Asian Journal of Medicine and Health

17(4): 1-21, 2019; Article no.AJMAH.53821
ISSN: 2456-8414

Effect of Infant and Young Child Feeding Practices on the Nutritional Status of Children 0-24 Months of Age in Port Harcourt, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author NST designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors BAAH and IOG managed the analyses of the study. Authors BAAH and IOG managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJMAH/2019/v17i430170
Editor(s):
(1) Dr. Raouf Afifi, SA Consultancy and Training, Health Research Institute, Cairo, Egypt and ITM-HS, Indianapolis Indiana, USA.
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(2) Jorge Castro Bedriñana, Universidad Nacional del Centro del Perú, Peru.
Complete Peer review History: http://www.sdiarticle4.com/review-history/53821

Original Research Article

Received 20 November 2019
Accepted 26 January 2020
Published 03 February 2020

ABSTRACT

Background: Childhood under-nutrition is prevalent in many developing countries including Nigeria, and is an underlying cause for more than half of all childhood deaths. Based on the recent Nigeria Demographic and Health Survey (NDHS), the prevalence of under-nutrition between 2008 and 2013 has risen, despite an increase in exclusive breastfeeding (EBF) rate over the same period.

This study was carried out to assess the effect of infant and young child feeding practices on , nutritional status of children 0 – 24 months in Port Harcourt, Nigeria.

Subjects and Methods: Data were collected between November and December 2016 from 307 mother-child (aged 0 – 24 months) pairs attending six health centres in Port Harcourt using a pretested self-administered questionnaire. Data collected included maternal and child socio-demographics, mother's infant feeding practices, 24-hour dietary recall and anthropometric measurements. Data were analysed using SPSS version 20.0.

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Results: The mean age of the children was 5.6±6.1 months, 207 (67.4%) were under 6 months of age and 100 (32.6%) between the ages of 6 to 24 months. Three hundred and three (98.7%) children were breastfed. The rate of exclusive breastfeeding was 51.7% among the children aged 0 – 5.9 months. The mean age at which breastfeeding was stopped was 9.3±5.5 months. The average age at which complementary foods were started was 4.4±1.8 months. All the children on complementary feeding met the minimum feeding frequency, but only 43 (33.6%) met the minimum dietary diversity of 4 or more food groups. Overall, 111 (36.2%) children were fed according to WHO recommendation. 10.1% of the children were overweight/obese, 5.5% were wasted, 6.2% were underweight and 8.8% were stunted. Lack of EBF was positively associated with stunting (p = 0.024).

Conclusion: Infant and Young Child Feeding practices among mothers in Port Harcourt fall short of the WHO recommendations, resulting in various types of malnutrition among the children. Therefore, more emphasis should be laid on growth monitoring and promotion services and age-specific nutritional counseling to parents and care-givers.

Keywords: Young child; feeding practices; care-givers; nutritional status.

1. INTRODUCTION

Adequate nutrition in the first two years of life is essential to ensure the growth, health, and development of children to their full potential and would reduce the prevalence of undernutrition [1,2]. Childhood under nutrition is prevalent in many developing countries, particularly in sub-Saharan Africa including Nigeria [3]. Globally in 2018, 149 million children under five were estimated to be stunted and 49 million to have low weight-for-height (wasted), mostly as a consequence of poor feeding and repeated infections [4]. Undernutrition is known to be the underlying factor for an estimated 1.3 million childhood deaths and more than ten per cent of the global disease burden in children annually [5]. Not only does undernutrition contribute to a high disease burden and mortality in childhood, early undernutrition also has long term effects on physical and cognitive development into adulthood [6].

Although economic factors are important determinants of nutritional status, feeding practices are often stronger determinants of childhood nutritional status, independent of socioeconomic determinants [7,8]. In recognition of the role of infant and young child feeding practices on the nutritional status of children under two, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) in 2002 launched the "Global Strategy for Infant and Young Child Feeding" which encompass both breastfeeding and complementary feeding practices [5]. This practice which is termed 'Optimal Infant and Young Child Feeding' ensures not only optimal physical and cognitive development, but also lowers the incidence of disease and mortality among children, especially under-five [5].

According to the WHO, globally an estimated 1 million lives could be saved each year through optimal infant and young child feeding practices [5]. This is particularly important in resource limited settings, such as Nigeria where childhood undernutrition is an underlying cause of more than half of all childhood deaths [9]. In such settings, optimal infant and young child feeding practices have been regarded as crucial to the survival of infants [9].

However, despite the unparalleled benefits of optimal infant feeding, less than 35% of infants worldwide are exclusively breastfed during the first six months of life [10]. Data from Australia puts exclusive breast feeding (EBF) rate by five months at 15% [11]. In Ghana, an estimated 84% of children younger than two months are exclusively breastfed, nevertheless, by the age of four to five months, only 49% continue to receive exclusive breastfeeding [12]. A study from Kano, northern Nigeria, reported that the proportion of mothers who exclusively breastfed their babies for 1 month, 3 months and 6 months were 26.0%, 24.8%, and 22.0%, respectively [13]. Similar to this finding from northern Nigeria, a study from southern Nigeria reported that only 21.2% of mothers practiced exclusive breastfeeding for all their children whereas up to 51.6% had never practiced exclusive breastfeeding with any child [14].

Reports have shown that despite continuous breastfeeding messages and the launch of the Global Strategy for Infant and Young Child Feeding over ten years ago, the EBF rate in Nigeria is still very low [13,15]. Complementary

feeding practices are also poor [16,17]. Unfortunately poor complementary feeding practices undermine the benefits of exclusive breast feeding and annually, an estimated 600,000 lives are lost globally from not continuing breastfeeding with proper complementary feeding [5,18].

Although the most recent Nigeria Demographic and Health Survey (NDHS) reported an increase in EBF rates from 13% in 2008, 17% in 2013,the prevalence of wasting and underweight over the same period increased from 14% to 18%, and 23% to 29%, respectively, particularly among children older than six months [19]. This may have resulted from poor complementary feeding practices, yet most studies on optimal infant feeding in Nigeria have focused mainly on exclusive breast feeding for six months, with less focus on complementary feeding and continued breast feeding up to two years and beyond [13,14,15]. Additionally, although several studies have reported poor infant feeding practices, there is little data on the direct nutritional impact of such feeding practices [15,20,21]. This study is therefore being carried out to assess the infant and young child feeding practices among mothers in Port Harcourt and determine any relationship between this and the nutritional status of the children.

1.1 Research Questions

1. Are the Infant and Young Child Feeding (IYCF) practices among mothers in Port Harcourt in accordance with the WHO recommendations?
2. What is the prevalence of malnutrition among children aged 0 – 24 months in Port Harcourt?
3. What is the relationship between the feeding practices and nutritional status of the children in Port Harcourt?

1.2 Null Hypothesis

1. There is no significant relationship between infant and young child feeding practices and the nutritional status of children aged 0 – 24 months in Port Harcourt.

2. SUBJECTS AND METHODS

2.1 Study Area

Rivers State is located in the Southern part of Nigeria and comprises 23 local government areas (LGAs), of which Port Harcourt is the capital. The projected population of Rivers State for 2015 is 6,592,000, [22] with a large proportion of this total population residing in the capital city – Port Harcourt. Port Harcourt Metropolis consists of Port Harcourt City LGA and some parts of Obio-Akpor LGA and is usually referred to as 'Port Harcourt'. The Port Harcourt metropolis is a cosmopolitan city and has some major Government parastatals, multinational companies and industries. The urban nature of the area with oil exploration and production activity has caused the influx of peoples of different ethnicities.

There are 18 health centres (inclusive of 2 health posts), two secondary health facilities, several private hospitals, maternities, and a teaching hospital in Port Harcourt Metropolis. The health centres are run directly by the Primary Health Care Management Board, under the State Ministry of Health. These health centres are highly utilized, particularly for immunization services and growth monitoring, antenatal care and care for sick children.

2.2 Study Design

This was a cross-sectional study.

2.3 Study Population

The study population comprised a dyad of mother and child (0-24 months old) attending Primary Health Centres in Port Harcourt. The age category of infants and children was chosen based on the focus of the Global Strategy for Infant and Young Child Feeding [5].

2.4 Inclusion Criteria

1. Children aged 0 – 24 months attending the health centre with their mothers, whose mothers gave consent.
2. Term babies with birth weight ≥ 2.5 kg.

