.0	77	27.2	188	66.4
Minimum dietary diversity (≥4 food groups)								
Met	5	1.8	19	6.7	17	6.0	41	14.5
Not met	57	20.1	102	36.0	83	29.3	242	85.5
Minimum Acceptable diet								
Met	5	1.8	13	4.6	8	2.8	26	9.2
Not met	57	20.1	108	38.2	92	32.5	257	90.8
Timely introduction of complementary foods at 6 months								
Met	24	8.5	64	22.6	56	19.8	144	50.9
Not met	38	13.4	57	20.1	44	15.5	139	49.1
Currently Breastfeeding								
Yes	61	21.6	117	41.3	74	26.1	252	89.0
No	1	0.4	4	1.4	26	9.2	31	11.0
Bottle-fed in the past 24h								
Yes	38	13.4	35	12.4	26	9.2	99	35.0
No	24	8.5	86	30.4	74	26.1	184	65.0
Appropriate Complementary Feeding								
No (Inappropriate)	60	21.2	117	41.3	94	33.2	271	95.8
Yes (Appropriate)	2	0.7	4	1.4	6	2.1	12	4.2

introduction of complementary foods (before the age of 6 months) we observed this in 32.1% of our study respondents, contrasting with findings from other locations in the South-West[26] and South-South[27] regions of Nigeria where 53.0% and 79.0% respectively introduced complementary feeding before the expected 6 months of age. Only few respondents in this study introduced complementary foods after the age of 6 months (17.0%). Breast milk is no longer sufficient to meet the nutritional requirements of an infant after six months and failure to introduce complementary feeds at the appropriate age results in growth faltering which can predispose to malnutrition especially when associated with recurrent infections which are common about this stage.[28]

The minimum dietary diversity and minimum meal frequency were met by only 14.5% and 33.6% of the respondents respectively. The prevalence of these two indicators was lower than the 2013 prevalence reported (16%) and (56%) respectively in a Nigerian study on the trends of complementary feeding indicators from 2003 to 2013.[11] However, the proportion that met the minimum acceptable diet (9.0%)[11] was consistent with this present study (9.2%). Breastfed children who met the acceptable diet and have started complementary feeding at six months were considered to have appropriate complementary feeding. Thus, the prevalence of appropriate complementary feeding in this study was 4.2%, using the WHO indicators. This was much lower than that reported in a study conducted in Northern Ghana[12] where 15.7% received appropriate complementary feeding.

Furthermore, the twenty-four hour dietary recall revealed that more than half of the mothers

Table 2: Complementary feeding practices of mothers using the infant and child feeding index components

ICFI Components	6-8 mo		9-11 mo		12-24 mo		6-24 mo	
	N	%	N	%	N	%	N	%
Breastfeeding								
Yes	61	21.6	117	41.3	74	26.1	252	89.0
No	1	0.4	4	1.4	26	9.2	31	11.0
Bottle feeding								
Yes	38	13.4	35	12.4	26	9.2	99	35.0
No	24	8.5	86	30.4	74	26.1	184	65.0
Dietary Diversity Score								
Low (0)	50	17.7	74	26.1	51	18.0	175	61.8
Medium (1)	7	2.5	28	9.9	32	11.3	67	23.7
High (2)	5	1.8	19	6.7	17	6.0	41	14.5
Food group frequency score								
Low (0-2)	32	11.3	41	14.5	12	4.2	85	30.0
Medium (3-4)	27	9.5	68	24.1	64	22.6	159	56.2
High (5-6)	3	1.1	12	4.2	24	8.5	39	13.8
Feeding Frequency score								
Low (0)	6	2.1	31	11.0	16	5.6	53	18.7
Medium (1)	17	6.0	53	18.7	49	17.3	119	42.0
High (2)	39	13.8	37	13.1	35	12.4	111	39.2
ICFI Categories								
Low (0-4)	6	2.1	16	5.7	11	3.9	33	11.7
Medium (5-8)	45	15.9	68	24.0	67	23.7	180	63.6
High (9-12)	11	3.9	37	13.1	22	7.8	70	24.7

gave grains/roots/tubers (92.6%) followed by dairy products (50.9%). This differs from the results of a study conducted among children in Northern Uganda[29] where it was reported that only 35.2% gave cereals, 0.9% gave tubers and 0.5% gave dairy products. Mothers in this study seemed to place minimal importance on protein and micronutrient-rich foods such as legumes, fruits, vegetables, and milk and meat products. Complementary foods of children should be varied and nutrient dense with at least 4 food groups represented in the foods offered in a 24 hour period.

