ORIGINAL ARTICLE

Determinants of timely initiation of complementary feeding among children aged 6-24 months in Sagamu, Nigeria

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Abstract

Background: Poor breastfeeding and complementary feeding practices may contribute to childhood malnutrition in the developing world.

Objective: The objective was to examine the determinants of timely initiation of complementary feeding among Nigerian children.

Materials and Methods: Using a cross-sectional design, children aged 6-24 months were surveyed in a Nigerian Teaching Hospital. Children with timely initiation of complementary feeding (6-8 months) were compared with children with untimely initiation of complementary feeding early (<6 months and >8 months) for clinical and social characteristics using both bivariate and multivariate analysis.

Results: Of 156 children, 41%, 53.8%, and 5.1% had timely, early and delayed initiation of complementary feeding. Complementary feeding was initiated with processed cereals (44.8%), locally prepared maize gruel (32.1%) and mashed family diet (23.1%). Bivariate analysis showed significant association between timely initiation of complementary and orthodox maternity care, no prelacteal feeding, exclusive breastfeeding, no siblings and first birth order. Parental education was not associated with timely initiation of complementary feeding. Multivariate analysis identified orthodox maternity care, exclusive breastfeeding and no siblings as independent predictors of timely initiation of complementary feeding.

Conclusion: Complementary feeding is most frequently initiated earlier than 6 months in this population. Good breastfeeding practices may influence timely initiation of complementary feeding. Interventions should be targeted at the entire population irrespective of educational and socioeconomic status.

Key words: Breastfeeding, malnutrition, supplementary feeding, weaning

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Introduction

The World Health Organization (WHO) estimates that malnutrition is an underlying contributor to up to 45% of under-five deaths.[1] Reports from various parts of the developing world agree on the high prevalence of childhood malnutrition[2,3] and the prominent role of malnutrition as a major contributor to under-five deaths.[4,5] Childhood malnutrition is often multifactorial in etiology. The spectrum spans through increased caloric and nutrients demand for rapid growth, inadequate intake of calories and nutrients and increased consumption of calories and nutrients occasioned by infections, infestations and diseases.[6] Community-based and hospital-based studies[7-9] conducted in different parts of the developing world have identified risk factors for malnutrition to include inappropriate infant feeding practices and family characteristics, which do not support or promote appropriate breastfeeding. Infant feeding encompasses breastfeeding and complementary feeding.

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The challenges of appropriate breastfeeding practices are well-known from studies within and outside Nigeria.[10-13] On the other hand, complementary feeding, which refers to the gradual introduction of nonmilk diet from the age of 6 months,[14] is less researched in many parts of the developing including Nigeria. Following the introduction of the Baby Friendly Hospital Initiative in 1990, attention, with respect to infant feeding, has been largely focused on breastfeeding practices and the attendant challenges. Attention is currently shifting from breastfeeding practices to complementary feeding as it appears the gains of successful breastfeeding according to the Baby Friendly Hospital Initiative tenets seem to be negated when complementary feeding is inappropriately carried out. The WHO also concurs that time of commencement of complementary feeding may be the onset of malnutrition in many cases.[14]

The WHO has highlighted the characteristics of complementary feeding to include timely initiation, adequacy, safety and availability.[14] The WHO recommends that complementary feeding be commenced at the age of 6 months and the frequency of nonmilk feeding should gradually increase until 24 months.[14] It is important to know which aspect of complementary feeding is most essential in the causation of childhood malnutrition. A few studies[8,15] have described inappropriate initiation of complementary feeding while another[16] have identified poor consistency and adequacy as the likely risk factors.

This study is in tandem with the WHO's stance that the age at which complementary feeding is commenced may be linked with the onset of malnutrition in many children.[14] It is imperative to examine current practices with regards to the initiation of complementary feeding in order to evaluate the consistency of the practices with the WHO recommendations. This is because studies on the current pattern of complementary feeding in Nigerian populations are sparse. Therefore, this study was conceived to determine the sociodemographic factors which may determine the initiation of complementary feeding in a population of under-five Nigerian children.