2.5 Exclusion Criteria

1. Acutely ill infants and young children.
2. Children with chronic health conditions such as renal disorders, cancer, tuberculosis or Acquired Immunodeficiency Syndrome (AIDS)
3. Children on growth suppressive drugs such as steroids
4. Multiple birth babies
5. Children not accompanied by their mothers

2.6 Sample Size Determination

A sample size of 288 was calculated based on the formula for calculating minimum sample size for cross-sectional studies [23].

$$n = z2\ (pq)/\ e2$$

Where

n = minimum sample size
z = 1.96 at 95% confidence limits
p= A prevalence of 88.7% reported in a similar study [17]
q = 1-p
e = error of margin tolerated at 4%
Allowance for non-response = 20%.

The sample size was approximated to 318 mother-child pairs.

2.7 Sampling

Six health centres were randomly selected by ballot method from the list of 18 health centres.

Fifty to fifty-five mother-child pairs were studied in each of these health centres. Mother-child pairs who met the inclusion criteria were recruited systematically until the total number of mother-child pairs for each health centre was obtained. Data were collected over a seven week period from November 14 to December 30, 2016.

Data were collected using a questionnaire which was pilot tested on 30 mother child pair in the Infant Welfare Clinic of University of Port Harcourt Teaching Hospital and questions modified for clarity. The questionnaires consisted of two sections. Section 1 covered questions on the socio-demographics of the mother and child as well as details of the mother's work. Section 2 contained questions regarding details about the child's feeding history and a 24 – hour dietary recall for the child.

Variables for assessing feeding practices among mothers with children less than six months was whether the child received breast milk, formula, or semi-solid/solid foods in the preceding 24 hours. The EBF rate was defined as the proportion of infants, aged less than six months, who received only breast milk and no other liquids or solids except for drops or syrups consisting of vitamins, minerals supplements or medicines [24,25]. The EBF rate was estimated according to the WHO recommended definition of this key Infant and Young Child Feeding (IYCF) indicator and further categorisation of EBF indicator for the following age ranges 0-1, 2-3 and 4-5 months of age was done [25].

The 24-hour dietary recall provided information on foods consumed. From this recall, scores adopted from a study by Disha, et al. [2] and based on the WHO recommended complementary feeding practices [26] were developed. A score of 1 was given for each of the seven food groups ingested in the preceding 24 hours and these were subsequently summed up. A minimum score of 0 was given if no food group was consumed and a maximum score of 7, if all seven food groups were ingested. Dietary diversity scoring was not done for children who were on exclusive breast feeding or exclusive feeding with breast milk substitute.

Among mothers with children 6-24 months, data on dietary diversity, feeding frequency and if the child received breast milk was obtained from the 24 hour recall. Feeding practices were then classified as those who:

a) Met dietary diversity – Consumption of meals containing four or more food groups [25].
b) Met adequate feeding frequency - 2 times or more for breastfed infants 6–8 months, 3 times or more for breastfed children 9–24 months and 4 times or more for non-breastfed children 6–24 months [26].
c) Met minimum acceptable diet - Fed foods meeting the recommended minimum dietary diversity and the minimum feeding frequency [26].

Three volunteer medical students trained as field assistance participated in the study by helping mothers who were unable to read and write to fill the questionnaires.

Anthropometric measurements were taken by the researchers and field assistants. Weights were measured using a Seca® weighing scale, with the child completely undressed. Weights were measured in kilograms, to the nearest 0.1 kg (100 grams). The weighing scale was standardized using the WHO standardization method, [27] by placing a predetermined labeled5 kg or 10kg weight on the weighing scale regularly after every five weight measurements to check for accuracy.

Lengths (to the nearest 0.1 cm) were measured with the child lying supine, and lower limbs extended. A Seca® measuring length board

graduated in centimetres, with a sliding foot piece was used to take the length measurements. The occipito-frontal circumference (OFC) was measured with an inelastic measuring tape, which touched the occiput, and passed across the glabella. Each OFC was taken twice, and an average of the values recorded to the nearest 0.1 cm.

The WHO classification of malnutrition was used. Wasting (weight for length/height), stunting (length/height for age), and underweight (weight for age) were determined using the z–scores on the WHO charts, and the (OFC) was compared to the WHO Head Circumference-for-age charts for children aged 0–2 years. The nutritional statuses of the children were then classified as follows:

1. Those who had Height-for-Age Z-scores (HAZ) below-2 SD were classified as stunted.
2. Those who had Weight-for-Height Z-scores (WHZ) below-2 SD were classified as wasted.
3. Those with Weight-for-Age Z-scores (WAZ) below-2 SD were classified as underweight.
4. Those who had HAZ, WHZ, and WAZ below-3 SD were classified as having severe stunting, wasting and underweight, respectively
5. Those who had WHZ above +2 SD were classified as overweight
6. Those who had WHZ above +3 SD were classified as obese

Socioeconomic status was classified using the Oyedeji classification [28]. Five social class groups were obtained (Social classes 1–5). Those in social classes 1 and 2 were re-classified as high social class, while those in class 3 were classified as middle social class, and those in social class 4 and 5 were classified as low social class.

2.8 Data Analysis

Data were entered into an excel work sheet and analysed using Statistical Package for Social Sciences (SPSS) version 20.0. WHO Anthro version 3.2.2 was used for the analysis of nutritional status.

The demographic characteristics of the mothers and children were displayed using tables and charts. Qualitative variables were presented as frequencies and proportions while the quantitative variables were summarized as means and standard deviation. The differences in proportions were compared using Chi square test (χ^2) or Fisher's exact test when the expected cell count was less than five in 20% or more of the cells. The bivariate analysis employed Chi square (χ^2) and Fisher's exact tests with level of significance set at a P value of < 0.05.

Mothers of children who were found to be malnourished were given further individual age-specific nutritional counseling on optimal infant and young child feeding and the need to have further follow-up visits to the health centre for growth monitoring and promotion. A list of these mothers and children with their contact phone numbers was compiled and given to the medical officer in charge of each health centre for further follow up and review.

3. RESULTS

Three hundred and eighteen questionnaires were filled. Among these, 11 had incomplete data and were thus not analysed. Three hundred and seven questionnaires were correctly filled, giving a response rate of 96.5%.

A total of 307 mother-child (aged zero to 24 months) pairs were studied. The mean age of the children was 5.6±6.1 months, with a median age of 3.0 months. Majority 207 (67.4%) of the children fell within the 0-5 months age range. There were 157 (51.1%) males and 150 (48.9%) females, giving a male to female ratio of 1.1:1.Majority 128 (41.7%) of the children belonged to the middle socioeconomic class. Majority 128 (41.7%) of the children were firstborns (Table 1).

The mothers' ages ranged from 16 to 45 years with a mean age of 29.8 ± 5.0 years. Majority (95.1%) of them were married. Majority (36.2%) of the mothers were from the Igbo tribe and majority (96.7%) of them were Christians. None of the mothers smoked tobacco, but 46 (14.9%) of them consumed alcohol. Majority (89.6%) of them had secondary education or higher. One hundred and twenty one (39.4%) were employed, while 186 (60.6%) were unemployed.

Out of the 121 (39.4%) mothers who were gainfully employed, 77 (63.6) were self-employed; 61 (50.4%) worked between 4- 8 hours daily; 94 (77.7%) went to work daily with baby and only 26 (21.5%) had Crèche at their workplace (Table 2).

Table 1. Socio-demographics of the children in the study population

Variables (n = 307)	N	%
Age of children in months		
0 - 5	207	67.4
6 – 12	58	18.9
13 – 18	24	7.8
19 – 24	18	5.9
Total	**307**	**100**
Sex distribution		
Male	157	51.1
Female	150	48.9
Total	**307**	**100**
Socio-economic class		
High	118	38.4
Middle	128	41.7
Low	61	19.9
Total	**307**	**100**
Child's birth order		
1st	107	34.9
2nd	101	32.9
3rd	48	15.6
4th	32	10.4
5th	16	5.2
6th	3	1.0
Total	**307**	**100**

Majority 286 (93.2%) of the mothers received antenatal care. The places where antenatal care was received where: health centers 140 (49.0%); private hospitals 71 (24.8%); maternity 42 (14.7%); general hospital 22 (7.7%) and tertiary hospital 11(3.8%). Majority 253 (88.5%) received antenatal education on breastfeeding. Two hundred and sixty-three (85.7%) had spontaneous vertex delivery, while 44 (14.3%) had caesarean section.

Majority 303 (98.7%) of the children were breastfed and 257 (84.8%) were still breastfeeding at the time of the study. Out of the 303 (98.7%) mothers who breastfed their babies, 114 (37.6%) initiated breastfeeding with one hour of delivery, 101 (33.3%) initiated breastfeeding beyond 1 hour after delivery but within the first day and 88 (29.1%) initiated breastfeeding from the second day and beyond.

