



Relationship between Weaning Foods and Nutritional Status of Children Attending Immunization Clinic at a Military Barracks in Port Harcourt, Nigeria

Chiemerie Adaeze Onyeka^{1*} and Margaret-Mary Mezie-Okoye¹

¹*Department of Preventive and Social Medicine, University of Port Harcourt, Rivers State, Nigeria.*

Authors' contributions

This work was carried out in collaboration between both authors. Author CAO designed the study, managed the literature searches, wrote the protocol and the first draft of the manuscript. Author MMMO reviewed the work. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJMAH/2017/33668

Editor(s):

(1) Serap Colak, School of Physical Education and Sport, Kocaeli University, Kocaeli, Turkey.

Reviewers:

(1) Ghada Mohammad Hussein Abu Shosha, Zarqa University, Jordan.

(2) Amarpreet Kaur, G.G.S.Medical College and Hospital, India.

(3) Ashwini Narasannavar, KLE University, India.

Complete Peer review History: <http://www.sciencedomain.org/review-history/19853>

Original Research Article

Received 25th April 2017

Accepted 5th June 2017

Published 4th July 2017

ABSTRACT

Aims: To determine the relationship between weaning foods and nutritional status of children aged 6-23 months attending immunization clinic at a military barracks in Port Harcourt, Rivers state, Nigeria.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: 400 children who attend immunization clinic at the 2 brigade medical centre, Port Harcourt participated in the study which took place from July-September 2016.

Methodology: Systematic random sampling was done and data was collected using questionnaires. Weight (using Salter scale, model 180) and height measurements (with a wooden measuring board) were taken. The completely filled questionnaires (373) were analyzed using Microsoft Excel 2007, SPSS version 20 and WHO Anthro version 3.2.2, 2011 and presented in tables. Chi square and logistic regression was done to determine association between weaning foods and nutritional status.

*Corresponding author: E-mail: doctorsbalm@yahoo.com;

Results: Response rate was 93.25%. The mean age of the children was 13.04±5.04 months, with 211 (56.6%) males and 162 (43.4%) females. Locally prepared cereals were the most commonly used weaning food, for 211(56.6%) children. Others include commercially prepared cereals 96(25.7%); family diet 12 (3.2%), combination of local, commercial or family diet 47(12.6%). Those overweight were 33 (8.8%), 23 (6.2%) were moderately wasted, 3 (0.8%) severely wasted, 44 (11.8%) moderately stunted, 36 (9.6%) severely stunted; 18 (4.8%) moderately underweight and 4 (1.1%) had severe underweight. Chi square test showed an association between weaning foods and all the forms of malnutrition ($P < .05$). Wasting and overweight were more with local + commercial cereals (16%, 16%, $P = .001$), underweight and stunting were more with local cereal+ family diet (15%, 40%, $P = .001$)

Conclusion: The poor nutritional status observed from this study was associated with the weaning foods used and emphasis should be placed on child care and feeding practices.

Keywords: Weaning foods; Nutritional status; 6-23 months; military barracks.

ABBREVIATIONS

HAZ : Height for Age Z Score

WAZ : Weight for Age Z Score

WHZ : Weight for Age Z Score

1. INTRODUCTION

Adequate feeding and optimum nutrition of infants and young children are ranked high in the determinants of their growth and development [1]. Poor weaning foods and practices have been associated with malnutrition in children below five years while good feeding practices will prevent malnutrition and early growth retardation in the growing child [2,3]. Weaning is the gradual replacement of milk by solid food as the main source of nutrition [4]. It is the period of transition for the infant between exclusive breastfeeding and cessation of breastfeeding during which there's a change in diet in terms of source, consistency and taste; from a liquid based diet, the child is gradually introduced to semi solid foods and then to solid foods being the family diet [4]. Weaning period can pose a lot of problems for the survival of the growing child [5]. Choice of appropriate weaning food as well as appropriate weaning practices is of paramount importance.

The use of poor weaning foods has been associated with poor nutritional status of children during the weaning period (6-23 months) especially in developing countries [6]. Malnutrition is an important cause of infant morbidity and mortality in the developing countries as reflected in the huge "malnutrition-divide" between developed and developing countries. It was estimated that in children less than five years of age, about 99 million are underweight, 161 million are stunted, 51 million wasted and 42 million are overweight globally [7].