Materials and Methods

This cross-sectional survey was carried out at the children's ward of the Olabisi Onabanjo University Teaching Hospital, Sagamu, Southwest Nigeria. The hospital provides general and specialized pediatric care services for the populace within Sagamu, other communities in other parts of Ogun State and neighboring Lagos and Ondo States of Nigeria. Children who are transferred from the children emergency room following stabilization as well as those who are recuperating from nonemergency conditions are usually hospitalized in the children's ward of the hospital.

The subjects were mother-infant pairs. The children aged between 6 months and 24 months were hospitalized in the children's ward of the hospital between January 2010 and December 2012 for morbidities not directly related to malnutrition. The study was time-limited and sampling was done purposively. Institutional ethical approval was obtained from the Ethics Committee of the Hospital and informed consent was obtained from the parents staying with the children during hospitalization. Only the children of consenting parents were enrolled into the study.

The research tool was a pretested semi-structured questionnaire. The data obtained during the survey included the demographic characteristics of the child and family, parental occupation and highest education and the details of feeding pattern from birth (including prelacteal feeding, exclusive breastfeeding for the first 6 months of life, initiation of complementary feeding and type of food used for the initiation of complementary feeding). The family characteristics including maternal age, type of family setting, number of siblings and birth order were also recorded. Initiation of complementary feeding between 6 and 8 months was described as timely while commencement before 6 months or beyond 8 months was described as untimely.

Places of antenatal care and delivery were designated as orthodox (government and private clinics and hospitals) or unorthodox (residential, traditional or spiritual birth homes). Socioeconomic classification of the family into Classes I-V was derived from the scoring of the educational qualification and present occupation of both parents as previously recommended.[17] This method of classification re-classified Classes I and II as upper, III as middle and Classes IV and V as the lower classes. Parental education was classified into low (no formal schooling and primary) or high (secondary and tertiary). The weight (in kg) and the length/height (in cm) were recorded for each child according to standard methods as previously described.[18] These anthropometric parameters were used to derive the respective weight-for-height (WFH) Z-score on the WHO WFH charts.[19] In this study, WFH Z-score between −2 standard deviation (SD) and +2 SD defined normal nutrition, WFH Z-score between < −2 SD and −3 SD defined moderate malnutrition while WFH Z-score < −3 SD defined severe malnutrition.[19]

Sociodemographic parameters of children with timely or untimely initiation of complementary feeding were compared using odds ratio (OR) and 95% confidence interval (CI). Multivariate analysis with binary logistic regression was used to determine variables with independent predictors of timely initiation of complementary feeding. Variables with significant association with timely initiation of complementary feeding, judging from the results of bivariate analysis, were entered into the regression model as independent variables after controlling for age. The data was managed using the SPSS version 17.0 software

(SPSS Inc, Chicago). Statistical significance was defined by CI excluding unity and $P < 0.05$.

Results

A total of 156 children aged between 6 months and 24 months were studied. They comprised 92 (59.0%) males and 64 (41.0%) females. Age distribution revealed that 52 (33.3%), 50 (32.1%) and 54 (34.6%) were aged 6-12 months, 13-18 months and 19-24 months, respectively. All the children were ever breastfed and had also been commenced on complementary feeding. The mothers were aged 19-43 years distributed as follows: <20 years (14; 8.9%), 21-30 years (83; 53.2%), 31-40 years (38; 24.4%) and >40 years (21; 13.5%). Forty-eight (30.8%) mothers were primiparous, while 108 (69.2%) were multiparous.

Timing of initiation of complementary feeding

Overall, 64 (41.0%) had timely initiation of complementary feeding, 84 (53.8%) had early initiation while 8 (5.1%) had delayed initiation. Therefore, 92 (59.0%) had untimely initiation of complementary feeding. The mean age of the children who had timely initiation of complementary feeding at the commencement of feeding was 6.4 ± 0.8 months, while the mean age of children who had early initiation of complementary feeding at the time of commencement of feeding was 3.9 ± 0.8 months. Similarly, the mean age of the children who had delayed initiation of complementary feeding at the commencement of feeding was 11.0 ± 0.9 months. Thirty-four (53.1%) children with timely initiation of complementary feeding were males compared with 58 (63.0%) of those with untimely initiation of complementary feeding (OR = 0.6; CI = 0.33-1.34; $P = 0.215$)

Types of foods used for complementary feeding

Complementary feeding was mostly initiated using processed cereals (70; 44.8%). Locally prepared maize gruels (pap) was used among 50 (32.1%), while 36 (23.1%) were introduced to complementary feeding using mashed family diet.