One hundred and forty one (46.5%) of the children were given pre-lacteal feeds. There was a significant relationship between giving of pre-lacteal feeds and late initiation of breastfeeding (χ^2 = 47.698; p = 0.0001). Out of the 189 (62.4%) babies who were initiated late on breastfeeding, 117(61.9%) were given pre-lacteal feeds, compared to 24 (21.1%) who were initiated early on breastfeeding. The pre-lacteal feeds given included glucose water, plain water, infant formula or a combination of two or more of these.

The exclusive breastfeeding rate for children less than 6 months (207; 67.4%) was 51.7% (107/207). Exclusive breastfeeding rate at 0-1 month of age; 2-3 months of age and 4-5 months of age were 58.8%; 49.1%; and 38.1% respectively. This is not statistically significant (χ^2=3.445; p=0.198).

Out of the 303 (96.7%) breastfed babies, 46 (15.2%) had stopped breastfeeding at the time of the study. Out of these 5 (10.9%) were less than 6 months and 41 (89.1%) were 6 months and older. The mean duration of breastfeeding among those who have stopped breastfeeding was 9.3±5.5 months. The mean duration of breastfeeding among those less than 6 months was 1.2±0.5 weeks.

Table 2. Work related characteristics of employed mothers in the study population

Variables (n=121)	n	%
Mother's place of work		
Government establishment	15	12.4
Private company	27	22.3
Personal business	77	63.6
Missionary work	2	1.7
Total	**121**	**100**
Hours at work		
<4 hours	32	26.5
4 – 8 hours	61	50.4
9 – 12 hours	26	21.5
13 – 16 hours	1	0.8
>16 hours	1	0.8
Total	**121**	**100**
Goes to work with baby		
Yes	94	77.7
No	27	22.3
Total	**121**	**100**
Crèche at place of work		
Yes	26	21.5
No	95	78.5
Total	**121**	**100**

One hundred and twenty eight (41.7%) children were on complementary feeding as at the time of the study. Seventy one (55.5%) of those on complementary feeding started it before the age of six months. Fifty (39.0%) children started complementary feeding at the WHO recommended age of 6 months, while 7 (5.5%) started later than six months. The mean age at which complementary feeding was started was

4.4±1.8 months. Among the children less than six months of age, the mean age at which complementary feeds were commenced was 9.8 ± 5.1 weeks.

Most (98.4%) of the children consumed grains, roots and tubers in the preceding 24 hours, followed by dairy products (90.6%) (Fig. 1).

Maize gruel fortified with milk was consumed by 85.7% (24/28) of the children who were less than 6 months of age on complementary diet and 75.9% (44/58) of those between 6 -12 months of age. Those between 13-24 months of age consumed mostly Rice and stew/Jollof rice (61.9%: 26/42).

Of all those on complementary feeding, only 43 (33.6%) consumed foods from four or more food groups in the preceding 24 hours, thus obtaining a dietary diversity score of ≥ 4 (Table 3).

Only 3.6% of those in the 0-6 months age group on complementary feeds met the dietary diversity score (p = 0.0001).

Only 42 (32.8%) of the children met the minimum acceptable diet (i.e. met both the feeding frequency for age and a dietary diversity score of ≥ 4). No child in the 0 – 5 month age group met the minimum acceptable diet (p = 0.0001) (Table 3).

One hundred and eleven (36.2%) children were fed according to WHO's recommendation. Out of 207 (67.4%) children in the age group 0-5 months, 107 (51.7%) were fed according to WHO's recommendation, compared to 4% (4/100) of those in the age group 6-24 months. This difference is statistically significant ($\chi 2=66.435$; p=0.0001).

The mean weights, lengths and OFCs were all lower in the females compared to the males in all the age categories of the children in the study population. These differences were statistically significant among the children who were less than six months old (Table 4a).

Nineteen (6.2%) children were found to be underweight. No child was severely underweight. Twenty one (6.8%) children were stunted, while 6 (2.0%) were severely stunted. Twelve (3.9%) of the children were wasted, and 5 (1.6%) were severely wasted. Twenty three (7.5%) of the children studied were overweight and 8 (2.6%) were obese (Table 4b).

The prevalence of wasting, stunting, underweight, over-weight and obesity were all higher among the children who were not fed according to the WHO recommendations for their age compared to those who were fed according to the recommendations as shown on Table 5. There was a significant relationship between not being fed according to the WHO recommendation and being underweight (p = 0.004). Eighteen out of the 19 (94.7%) children who were underweight were not fed according to the WHO recommendations.

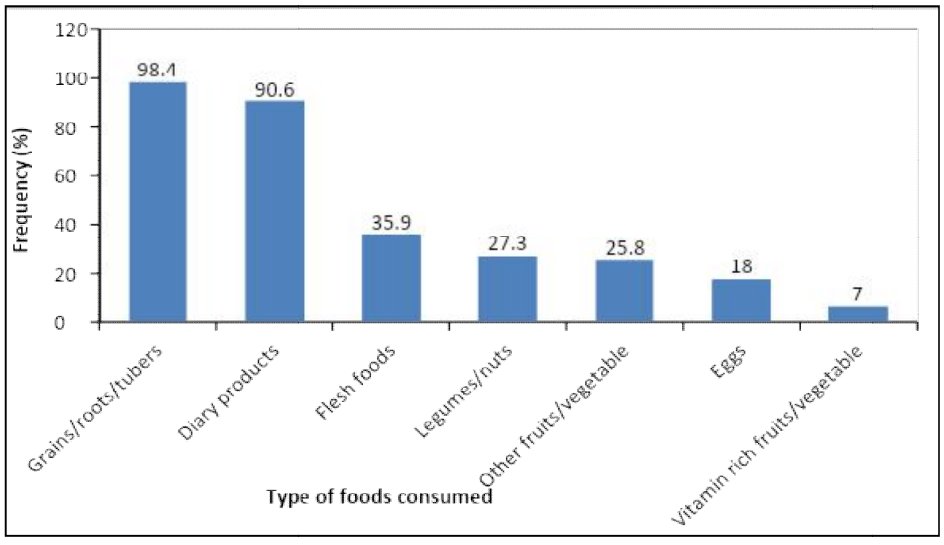

Fig. 1. Types of foods consumed in the preceding 24 hours by children on complementary feeding in the study population (N = 128)

Table 3. Comparison between age and adequacy of feeding among the children on complementary feeding in the study population

	Age in months		Total n (%)	χ2	P
Variables (n = 128)	**0 – 5 n (%)**	**6 – 24 n (%)**			
Dietary diversity					
Met dietary diversity	1 (3.6)	42 (42.0)	43 (33.6)		
Did not meet Dietary diversity	27 (96.4)	58 (58.0)	85 (66.4)	14.481 (Fisher's Exact)	0.0001*
Minimum acceptable diet					
Met the minimum Acceptable diet	0 (0.0)	42 (42.0)	42 (32.8)		
Did not meet the minimum Acceptable diet	28 (100.0)	58 (58.0)	86 (67.2)	17.503 (Fisher's Exact)	0.0001*

There was a statistically significant relationship between lack of exclusive breastfeeding and stunting and underweight. Of the 14 children aged less than six months who were stunted, 9 (64.3%) were not being exclusively breastfed compared to 5 (35.7%) who were on exclusive breastfeeding. Also 88.9% of those who were underweight were not exclusively breastfed, compared to 11.1% that were being exclusively breastfed. There was no significant relationship between EBF and WHZ as shown on Table 6a.

Starting complementary feeding either earlier or later than the WHO recommended age of six months had no statistically significant relationship with WHZ, HAZ or WAZ. Although the prevalence of wasting, stunting, underweight, over-weight and obesity were higher in children who did not start timely complementary feeding, these differences were not statistically significant. (Table 6b).

Maternal knowledge about infant and young child feeding practices affected the practice of exclusive breastfeeding, but not complementary feeding practices. On the other hand, mode of delivery and maternal employment had no impact on either exclusive breastfeeding, or complementary feeding practices.

As regards mothers' knowledge about breastfeeding; knowledge about the duration of EBF for six months was the highest (91.2%), while knowledge about the continued duration of breastfeeding of up to two years and beyond was the least (30.3%). For complementary feeding; knowledge about the appropriate age of initiation of complementary feeding of six months was the highest (73.9%), whereas knowledge about adequate meal frequency for children aged 6–24 moths was the lowest (34.9%). (Fig. 2).

On bivariate analysis, factors that were found to have a significant relationship with the practice of exclusive breastfeeding included maternal knowledge about EBF, non-use of feeding bottles, and use of pre-lacteal feeds [Table 7a].

Eight (7.5%) of the 107 children aged less than six months who were on EBF were fed with expressed breastmilk using feeding bottles.

On multiple logistics regression analysis however, only non-use of feeding bottle OR 44.052 (95% CI 18.238, 106.403) was found to be a predictor of exclusive breastfeeding [Table 7b].