However, the 2015 UNICEF-WHO-World bank joint child malnutrition estimates shows that the global trend in stunting prevalence is decreasing (159 million) but the decline is not fast enough and 50 million children globally are wasted of which 16 million were severely wasted in 2014 [8]. Similarly, the prevalence of overweight is also increasing (4.5% in 1990 to 6.1% in 2014) giving a figure of 41 million [8]. Africa has also shown slow progress in reduction of the prevalence of stunting as seen in the joint child malnutrition estimates with more than one-third (37%) of all stunted children under five years of age living in Africa in 2014. In Nigeria, the 2013 National demographic and health survey puts the prevalence of stunting at 37%, underweight 29% and wasting 18% with the prevalence in Rivers state being 22.9% for stunting, 17.7% for underweight and 13.3% for wasting [9]. The poor nutritional status noted among children in developing countries is as a result of their being mostly predisposed to growth faltering between the ages of six to twenty-four months (6-24 months) when complementary foods are started with decreased or no consumption of breast milk, increased micronutrient deficiencies especially with inadequate weaning foods as well as diarrhoeal diseases [6]. Also, early weaning, delayed introduction of complementary foods have been identified as immediate causes of malnutrition [10].

Studies have shown that under nutrition has a wide range of effects that distort not only the nutrition and development of children in the immediate period, but also their cognitive abilities and productivity in adulthood, with profound measurable economic impacts [6,11]. Likewise it has been shown that the window of opportunity for addressing the nutritional needs of the child in order to produce healthy, productive adults lasts from conception up to two years of age. After this

period, the effects of under nutrition are largely irreversible [12]. The 2015 United Nations Sustainable development goals is a clarion call to extinct the menace of malnutrition and its consequences. This is reflected by goals 2 and 3 of the 15 sustainable development goals [13]. . Goal 2 states ‘to end hunger, achieve food security and improved nutrition and promote sustainable agriculture’ while goal 3 states “ensure healthy lives and promote wellbeing for all at all ages” (UN,2015). The 2nd target of goal 3 aims to end preventable deaths of newborns and children under five years of age with all countries aiming to reduce neonatal mortality to as low as 12 deaths per 1000 live births and under-five mortality to as low as 25 deaths per 1000 live births. Improvements in nutrition are necessary and desirable for the growth and physical health of young children, reduction in the risk of infection, enhancing psychomotor development and school performance as well as improving opportunities to participate in social development in the long run, hence this study. This study is limited to assessing the nutritional status of children aged 6-24 months and who attend immunization clinic at a military barracks in Port Harcourt in relation to foods used for weaning; it does not undermine the fact that so many other factors can actually have effect on the nutritional status of these children. A study of this kind has not been conducted previously and documented among these children probably as a result of the restricted nature of the environment. Thus, this study with its recommendation will contribute to the desired improvement in nutritional status of the targeted age group in the study population.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out from July –September 2016 at the 2 brigade medical centre (now 6 Division Hospital) located within the 2 Brigade (now 6 Division) barracks of the Nigerian army in Port Harcourt commonly called Bori camp. Bori camp is situated in the heart of Port Harcourt, Obio-Akpor Local Government Area in Rivers state, Nigeria. The barracks is bounded on the North by the Nigerian Air force base Port Harcourt, on the South by Ikwerre road, on the West by the East-West road and on the East by Aba road. The barracks occupy a wide land mass comprising of about two hundred and eight blocks of one thousand eight hundred and seventy three flats and rooms occupied by

military personnel and their families. Military personnel serving within the state and their families mainly reside in this camp. The 6 Division hospital provides primary health care services to all the soldiers and their families in the barrack. The clinic also provides family planning and immunization services to military personnel as well as civilians that come to assess these services.

2.2 Study Design

A descriptive cross sectional study design was undertaken.

2.3 Study Population

This study involved all the children (6-23 months) alongside their mothers who access the immunization services rendered at the medical centre in this military barracks. Children used for the study were ensured to be appropriate for gestational age at birth (2.5-3.99 kg) and within the specified age range. Children with mental retardation, chronic diseases and obvious congenital anomalies were excluded from this study.

2.4 Sample Size Determination

The formula for sample size determination was used [14]. A prevalence of 35.8% from the study of Akorede et al was used [15].

Approximately, a minimum sample size of 400 children was obtained after adjusting for non-response rate of 10%.

2.5 Sampling Technique

The average attendance of children within the desired age range that attend each immunization day (Tuesdays and Thursdays) is about 50 as seen from their daily immunization record. Systematic random sampling was used in selecting the study sample. The sample size of 400 was collected over a period of 8 weeks, (50 weekly and 25 daily) using a sampling interval of 2.