Comparison of the sociodemographic characteristics of children with timely and untimely initiation of complementary feeding

Tables 1 and 2 show that similar proportions of children with timely or untimely initiation of complementary feeding were introduced to complementary feeding using processed cereals (37.5% vs. 45.7%). In addition, there was no statistically significant difference in the proportions of children with timely and untimely initiation of complementary feeding belonging to parents who were aged <30 years (70.3% vs. 56.5%), lived together in the same house (84.4% vs. 91.3%), belonging to mothers with low education (54.8% vs. 72.8%), belonging to fathers with low education (56.2% vs. 56.5%) or belonging to families in the lower socioeconomic Classes IV and V (64.1% vs. 66.3%).

Table 1: Sociodemographic parameters of mothers with and without timely initiation of complementary feeding

Parameters	Timely group (*n*=64)	Untimely group (*n*=92)	Statistics
Age			
≤30 years	45 (70.3)	52 (56.5)	OR=1.2 (0.88-3.80), *P*=0.08
>30 years	19 (29.7)	40 (43.5)	
Orthodox antenatal care			
Yes	60 (93.8)	62 (67.4)	OR=7.3 (2.2-25.96), *P*<0.001
No	4 (6.2)	30 (32.6)	
Orthodox place of delivery			
Yes	50 (78.1)	58 (63.0)	OR=2.1 (1.01-4.56), *P*=0.04
No	14 (21.9)	34 (37.0)	
Family type			
Monogamous	60 (93.8)	70 (76.1)	OR=4.7 (1.43-17.99), *P*=0.004
Polygamous	4 (6.2)	22 (23.9)	
Number of siblings			
None	28 (43.8)	12 (13.0)	OR=5.1 (2.23-12.26), *P*<0.001
≥1	36 (56.2)	80 (87.0)	
Birth order			
1st	28 (43.8)	20 (21.7)	OR=2.8 (1.31-5.99), *P*=0.003
≥2nd	36 (56.2)	72 (78.3)	
Parents living together			
Yes	54 (84.4)	84 (91.3)	OR=0.5 (0.17-1.53), *P*=0.183
No	10 (15.6)	8 (8.7)	
Mother works outside home			
Yes	54 (84.4)	62 (67.4)	OR=2.6 (1.10-6.33), *P*=0.01
No	10 (15.6)	30 (32.6)	
Maternal education			
High	27 (42.2)	25 (27.2)	OR=1.9 (0.94-4.07), *P*=0.055
Low	37 (54.8)	67 (72.8)	
Paternal education			
High	28 (43.8)	40 (43.5)	OR=1.0 (0.50-4.07), *P*=0.973
Low	36 (56.2)	52 (56.5)	
Socioeconomic classes			
I-III	23 (35.9)	31 (33.7)	OR=1.1 (0.54-2.27), *P*=0.772
IV-V	41 (64.1)	61 (66.3)	

OR=Odds ratio

Table 2: Feeding practices of mothers with and without timely initiation of complementary feeding

Practices	Timely group (*n*=64)	Untimely group (*n*=92)	Statistics
Prelacteal feeding			
Yes	18 (28.1)	44 (47.8)	OR=0.4 (0.20-0.89), *P*=0.01
No	46 (71.9)	48 (52.2)	
Exclusive breastfeeding			
Yes	42 (65.6)	18 (19.6)	OR=7.8 (3.57-17.47), *P*<0.001
No	22 (34.4)	74 (80.4)	
Type of complementary feed			
Pap/family diet	40 (62.5)	50 (54.3)	OR=1.4 (0.69-2.83), *P*=0.311
Processed cereals	24 (37.5)	42 (45.7)	

OR=Odds ratio

On the other hand, compared with children who had untimely initiation of complementary feeding, significantly higher proportions of children who had timely initiation of complementary feeding belonged to mothers who received orthodox antenatal care (OR = 7.3; $P < 0.0001$), who were delivered in orthodox health facilities (OR = 2.1; $P = 0.045$), did not receive prelacteal feeding (OR = 0.4; $P = 0.013$) and were exclusively breastfed for the first 6 months of life (OR = 7.8; $P < 0.0001$).