Factors identified to affect complementary feeding practices on bivariate analysis were the age of the child, whether the child was exclusively breastfed or not and the use of feeding bottle. [Table 8a].

On logistics regression analysis however, none of these factors was identified as a predictor of appropriate complementary feeding [Table 8b].

4. DISCUSSION

One third (36.2%) of the children in this study were fed according to the World Health Organisation's(WHO's) recommendations on Infant and Young Child Feeding (IYCF). The WHO recommended EBF rate for children less than six months is 90% [1]. However, the exclusive breastfeeding rate observed in this study was 51.7%. Although this rate is comparatively higher than the national average of 17% for Nigeria, [19] it fell short of the WHO's recommended 90%. The complementary feeding practices were also poor, with only one third of the children on complementary feeding meeting the minimum acceptable diet. The combined prevalence of overweight and obesity (10.1%) was higher than that of wasting (5.5%), underweight (6.2%), and stunting (8.8%). Higher rates of all forms of malnutrition were observed

among the children who were not fed according to the WHO recommendations.

Early initiation of breastfeeding within one hour of delivery is known to positively impact the practice of exclusive breastfeeding [29]. In this study however, only about a third (37.6%) of mothers initiated breastfeeding early. This is similar to the findings by Onah, et al. [20] who reported that 32% of the mothers in their study initiated breastfeeding within one hour of delivery. Higher rates of 48.2% and 65% were however reported by Ukegbu, et al. [30] and Lawan, et al. [17] respectively. The difference between what was observed in the present study and that reported by Ukegbu, et al. [30] and Lawan, et al. [17] may be due to the fact that nearly half (46.5%) of the children in this study were given pre-lacteal feeds, which had a significant relationship with late initiation of breast feeding. Notably, in the study by Ukegbu, et al. [30] where only a quarter (25.9%) of the babies were given pre-lacteal feeds, a higher rate of early initiation of breastfeeding (46.5%) was reported compared to this study. In contrast, Onah, et al. [20] who reported a low rate of early initiation of breastfeeding (32%) similar to that observed in this study also reported a high rate of use of pre-lacteal feeds (51.6%) among the mothers in their study. The use of pre-lacteal feeds is discouraged as it is known to lead to delayed initiation of breastfeeding and ultimately reduce the practice of exclusive breastfeeding.

The exclusive breastfeeding rate of 51.7% among the children aged less than six months observed in the present study is comparable to that reported by Anigo, et al. [31] (54.3%) in north western Nigeria and Disha, et al. [2] (51%) among children in Zambia. It is however higher than that reported by several others from Nigeria. Agbo and colleagues reported an EBF rate of 16.4%, [32] while Onah, et al. [20] and Ukegbu, et al. [30] reported EBF rates of 33.5% and 37.3%, respectively. It is also higher than the 17.9% reported by Motee, et al. [33] from Mauritius.

The difference between the findings by Agbo, et al. [32] and what was observed in the present study can be explained by the fact that the study population in the work by Agbo and colleagues was based on data from the Nigeria Demographic and Health Survey (NDHS) of 2003 [32]. The EBF rate which they reported is thus representative of the national average for Nigeria, and not just one city in Nigeria, as was the case in the present study.

In contrast to the EBF rate of 51.7% in the present study, Gyampoh, et al. [16] in their study among Ghanaian women reported a much higher EBF rate of 80.1%. The reason for this difference may be because the present study assessed the overall practice of EBF among the children less than six months whereas Gyampoh, et al. [16] assessed the practice of EBF in only the preceding 24 hours. Thus several children who were on mixed feeding would have been regarded as being exclusively breastfed if they were exclusively breastfed in the preceding 24 hours to their study.

WHO recommends continued breastfeeding up to the age of two years and beyond. In the present study, 15.2% of the children stopped breastfeeding before the age of two years and the mean age at which breastfeeding was stopped was 9.3±5.5 months. A high proportion (84.8%) of the children were however still breastfeeding as at the time of the study. This finding is higher than that of Anigo, et al. [31] who reported that 70% of the mothers in their study were still breastfeeding their children. This difference may have been due to the fact that the Anigo, et al. [31] study involved children aged 6 – 24 months, as breastfeeding rates are known to decline with increasing age [16].

WHO recommends that from the age of six months complementary foods should `be added to the diet of the child. This is because at this age, breastmilk alone can no longer provide all the nutritional requirements of the child. Most studies [17,31,33,34] have however shown that complementary foods are either started too early or too late, with very few mothers introducing complementary foods at the WHO recommended age of six months. In the present study over half (55.5%) of the children started complementary foods before the age of six months. This is similar to the findings by Anigo, et al. [31] who reported that 59% of mothers started complementary feeding for their children before the age of five months. It was also observed in the present study that complementary foods were commenced from as early as two weeks. This is lower than the age of 1 – 2 months reported by Anigo, et al. [31] Such an age is far too early for the introduction of complementary feeding, as the child's digestive tract is not yet mature enough to handle such foods. The mean age at which complementary feeding was started in the present study was four months. This is comparable to the findings by Tagbo, et al. [34] and Motee, et al. [33].

Table 4a. Age and gender distribution of the mean weights, lengths and OFCs of the children in the study population

Age in months	Gender		t	p-value
	Male Mean ± S.D	Female Mean ± S.D		
		Weight (kg)		
0 – 5 months	5.5±1.2	5.0±1.3	3.229	0.001*
6 – 12 months	8.6±1.4	8.2±1.2	1.150	0.255
13 – 18 months	10.0±0.9	10.3±1.2	-0.648	0.523
19 – 24 months	11.9±2.6	11.1±1.4	0.837	0.415
		Length (cm)		
0 – 5 months	57.8±4.7	55.7±4.6	3.194	0.002*
6 – 12 months	72.5±4.2	69.1±3.7	3.211	0.002*
13 – 18 months	79.7±3.0	79.4±3.1	0.296	0.770
19 – 24 months	85.6±5.9	85.3±4.7	0.130	0.898
		OFC (cm)		
0 – 5 months	39.9±2.4	38.8±2.5	3.344	0.001*
6 – 12 months	45.4±1.4	44.9±1.3	1.515	0.135
13 – 18 months	48.0±1.1	47.3±1.6	1.257	0.222
19 – 24 months	48.5±1.2	47.5±1.5	1.468	0.161

**Statistically significant; OFC – Occipito-frontal circumference*

Table 4b. Age categories vs nutritional status of the children in the study population

Age range (months)	Nutritional Status				Total	χ^2	P
	Normal (WAZ ≥ -2SD)	**Under-weight (WAZ < -2SD)**	**Severely Underweight (WAZ < -3SD)**				
	N (%)	N (%)	N (%)		N (%)		
0 – 5	198(95.7)	9 (4.3)	0 (0)		207 (100)		
6 – 12	51 (87.9)	7 (12.1)	0 (0)		58 (100)		
13 – 18	22 (91.7)	2 (8.3)	0 (0)		24 (100)	*4.997*	*0.118*
19 – 24	17 (94.4)	1 (5.5)	0 (0)		18 (100)	*(Fisher's exact)*	
	Normal (HAZ ≥ -2SD)	**Stunted (HAZ < -2SD)**	**Severely Stunted (HAZ < -3SD)**				
0 – 5	188 (90.8)	14 (6.8)	5 (2.4)		207 (100)		
6 – 12	52 (89.7)	6 (10.3)	0 (0.0)		58 (100)		
13 – 18	23 (95.8)	1 (4.2)	0 (0.0)		24 (100)	*4.456*	*0.518*
19 – 24	17 (94.4)	0 (0.0)	1 (5.6)		18 (100)	*(Fisher's exact)*	
	Normal (WHZ ≥ 2 SD)	**Wasted (WHZ < -2 SD)**	**Severely wasted (WHZ <-3 SD)**	**Overweight (WHZ > +2 SD)**	**Obese (WHZ > +3 SD)**		
0 – 5	170 (82.1)	7 (3.4)	2 (1.0)	20 (9.7)	8 (3.9)		
6 – 12	50 (86.2)	3 (5.2)	3 (5.2)	2 (3.4)	0 (0.0)	12.477	0.256
13 – 18	22 (91.7)	2 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	*(Fisher's exact)*	
19 – 24	17 (94.4)	0 (0.0)	0 (0.0)	1 (5.6)	0 (0.0)		

WAZ – Weight-for-Age z score; HAZ – Height-for-Age z score;
WHZ – Weight-for-Height z score SD – Standard deviation

Table 5. Feeding practice vs nutritional status of the children in the study population