The Infant and Child Feeding Index (ICFI) mean scores varied among the different age groups of the children with the 9-11 months and 6-8 months having the highest and lowest ICFI mean scores respectively. Among the five components of the ICFI, both the mean food group frequency score (FGFS) and dietary diversity score (DDS) were highest among 12-24 months old children and lowest among 6-8 months old children. This reveals greater vulnerability to poor feeding in children of the younger age group, as also observed by researchers in India[17] where FGFS differed between children less than 12 months of age and those more than 12 months. They however did not observe any differences in the dietary diversity scores (DDS) of the children.

In this study, both the WHO IYCF Indicators and the Infant and Child Feeding Index reflected complementary feeding practices more holistically than just one or few behaviors studied separately. This finding reiterates the justification for the measurement of feeding practices in children aged 6 months and older, as this involves assessing various dimensions of feeding simultaneously.[10] However, a significantly greater proportion of respondents fell into the category of inappropriate complementary feeding practices when assessed using the WHO IYCF indicators.

Table 3: Comparison between mothers who practiced appropriate complementary feeding and those who do not among socio demographic variables

Variable	Appropriate complementary feeding (%)	Inappropriate complementary feeding (%)	Pearson's χ^2 value	*P*
Highest level of Education				
No formal education	0.0	1.4	3.937[a]	0.268
Primary	0.0	4.6		
Secondary	1.1	45.2		
Tertiary	3.2	44.5		
Place of work				
Work at home	2.0	11.7	9.837[a]	0.002
Work outside home	2.3	84.0		
ANC Use				
<4 times	2.5	26.5	5.248[a]	0.022
≥4 times	1.8	69.3		
CWC Attendance				
Every appointment day	3.5	91.9	4.168[a]	0.041
Once in a while	0.7	3.9		
Household size				
<5	3.2	57.6	1.063[a]	0.302
≥5	1.1	38.2		

Table 4: Comparison between mothers who have high, medium and low infant and child feeding index scores among socio demographic variables

Variable	Low ICFI score (%)	Medium ICFI score (%)	High ICFI score (%)	Pearson χ^2 value	*P*
Mother's level of Education					
No formal education	0	1.4	0	15.648[a]	0.016
Primary	1.1	3.2	0.4		
Secondary	6.4	31.8	8.1		
Tertiary	4.2	27.2	16.3		
Place of work					
Work at home	0.8	8.2	4.7	2.715[a]	0.257
Work outside home	10.9	55.1	20.3		
ANC Use					
<4 times	2.8	17.7	8.5	1.444[a]	0.486
≥4 times	8.8	45.9	16.3		
Household size					
<5	5.3	37.5	18.0	7.805[a]	0.020
≥5	6.4	26.1	6.7		

With respect to the factors associated with complementary feeding practices using both tools, some disparities were observed; the ICFI components and categories were associated with mother's level of education and household size while the WHO IYCF indicators were associated with antenatal care use, mother's workplace and child welfare clinic attendance. A study conducted in South West Nigeria[30] however,

reported an association between feeding practices and maternal employment, where mothers that worked outside the home were found to have better feeding practices when compared to the non-working mothers and those that worked at home.

4.2. Limitations of the Study

The assessment of children's feeding was based on their mother's recall of foods consumed. This could have resulted in a recall bias as some mothers could overestimate or underestimate their children's food intake or not be as observant as required. Secondly, not all mothers patronize primary health facilities, though the respondents form a representative sample. Moreover, the study was cross sectional and only provided a descriptive snapshot of the complementary feeding practices of mothers at the period of the study. Longitudinal studies will further ascertain the determinants and possible effects of these feeding practices, particularly on child nutritional status.

5. Conclusion and Global Health Implications

Our findings revealed a high prevalence of inappropriate complementary feeding practices among the nursing mothers. The use of composite indices reflected these practices and their associated factors holistically as they revealed different dimensions of complementary feeding. This may be useful for monitoring, evaluation, research and the required advocacy for complementary feeding. The development of successful intervention strategies to improve complementary feeding requires appropriate instruments to assess existing practices and to keep track of the effectiveness of these interventions.

Compliance with Ethical Standards

Conflict of Interest: *Authors declare they have no conflicts of interest.* ***Funding:*** *The research was funded by the authors.* ***Ethical Approval:*** *Study was approved by the UI/UCH Institutional Ethical Review Board, University of Ibadan and a letter of permission was issued by the Primary Health Care Department of Ijebu-Ode LGA.* ***Acknowledgements:*** *The authors wish to thank the Chairman and PHC Director of Ijebu-Ode Local Government Area of Ogun State (2016) for their support in the course of data collection.*

Key Messages

- Complementary feeding practices of mothers were poor as shown by the high prevalence of inappropriate complementary feeding practices.
- Composite indices reflect feeding practices holistically, hence are very useful for assessing complementary feeding practices.
- Factors such as mother's education, mother's workplace, antenatal care visits, child welfare clinic attendance and household size were associated with feeding practices.

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