In addition, timely initiation of complementary feeding was significantly associated with monogamous family setting (OR = 4.7; $P = 0.004$), no sibling (OR = 5.2; $P < 0.0001$), were of the first birth order (OR = 2.8; $P = 0.03$) and mothers who were not working outside the home (OR = 2.6; $P = 0.017$).

Multivariate analysis of predictors of timely initiation of complementary feeding

Using binary logistic regression model, Table 3 shows that independent predictors of timely initiation of complementary feeding included orthodox antenatal care (OR = 12.4), exclusive breastfeeding (OR = 12.4), absence of siblings (OR = 9.2) and mothers who did not work outside home (OR = 3.6).

Nutritional status

Overall, 91 (58.3%) children had normal nutritional status, 29 (18.6%) had moderate malnutrition while 36 (23.1%) had severe malnutrition. Fourteen (21.9%) of children with timely initiation of complementary feeding had malnutrition compared with 51 (55.4%) of children with untimely initiation of complementary feeding. The difference in the prevalence of malnutrition was statistically significant (OR = 4.4, CI = 2.04–9.78; $P < 0.001$).

Discussion

This study revealed that all the children had been commenced on complementary feeding. However, only two-fifth of the children had timely initiation of complementary feeding and that presumably puts the remaining three-fifth at risk of malnutrition. Indeed, the present study suggested a relationship between untimely initiation of complementary feeding and poor nutritional status. This is in consonance with previous reports.[20-22] This observation may be explained in terms of the higher risk of infections and the deficit in the intake of calories which occurs by virtue of early or late initiation of complementary feeding respectively. Therefore, ensuring timely initiation of complementary feeding may be a crucial step towards the reduction of the prevalence of malnutrition in the population studied.

Table 3: Multivariate analysis of independent determinants of timely initiation of complementary feeding

Variables	OR	*P* values	95% CI
Orthodox antenatal care	12.4	0.001	3.25-23.56
Orthodox delivery	0.4	0.062	0.06-1.07
No prelacteal feeding	0.7	0.521	0.23-2.04
Exclusive breastfeeding	12.4	0.000	5.69-25.72
Monogamous family	2.9	0.207	0.60-10.86
No sibling	9.2	0.021	1.49-12.95
First birth order	0.5	0.542	0.06-4.28
Working outside home	3.6	0.002	2.01-16.32

OR=Odds ratio; CI=Confidence interval

The rate of timely commencement of complementary feeding observed in this study was remarkably lower than 89.7% recorded in a Chinese population[11] and 58% in India.[13] This may reflect differences in the levels of awareness of the different populations with respect to appropriate infant feeding practices. Unfortunately, similar data in the Nigerian setting are not available.

More than half of the population studied had early initiation of complementary feeding. This was similar to 75% observed in Cameroun[23] and 40% in Nepal,[24] but higher than 25% in India.[25] Indeed, the recommended age of 6 months for the commencement of complementary feeding has both nutritional and behavioral implications. Apart from providing extra calories and other nutrients needed to meet the shortfall in the supplies obtainable from breast milk, complementary feeding also teaches the infant the act of chewing whether or not tooth eruption has started.[26] Going with this arrangement is the readiness of the gastrointestinal tract in terms of mechanical and enzymatic activities required for digestion.[6] Therefore, too early commencement of complementary feeding prematurely displaces breast milk, which is still optimal in meeting the nutritional needs of the body at that phase of life. It also allows contact between the ill-prepared gastrointestinal tract and various microbes contained in common complementary feeds.[27] That increases the likelihood of inadequate nutrition in addition to infections and infestations. The practice of early commencement of complementary feeding has been reported in a previous Nigerian study to be a leading risk factor for malnutrition among under-five children.[7] This is contrary to other reports, which suggested that delayed initiation of complementary feeding was a leading risk factor for childhood malnutrition.[8,9] Only 1 out of every 20 children in the present study had delayed initiation of complementary feeding and this low rate may be re-assuring. This is because delayed commencement of complementary feeding deprives the child of additional calories and nutrients at a time when the breast milk supplies are no longer sufficient to maintain optimal growth.[6]