Nutritional status	Feeding practice		Total n (%)	χ^2	P
	Fed according to WHO recommendation n (%)	Not fed according to WHO recommendation n (%)			
WHZ					
Normal	166 (64.1)	93 (35.9)	259 (100.0)		
Wasted	4 (33.3)	8 (66.7)	12 (100.0)		
Severely wasted	1 (20.0)	4 (80.0)	5 (100.0)		
Over-weight	10 (43.5)	13 (56.5)	23 (100.0)	*1.176 (Fisher's exact)*	*0.915*
Obese	3 (37.5)	5 (62.5)	8 (100.0)		
HAZ					
Normal	175 (62.5)	105 (37.5)	280 (100.0)		
Stunted	6 (28.6)	15 (71.4)	21 (100.0)	*3.905 (Fisher's exact)*	*0.119*
Severely stunted	0 (0.0)	6 (100.0)	6 (100.0)		
WAZ					
Normal	178 (61.8)	110 (38.2)	288 (100.0)		
Underweight	1 (5.3)	18 (94.7)	19 (100.0)	8.37	0.004*

**Statistically significant; WHZ - weight-for-height z-score; HAZ - height-for-age z-score; WAZ - weight-for-age z-score*

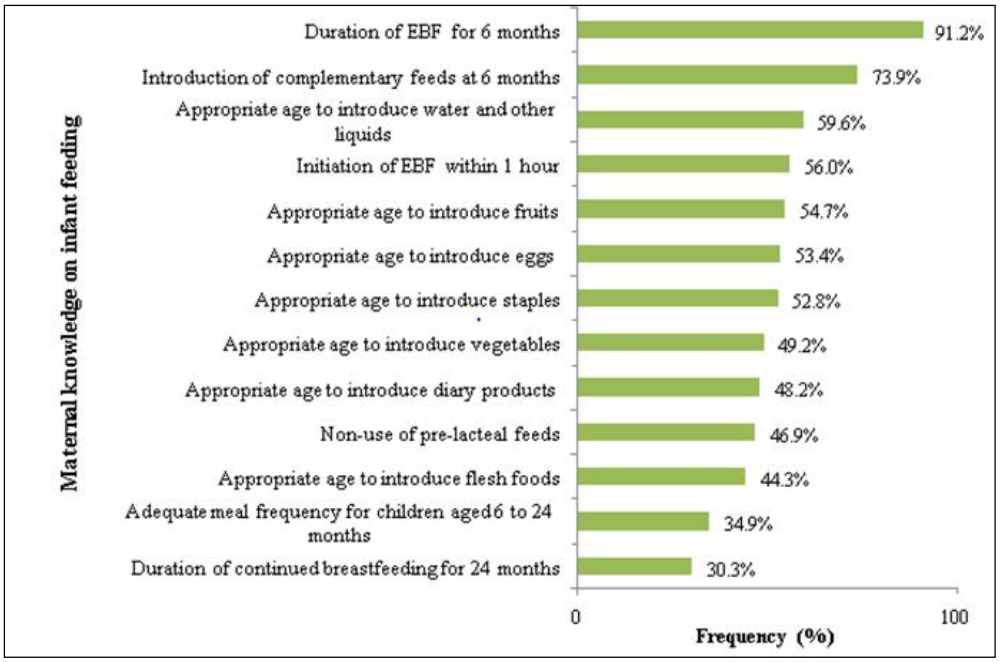

Fig. 2. Proportion of mothers with knowledge on aspects of infant feeding

Only 39% of mothers in the present study started timely complementary feeding at the WHO recommended age of six months. This finding is also similar to that reported by Anigo, et al. [31] who found that 38.9% of mothers in their study started complementary feeding for their children between the ages of 5 – 6 months. In contrast, both Lawan, et al. [17] and Disha, et al. [2] reported that higher proportions of mothers gave timely complementary foods at the recommended age of six months. Lawan and colleagues reported that 58.2% of mothers gave

timely complementary foods at six months.17 Disha, et al. [2] reported much higher rates of timely introduction of complementary foods among Ethiopian children (61%) and Zambian children (90%). The reasons for the differences between these studies and the present study as regards the timely introduction of complementary food is not apparent.

It is expected that complementary foods should be derived from locally available food items and should have a diversity of nutrients necessary for adequate growth of the child [5]. The child is expected to consume foods from at least four of the seven food groups in order to meet the recommended dietary diversity [26,35].

Children are also expected to be fed according to the recommended feeding frequencies based on their age. In the present study only 33.6% consumed nutritionally diverse foods, (containing four or more food groups) while 66.4% consumed complementary foods with low dietary diversity. This is lower than that reported by Ndiokwelu, et al. [15] who found that 72.5% of the children in their study consumed complementary foods with low dietary diversity, mainly due to poor maternal knowledge. On the other hand, the findings by Sossa, et al. [36] and Disha, et al. [2] are similar to the findings in the present study. Sossa, et al. [36] in their study among children in Benin Republic reported that 33.8% of children consumed nutritionally diverse foods, while Disha, et al. [2] found that 37% of Zambian children were given dietary diverse complementary foods.

In contrast to the present study, Gyampoh, et al. [16] reported that a higher proportion of children (42%) were fed with dietary diverse complementary foods. Regular exposure to the growth monitoring services by the mothers in the Gyampoh, et al [16] study may have affected improved complementary feeding practices compared to the present study.

As has been noted in other studies, the most commonly consumed food group in the present study was the starchy staples - grains, roots and tubers, (98.4% of the children consumed it in the preceding 24 hours). This is similar to the findings by Tagbo, et al. [34] (93.5%) and Gyampoh, et al. [16] (90%). On the other hand, the proportion of children who consumed vitamin A rich fruits and vegetables, other fruits and vegetables and eggs in this study was low. This is similar to findings by others [16,32] and may be due to poor knowledge among mothers about the need to incorporate fruits and vegetables into the diets of their children.

All the children on complementary feeding in the present study met the recommended feeding frequencies but only 32.8% of them met the minimum acceptable diet (i.e. met both minimum dietary diversity and feeding frequency). This is similar to the 32% reported by Gyampoh, et al. [16] to have met the minimum acceptable diet.

Table 6a. Relationship between nutritional status and EBF among the children aged less than six months (n = 207)

Nutritional status	EBF n (%)	Not EBF n (%)	Total n (%)	χ^2	P
WHZ					
Normal	89 (52.4)	81 (47.6)	170 (100.0)		
Wasted	4 (57.1)	3 (42.9)	7 (100.0)		
Severely wasted	1 (50.0)	1 (50.0)	2 (100.0)		
Over-weight	10 (50.0)	10 (50.0)	20 (100.0)	*1.115*	*0.931*
Obese	3 (37.5)	5 (62.5)	8 (100.0)	*(Fisher's exact)*	
HAZ					
Normal	102 (54.3)	86 (45.7)	188 (100.0)		
Stunted	5 (35.7)	9 (64.3)	14 (100.0)	*7.107*	*0.024**
Severely stunted	0 (0.0)	5 (100.0)	5 (100.0)	*(Fisher's exact)*	
WAZ					
Normal	106 (53.5)	92 (46.5)	198 (100.0)		
Underweight	1 (11.1)	8 (88.9)	9 (100.0)		
					*0.016**

**Statistically significant; WHZ - weight-for-height z-score; HAZ - height-for-age z-score; WAZ - weight-for-age z-score; EBF – Exclusive Breastfeeding*

Table 6b. Relationship between nutritional status and feeding with complementary foods that meet the minimum dietary diversity (n = 128)

	Minimum dietary diversity		Total	χ^2	P
Nutritional status	**Met dietary diversity n (%)**	**Did not meet dietary diversity n (%)**	**n (%)**		
WHZ					
Normal	40 (35.7)	72 (64.3)	112 (100.0)		
Wasted	2 (33.3)	4 (66.7)	6 (100.0)		
Severely wasted	0 (0.0)	3 (100.0)	3 (100.0)		
Over-weight	1 (20.0)	4 (80.0)	5 (100.0)	*2.263*	*0.141*
Obese	0 (0.0)	2 (100.0)	2 (100.0)	*(Fisher's exact)*	
HAZ					
Normal	41 (35.7)	74 (64.3)	115 (100.0)		
Stunted	1 (10.0)	9 (90.0)	10 (100.0)	*2.735*	*0.222*
Severely stunted	1 (33.3)	2 (66.7)	3 (100.0)	*(Fisher's exact)*	
WAZ					
Normal	42 (36.2)	74 (63.8)	116 (100.0)		
Underweight	1 (8.3)	11 (91.7)	12 (100.0)		*0.059*

WHZ - weight-for-height z-score; HAZ - height-for-age z-score; WAZ - weight-for-age z-score

Overall, the proportion of children in this study who were fed according to the WHO recommendations on IYCF was 36.2%. Those aged less than six months were more likely to be fed according to the recommendations compared to those older than six months (p = 0.001). Most (96.4%) of the children who were fed according to the WHO recommendations were less than six months old and only 3.6% of them were older than six months. This is understandable because the recommended feeding practice for those less than six months is exclusive breastfeeding. On the other hand, among those older than six months lack of feeding with nutritional diverse foods and early cessation of breastfeeding resulted in a low proportion of them being fed according to the WHO's recommendations. This finding is a cause for concern. Ultimately, the implication of having such a low proportion of children older than six months being fed according to the WHO recommendations is high rates of malnutrition in this age group.

Children who were not fed according to the WHO recommendations had higher prevalence of stunting, wasting, underweight, over-weight and obesity. The prevalence of stunting, wasting and underweight in the present study were 8.8%, 5.5%, and 6.2%, respectively. These are all lower than the national prevalence rates for stunting (8.8% vs 37%), underweight (5.5% vs 29%), and wasting (6.2% vs 18%). On the other hand, the combined prevalence of overweight and obesity (10.1%) observed in this study is higher than the 4% reported in the NHDS [19]. These differences may be due to the fact that the present study was carried out in an urban population. The high prevalence of overweight found in this study is of public health significance and buttresses the fact that overweight malnutrition is becoming an increasing problem in developing nations like Nigeria.

The prevalence of stunting and underweight in the present study are both higher than that reported by Agbedeyi, et al. [37] among children attending day-care centres in Port Harcourt. Agbedeyi, et al. [37] reported a 5.5% prevalence rate (compared to 8.8% in present study) for stunting and 3% prevalence (compared to 6.2% in present study) for underweight. On the other hand, the prevalence of overweight/obesity in the present study (10.1%) was lower than the 21.3% prevalence of overweight reported by Agbedeyi, et al. [37] The recent economic recession in Nigeria leading to lower income for families may be responsible for these differences.

The prevalence of stunting (73.7%) and wasting (40%) reported by Lawan, et al. [17] are far higher than that seen in the present study. These differences are due to the criteria used for classification of these parameters. Lawan, et al. [17] used the Waterlow classification to determine wasting and stunting. This criterion over-estimates the prevalence of stunting and wasting. On the other hand, the WHO classification which was used in the present study adopts standard deviation scores and has

better statistical precision. The prevalence of stunting in the present study (8.8%) is also lower than that reported by Anigo, et al. [31] (31.7%). The higher proportion of children in the middle and high socio-economic class in the present study may have accounted for these differences.

In the present study, the practice of exclusive breastfeeding was associated with lower rates of stunting. This is similar to the findings by Disha, et al. [2] among Ethiopian Children. They reported that EBF was negatively associated with HAZ stunting [2].

Table 7a. Bivariate analysis of factors affecting exclusivity of breastfeeding (n = 207)

Variables	Exclusivity of breastfeeding		Total n (%)	χ^2	p
	Exclusively breastfed n (%)	Not exclusively breastfed n (%)			
Maternal knowledge about EBF					
Poor	42 (65.6)	22 (34.4)	64 (100.0)		
Fair	52 (51.5)	49 (48.5)	101 (100.0)		
Good	13 (31.0)	29 (69.0)	42 (100.0)	*12.212*	*0.002**
Antenatal education on EBF (n = 192)					
Yes	88 (51.5)	83 (48.5)	171 (100.0)		
No	12 (57.1)	9 (42.9)	21 (100.0)	*0.242*	*0.623*
Mother's employment status					
Yes (employed)	31 (49.2)	32 (50.8)	63 (100.0)		
No (unemployed)	76 (52.8)	68 (47.2)	144 (100.0)	*0.224*	*0.636*
Mode of delivery					
Vaginal	97 (53.9)	83 (46.1)	180 (100.0)		
Caesarean section	10 (37.0)	17 (63.0)	27 (100.0)	*2.670*	*0.102*
Place of delivery [NT]					
Hospital	90 (51.4)	85 (48.6)	175 (100.0)		
Non-hospital	17 (53.1)	15 (46.9)	32 (100.0)	0.031	0.860
Birth order of children					
1	28 (41.8)	39 (58.2)	67 (100.0)		
2	33 (50.0)	33 (50.0)	66 (100.0)		
3	18 (52.9)	16 (47.1)	34 (100.0)		
4	18 (75.0)	6 (25.0)	24 (100.0)		
5	9 (64.3)	5 (35.7)	14 (100.0)		
6	1 (50.0)	1 (50.0)	2 (100.0)	*8.840*	*0.116*
Maternal age					
<=20 years	2 (40.0)	3 (60.0)	5 (100.0)		
21 - 25 years	17 (44.7)	21 (55.3)	38 (100.0)		
26 - 30 years	45 (52.9)	40 (47.1)	85 (100.0)		
31 - 35 years	31 (58.5)	22 (41.5)	53 (100.0)		
36 - 40 years	9 (42.9)	12 (57.1)	21 (100.0)	*3.567*	*0.625*
Above 40 years	3 (75.0)	1 (25.0)	4 (100.0)	*(Fisher's exact)*	
Marital status					
Single	2 (28.6)	5 (71.4)	7 (100.0)		
Married	104 (52.5)	94 (47.5)	198 (100.0)	*1.729*	*0.556*
Co-habiting	1 (50.0)	1 (50.0)	2 (100.0)	*(Fisher's exact)*	
Religion					
Christianity	104 (51.5)	98 (48.5)	202 (100.0)		
Islam	3 (60.0)	2 (40.0)	5 (100.0)		*1.000*
Maternal alcohol intake					
Yes	16 (50.0)	16 (50.0)	32 (100.0)		
No	91 (52.0)	84 (48.0)	175 (100.0)	*0.043*	*0.835*
Socio-economic class					
High	45 (60.8)	29 (39.2)	74 (100.0)		
Middle	43 (47.3)	48 (52.7)	91 (100.0)		
Low	19 (45.2)	23 (54.8)	42 (100.0)	*3.883*	*0.143*

Variables	Exclusivity of breastfeeding		Total n (%)	χ^2	p
	Exclusively breastfed n (%)	Not exclusively breastfed n (%)			
Mother's place of work (N = 63) [NT]					
Government establishment	3 (50.0)	3 (50.0)	6 (100.0)		
Private company	8 (57.1)	6 (42.9)	14 (100.0)		
Personal business	20 (47.6)	22 (52.4)	42 (100.0)	*1.403*	*0.886*
Missionary work	0 (0.0)	1 (100.0)	1 (100.0)	*(Fisher's exact)*	
Hours at work (N = 63)					
<4 hours	11 (57.9)	8 (42.1)	19 (100.0)		
4 - 8 hours	15 (48.4)	16 (51.6)	31 (100.0)		
9 - 12 hours	4 (36.4)	7 (63.6)	11 (100.0)		
13 - 16 hours	1 (100.0)	0 (0.0)	1 (100.0)	*3.173*	*0.568*
>16 hours	0 (0.0)	1 (100.0)	1 (100.0)	*(Fisher's exact)*	
Use of feeding bottle					
Yes	8 (9.1)	80 (90.9)	88 (100.0)		
No	99 (83.2)	20 (16.8)	119 (100.0)	*111.245*	*0.0001**
Attend work with baby (N = 63)					
Yes	22 (45.8)	26 (54.2)	48 (100.0)		
No	9 (60.0)	6 (40.0)	15 (100.0)	*0.918*	*0.338*
Creche at place of work (N = 63)					
Yes	8 (50.0)	8 (50.0)	16 (100.0)		
No	23 (48.9)	24 (51.1)	47 (100.0)	*0.005*	*0.941*
Use of pre-lacteal feed (N = 205)					
Yes	37 (39.4)	57 (60.0)	94 (100.0)		
No	70 (63.1)	41 (36.9)	111 (100.0)	*11.459*	*0.001**
Initiation of breast feeding (N = 205)					
Early	41 (58.6)	29 (41.4)	70 (100.0)		
Late	66 (48.9)	69 (51.1)	135 (100.0)	*1.732*	*0.188*

**Statistically significant; NT – Non-hospitals include: Traditional birth attendant's home, Midwife's house, Church, Home, and Chemist shop; NT – None of the respondents were working in the bank*

Table 7b. Logistics regression analysis showing predictors of EBF

Independent variables	Coefficient (B)	Odds ratio	95% Confidence Interval		P-value
			Lower	Upper	
Maternal knowledge about EBF					
Good/Fair	0.625	1.869	0.653	5.352	0.244
Poor [R]		1			
Use of feeding bottle					
No	3.785	44.052	18.238	106.403	0.0001*
Yes [R]		1			
Use of pre-lacteal feed					
No	0.675	1.964	0.866	4.456	0.106
Yes [R]		1			
Constant	-1.989	0.137	-	-	0.0001

**Statistically significant R – Reference category EBF: Exclusive Breastfeeding*

In the present study, the prevalence of stunting is the highest (8.8%), followed by underweight (6.2%) and wasting (5.5%). This is also the trend seen from the most recent NDHS [19] where the prevalence of stunting is also the highest (37%) compared to underweight (29%), and wasting (18%). The same trend is also seen in the study by Lawan, et al. [17] (stunting was 73.7% and wasting was 40%). This draws attention to the fact that infant and young child feeding practices in Nigeria need to be improved to reduce the rate of stunting among our children. Stunting reflects

the effects of chronic malnutrition, which presupposes that malnutrition begins early in the life of a child due to lack of appropriate IYCF practices such as EBF.