This study suggests that good exclusive breastfeeding practices are associated with timely initiation of complementary

feeding. Exclusive breastfeeding and nonusage of prelacteal feeding were significantly associated with timely initiation of complementary feeding. It may appear that good knowledge of breastfeeding and infant feeding practices generally, may be responsible for the observed trends. This is not surprising as orthodox maternity care was also associated with timely initiation of complementary feeding in the present study as previously observed in India.[28] It is attractive to postulate that, the opportunity of receiving orthodox maternity care services provides further benefits of counseling on issues relevant to child care, including breastfeeding and infant feeding practices. Previous studies have demonstrated the positive relationship between utilization of orthodox maternity care services and good infant feeding practices among Nigerians.[10]

Unlike previous studies which have demonstrated the positive roles of maternal education on good breastfeeding practices,[10] there was no significant relationship between high parental education and timely commencement of complementary feeding in this study. This presumably suggests that, the practice of timely initiation of complementary feeding is less related to individual educational attainment. This is likely to be related to the need to reduce breastfeeding and commence other forms of feeding, as part of the preparations for work resumption. Whilst this may be a matter of compliance with job policies for employed highly educated mothers, it may be a matter of ignorantly seeking liberty from the burden of child care for poorly educated mothers who are either self-employed or employed as artisans. The absence of such job pressures among mothers who do not work outside home may explain the significant relationship with timely initiation of complementary feeding observed among them.[28] These explanations will also be applicable to the nonassociation observed between socio-economic classes and timely initiation of complementary feeding in the present study. The lack of association between parental education, socio-economic classes and timely initiation of complementary feeding, unlike previous reports about exclusivity of breastfeeding,[10] suggests that timely initiation of complementary feeding is an entirely different challenge in infant feeding. Therefore, interventions are desired to bring timely initiation of complementary feeding to the limelight of health education and public enlightenment, just as it has been done with respect to timely initiation and exclusivity of breastfeeding.

Families in the monogamous setting were more likely to initiate complementary feeding at the other time as they are less likely to have economic pressures which take mothers outside home unlike those in polygamous settings.[13] In the same vein, the absence of siblings and belonging to the first birth order favor timely initiation of complementary feeding presumably because mothers are less stressed and more likely to be compliant with health directives. Therefore, health education efforts should be concentrated on mothers with multiple children. It may also be attractive to provide incentives in the form of food supplementation or other forms of empowerment to this category of mothers in order to reduce their economic stress and enhance their adherence to recommended infant feeding practices. Women in the child-bearing age need to be supported by the husbands, relations and employers to encourage appropriate breastfeeding and infant feeding practices.

The relatively high occurrence of some parameters (such as prelacteal feeding, monogamous family setting and first birth order ranking) in both comparison groups may explain the loss of their significant association with timely initiation of complementary feeding at the level of multivariate analysis.

Conclusion

The prevalence rate of timely initiation of complementary feeding in the population studied was low. Rather, complementary feeding was most frequently initiated earlier than 6 months. Orthodox maternity care services and good breastfeeding practices influence timely initiation of complementary feeding. The lack of association between parental educational attainment, socioeconomic classes and timely initiation of complementary feeding suggests that the challenge of poor infant feeding practices cuts across the board. Therefore, interventions, particularly in the form of health education, should be targeted at the entire population irrespective of educational and socioeconomic status.

The major limitation of this study is the hospital-based design but this might not influence the interpretation of the findings or the applicability of the findings to the general population since the subjects were drawn from the same population *ab-initio*.

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