Factors which were found to affect the practice of exclusive breastfeeding were different from those which affected the practice of appropriate complementary feeding. One factor however which was found to affect both exclusive breastfeeding and complementary feeding was the use of feeding bottles. The reason for this may be the fact that bottle-fed babies may have "nipple confusion" which may lead to early cessation of breastfeeding and lack of EBF. Also, it would be more difficult to provide a nutritionally diverse meal (containing four or more food groups) entirely in liquid form to be fed using a feeding bottle. Children who are therefore bottle-fed with complementary foods are less likely to meet the minimum acceptable diet. The implication of this finding is that the use of feeding bottles needs to be discouraged in order to promote good IYCF practices.

Table 8a. Bivariate analysis of factors affecting complementary feeding (N = 128)

Variables	Minimum Acceptable Diet (MAD)		Total n (%)	χ^2	P
	Met MAD n (%)	Did not meet MAD n (%)			
Maternal knowledge about IYCF					
Poor	11 (25.0)	33 (75.0)	44 (100.0)		
Fair	18 (41.9)	25 (58.1)	43 (100.0)		
Good	13 (31.7)	28 (68.3)	41 (100.0)	*2.838*	*0.242*
Antenatal education on EBF (N= 124)					
Yes	36 (34.6)	68 (65.4)	104(100.0)		
No	6 (30.0)	14 (70.0)	20 (100.0)	*0.160*	*0.690*
Maternal age (N = 126)					
<=20 years	1 (33.3)	2 (66.7)	3 (100.0)		
21 - 25 years	4 (21.1)	15 (78.9)	19 (100.0)		
26 - 30 years	19 (35.2)	35 (64.8)	54 (100.0)		
31 - 35 years	12 (32.4)	25 (67.6)	37 (100.0)		
36 - 40 years	2 (22.2)	7 (77.8)	9 (100.0)	*4.789*	*0.428*
Above 40 years	3 (75.0)	1 (25.0)	4 (100.0)	*(Fisher's exact)*	
Marital status					
Married	41 (33.6)	81 (66.4)	122(100.0)		
Single	1 (20.0)	4 (80.0)	5 (100.0)	*0.772*	*1.000*
Co-habiting	0 (0.0)	1 (100.0)	1 (100.0)	*(Fisher's exact)*	
Mother's employment status					
Employed	24 (33.3)	48 (66.7)	72 (100.0)		
Not Employed	18 (32.1)	38 (67.9)	56 (100.0)	*0.020*	*0.887*
Religion					
Christian	41 (33.6)	81 (66.4)	122(100.0)		
Islam	1 (16.7)	5 (83.3)	6 (100.0)		*0.663*
Socio-economic class					
High	23 (45.1)	28 (54.9)	51 (100.0)		
Middle	12 (23.1)	40 (76.9)	52 (100.0)		
Low	7 (28.0)	18 (72.0)	25 (100.0)	*5.990*	*0.050*
Birth order of children					
1	15 (30.0)	35 (70.0)	50 (100.0)		
2	13 (28.3)	33 (71.7)	46 (100.0)		
3	7 (38.9)	11 (61.1)	18 (100.0)		
4	4 (40.0)	6 (60.0)	10 (100.0)		
5	2 (66.7)	1 (33.3)	3 (100.0)	*4.812*	*0.418*
6	1 (100.0)	0 (0.0)	1 (100.0)	*(Fisher's exact)*	
Mother's place of work (N = 72)					
Government establishment	4 (44.4)	5 (55.6)	9 (100.0)		
Private company	7 (43.8)	9 (56.2)	16 (100.0)		

Variables	Minimum Acceptable Diet (MAD)		Total n (%)	χ^2	P
	Met MAD n (%)	Did not meet MAD n (%)			
Personal business	12 (27.3)	32 (72.7)	44 (100.0)		
Bank	0 (0.0)	1 (100.0)	1 (100.0)	*3.241*	*0.551*
Missionary work	1 (50.0)	1 (50.0)	2 (100.0)	*(Fisher's exact)*	
Age in months					
0 – 5 months	0 (0.0)	28 (100.0)	28 (100.0)		
6 – 9 months	10 (23.3)	33 (76.7)	43 (100.0)		
10 – 12 months	6 (40.0)	9 (60.0)	15 (100.0)		
13 – 15 months	5 (50.0)	5 (50.0)	10 (100.0)		
16 – 18 months	7 (50.0)	7 (50.0)	14 (100.0)		
19 – 21 months	8 (80.0)	2 (20.0)	10 (100.0)	*35.582*	*0.0001**
22 – 24 months	6 (75.0)	2 (25.0)	8 (100.0)	*(Fisher's exact)*	
Exclusivity of breastfeeding					
Exclusively breastfed	20 (54.1)	17 (45.9)	37 (100.0)		
Not exclusively breastfed	22 (24.2)	69 (75.8)	91 (100.0)	*10.652*	*0.001**
Hours at work (N= 72)					
<4 hours	5 (27.8)	13 (72.2)	18 (100.0)		
4 - 8 hours	14 (38.9)	22 (61.1)	36 (100.0)		
9 - 12 hours	5 (27.8)	13 (72.2)	18 (100.0)	*1.000*	*0.607*
Feeding bottle use					
Yes	15 (23.4)	49 (76.6)	64 (100.0)		
No	27 (42.2)	37 (57.8)	64 (100.0)	*5.103*	*0.024**
Attend work with baby (N = 72)					
Yes	18 (32.1)	38 (67.9)	56 (100.0)		
No	6 (37.5)	10 (62.5)	16 (100.0)	*0.161*	*0.688*
Creche at place of work (N = 72)					
Yes	7 (53.8)	6 (46.2)	13 (100.0)		
No	17 (28.8)	42 (71.2)	59 (100.0)		*0.108*

**Statistically significant*

Table 8b. Logistics regression analysis showing predictors of meeting optimal feeding frequency and dietary diversity (meeting the minimum acceptable diet)

Independent variables	Coefficient (B)	Odds ratio	95% Confidence Interval		P-value
			Lower	Upper	
Child's age (months)					
≥6 months	20.449	76.800	0.000	0.000	0.998
<6 months [R]		1			
Exclusivity of breastfeeding					
Exclusively breastfed	0.475	1.608	0.702	3.681	0.261
Not exclusively breastfed [R]		1			
Use of feeding bottle					
No	0.756	2.131	0.925	4.908	0.076
Yes [R]		1			
Constant	-0.344	0.709	-	-	0.352

R – Reference category

The only predictor of EBF found in this study was non-use of feeding bottles. This is at variance with the findings by Agbo, et al. [32] and Onah, et al. [20] who reported high socio-economic class as being a positive predictor for EBF. Factors identified by Ukegbu, et al. [30] to affect EBF including older maternal age, and higher parity are also at variance with the present study.

Factors identified to affect appropriate complementary feeding practices in the present study were practice of EBF in the first six

months, increasing age of the child and non-use of feeding bottles. This is because the mothers of children who were exclusively breastfed in the present study also had higher educational attainments, which would likely result in better understanding of complementary feeding recommendations. Also, older children are more likely to eat more times in the day and also ingest nutritionally diverse foods.

It is noteworthy that maternal knowledge about EBF in this study was quite high. The high levels of knowledge about EBF observed can be attributed to the level of focus that has been given to EBF nationally. This high level of knowledge positively affected the practice of EBF observed in the present study. However, knowledge about complementary feeding was generally poor and lower than that for EBF. This may have accounted for the poor complementary feeding practices observed in this study. Special attention is needed to improve the complementary feeding practices, particularly dietary diversity for children 6-24 months of age, while sustaining a focus on EBF among children under six months of age, in order to improve overall nutritional status of young children in Port Harcourt.

5. CONCLUSION

Exclusive breastfeeding and complementary feeding practices among mothers in Port Harcourt fall short of the WHO recommendations on Infant and Young Child Feeding (IYCF). There was a higher prevalence of overweight /obesity compared to the prevalence of wasting, underweight, or stunting among the children studied. The prevalence of overweight, wasting, underweight and stunting were all higher among those who were not fed according to the WHO recommendations on IYCF. The prevalence of underweight and stunting were significantly higher among those who were not exclusively breastfed. The use of pre-lacteal feeds and feeding bottles should be discouraged among mothers. Routinely communicating the "Ten Steps to Successful Breastfeeding" to all staff at health facilities can help achieve this.

CONSENT AND ETHICAL APPROVAL

Ethical approval for the study was obtained from the University of Port Harcourt Teaching Hospital Ethics Committee. Approval to carry out the study was obtained from the Rivers State Primary Health Care Management Board. Permission was also obtained from the medical officer in charge of each health centre. The details of the study were explained to the participating mothers and their written consent was obtained. All respondents gave consent by signing the consent form.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. World Health Organization. Infant and young child feeding. Lyon, France: World Health Organization; 2009.
2. Disha AD, Rawat R, Subandoro A, Menon P. Infant and young child feeding practices in Ethiopia and Zambia and their association with child nutrition: Analysis of demographic and health survey data. African Journal of Food, Agriculture and Development. 2012;12(2):5895-5914.
3. Ecker O, Nene M. Nutrition policies in developing countries: Challenges and highlights. Policy Note. Washington, DC: International Food Policy Research Institute; 2012.
4. United Nations Children's Fund, World Health Organisation, World Bank. Levels and trends in child malnutrition. The Joint Child Malnutrition Estimates; 2019.
   Available:https://www.who.int/nutgrowthdb/jme-2019-key-findings.pdf?ua=1
   (Accessed 30th December 2019)
5. World Health Organization/UNICEF. Global strategy for infant and young child feeding. Geneva: World Health Organization; 2003.
6. Black RE, Allen LH, Bhutta ZA, Caulfield LE, De Onis M, Ezzati M, et al. Maternal and child undernutrition: Global and regional exposures and health consequences. Lancet 2008;371:243–260.
7. Agee MD. Reducing child malnutrition in Nigeria: Combined effects of income growth and provision of information about mothers' access to health care services. Soc Sci Med. 2010;71(11):1973-1980.
8. Kanjilal B, Mazumdar PG, Mukherjee M, Rahman MH. Nutritional status of children in India: Household socio-economic condition as the contextual determinant. Int J Equity Health. 2010;9(1):19.

9. Frank-Briggs AI, Grange A. Disease patterns and childhood mortality in the Tropics. In: Azubuike JC, Nkanginieme KEO (editors). Paediatrics and Child Health in a Tropical Region. 2nd ed. Port Harcourt. University of Port Harcourt Press. 2007;12–5.
10. World Health Organization. WHO factsheet on Infant and Young Child Feeding. Fact sheet N° 342 (Updated February 2014); 2014.
11. Australian Institute of Health and Welfare. Australian National Infant Feeding Survey: Indicator Results. Canberra: AIHW; 2011.
12. Ghana Statistical Service, Ministry of Health & ICF Macro. Ghana demographic and health survey 2008. Accra: GSS, MOH and ICF Macro; 2009
13. Iliyasu Z, Kabir M, Abubakar IS, Galadanchi NA. Current knowledge and practice of exclusive breastfeeding among mothers in Gwale local government area of Kano State. Niger Med Pract. 2005;48:50-55.
14. Uchendu UO, Ikefuna AN, Emodi IJ. Factors associated with exclusive breast feeding among mothers seen at the University of Nigeria Teaching Hospital, Enugu. J Child Health. 2009;3:14-19.
15. Ndiokwelu CI, Maduforo AN, Amadi CA, Okwy-Nweke CP. Breastfeeding and complementary feeding practices of mothers of Children (0–24 Months) Attending Infant Welfare Clinic (IWC) at the Institute of Child Health (ICH) University of Nigeria Teaching Hospital (UNTH) Ituku-Ozalla Enugu. Journal of Biology, Agriculture and Healthcare. 2014;4(11):5-15.
16. Gyampoh S, Otoo GE, Aryeetey RN. Child feeding knowledge and practices among women participating in growth monitoring and promotion in Accra, Ghana. BMC Pregnancy Childbirth 2014;14: 180.
DOI: 10.1186/1471-2393-14-180
17. Lawan UM, Amole GT, Jahum MG, Sani A. Age-appropriate feeding practices and nutritional status of infants attending child welfare clinic at a Teaching Hospital in Nigeria. J Fam Community Med; 2014.
(Accessed April 8, 2015)
18. Egbuonu I, Ojukwu JU. Infant feeding. In: Azubuike JC, Nkanginieme KEO (editors). Paediatrics and child health in a tropical region. 2nd ed. Port Harcourt. University of Port Harcourt Press. 2007;224–239.
19. National Population Commission Abuja, Nigeria. Nigeria Demographic and Health Survey, 2013. Preliminary Report. Calverton, Maryland, USA: MEASURE DHS, ICF International; 2013.
20. Onah S, Osuorah DI, Ebenebe J, Ezechukwu C, Ekwochi U, Ndukwu I. Infant feeding practices and maternal socio-demographic factors that influence practice of exclusive breastfeeding among mothers in Nnewi South-East Nigeria: a cross-sectional and analytical study. Int Breastfeed J. 2014;9:6.
DOI:10.1186/1746-4358-9-6
(Accessed April 8, 2015)
21. Sadoh AE, Sadoh WE, Oniyelu P. Breast feeding practice among medical women in Nigeria. Niger Med J. 2011;52(1):7–12.
PMCID: PMC 3180747
22. National Population Commission of Nigeria. Niger Delta Regional Development Master Plan. Federal Republic of Nigeria: Niger Delta Development Commission (NDDC); 2006.
23. Lwanga SK, Lemeshow S. Sample size determination in health studies: A practical manual. Geneva, Switzerland: Publication of World Health Organization. 1991;1-3.
24. World Health Organisation. Indicators for assessing breastfeeding practices. Report of an informal meeting. Geneva: WHO; 1991.
25. World Health Organization. Indicators for assessing Infant and Young Child Feeding Practices. Washington DC, USA: WHO; 2008.
26. Pan American Health Organisation (PAHO). 2002 Guiding principles for complementary feeding of the breastfed child. Washington DC: PAHO/WHO; 2003.
27. Lohman TG, Roche AF, Martorell R. Anthropometric standardization reference manual. Champaign IL; Human Kinetics Books. 1991;1-90.
28. Oyedeji GA. Socio-economic and cultural background of hospitalized children in Ilesha. Nig J Paediatr. 1985;12:111-7.
29. Central Bureau of Statistics, Ministry of Health, Kenya. Kenya Demographic and Health Survey 2003. Calverton, Maryland: CBS, MOH and ORC Macro. 2004;153-155.
30. Ukegbu AU, Ukegbu PO, Onyeonoro UU, Ubajaka CF. Determinants of breast feeding patterns among mothers in

Anambra State, Nigeria. S Afr J Child Health. 2011;5(4):112.
31. Anigo KM, Ameh DA, Ibrahim S, Danbauchi SS. Infant feeding practices and nutritional status of children in North Western Nigeria. Asian J Clin Nutr. 2009; 1:12-22.
32. Agbo KE, Dibley MJ, Odiase JI, Ogbonmwan SM. Determinants of exclusive breastfeeding in Nigeria. BMC Pregnancy Childbirth. 2011;11:2. Published online Jan 11, 2011 DOI:10.1186/1471-2393-11-2 PMCID: PMC3025918 (Accessed April 8, 2015)
33. Motee A, Ramasawmy D, Pugo-Gunsam P, Jeewon R. An assessment of the breastfeeding practices and infant feeding pattern among mothers in Mauritius. Journal of Nutrition and Metabolism; 2013. Article ID 243852:8. DOI:10.1155/2013/243852 (Accessed April 16, 2015)
34. Tagbo BN, Ughasoro MD. Complementary feeding pattern of infants attending the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu. Nig J Paediatr. 2009; 36(3&4):51-59.
35. Arimond M, Ruel MT. Dietary diversity is associated with child nutritional status: Evidence from 11 Demographic and Health Surveys. J Nutr. 2004;134(10): 2579- 2585.
36. Sossa CJ, Laleye FT, Agueh VD, Guedegbe J, Azandjeme C, et al. Evaluation of feeding practices in children aged 6 – 23 months in Southern Benin Rural Setting. Int. J of Tropical Dis and Health. 2015;10(4):1-8.
37. Agbedeyi GO, Eke GK, Nte AR. Nutritional status of day care attendees in Port Harcourt Metropolis. Niger J Paediatr. 2015;42(3):210-213.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/53821