2.6 Study Instrument and Procedure

Data collection was done using semi structured interviewer guided questionnaire that was distributed to the mothers of the children. Two community health extension workers were trained on how to guide the mothers in filling the questionnaires as well as on height and length measurement. After the health talk was done on

each of the immunization days, the mother-child pairs within the desired age groups were informed about the research and their consent obtained to participate in the study, after which they were selected and assigned numbers starting from 1. The 1st sample was chosen by balloting and the others followed at an interval of two and were recruited into the study. Having signed the consent letters, the interviewers guided them in completing the questionnaires. The weight measurement of each of the selected children using an infant weighing scale (Salter scale, model 180) was taken with the child putting on light clothing such as pant and singlet and recorded to the nearest 0.1 kg. Likewise the length of each of the children was measured using a locally made measuring board constructed by fixing a graduated non- elastic measuring tape to a wooden frame [16] while in the recumbent position without shoes or cap and read to the nearest millimeter which is similar to what was done by WHO in designing the WHO multicentre growth reference chart [17].

2.7 Data analysis

The response rate was 93.25. The data contained in the 373 questionnaires collated were entered into Microsoft Excel data sheet (2007 version) and then into Statistical Package for the Social Sciences (SPSS) version 20 software for data analysis and calculation of anthropometric indices was done using WHO Anthro version 3.3.2 software [17]. Summary statistics by use of frequency tables, mean and standard deviation was done. Also, bivariate analysis using chi square test at p=5% was done to determine the association between the type of food used for weaning and the nutritional status of the children under study while logistic regression analysis was performed to control for confounders.

3. RESULTS AND DISCUSSION

3.1 Socio-Demographic Characteristics

Table 1 shows that 155 (41.6%) of the 373 children studied were aged 6-11 months, 158 (42.4%) aged 12-17 months and 60 (16.0%) were 18-23 months old with the mean age being 13.04 ± 5.04 months. Two hundred and eleven (56.6%) were males while 162 (43.4%) were females. Most, 282 (75.6%) of the respondents were Christians while the rest were Muslims, 91 (24.4%). Over half of the respondents were of the three main ethnic groups in Nigeria viz:

Hausa, 86 (23.1%), Igbo, 81 (21.7%), and Yoruba, 34 (9.1%). A large number of their fathers were Military personnel, 223 (59.8%), others were Businessmen, Artisans, Civil servants, Professionals etc. Over half of the mothers were housewives, 192 (51.5%), while others were business women, Civil servants, Military personnel etc.

Table 1. Socio-demographic characteristics

Characteristics	Frequency	Percent
N=373		
Age (months)		
6-11	155	41.6
12-17	158	42.4
18-23	60	16.0
Mean ± SD	13.04 ± 5.04	
Sex		
Male	211	56.6
Female	162	43.4
Religion		
Christianity	282	75.6
Islam Tribe	91	24.4
Ethnicity		
Hausa	86	23.1
Igbo	81	21.7
Yoruba	34	9.1
Others	172	56.1
Fathers occupation		
Military	223	59.8
Business	99	26.5
Civil Servant	17	4.6
Company Worker	12	3.2
Artisan	11	3.0
Clergy	6	1.6
Professional (Lawyer, Doctor)	5	1.3
Mothers occupation		
Housewife	192	51.5
Business	128	34.3
Civil Servant	19	5.1
Military	16	4.3
Professional (Lawyer, Doctor, Estate Surveyor, Nurse)	12	3.2
Student	4	1.1
Clergy	2	0.5
Family monthly income(Naira)		
0-49,900	28	7.5
50,000-99,000	244	65.4
100,000-149,900	66	17.7
150,000-199,900	18	4.8
≥ 200,000	17	4.6
Mean ± SD	88,710.46 ± 46,377.79	
Number of children in the family		
1	77	20.6
2	122	32.7
3	117	31.4
4	38	10.2
5	12	3.2
6	7	1.9
Mean ± SD	2.48 ± 1.13	

Majority, 244 (65.4%) of the families earn 50,000-99,000 Naira monthly with the mean being ₦88,710.46 ± ₦46,377.79. Most of families had 2-3 children, 239 (64.1%) and the mean number of children was 2.48 ± 1.13 children.

3.2 Weaning foods

Table 2 shows that the most popular weaning foods fed the children were locally prepared cereals, 211 (56.6%). The locally prepared weaning food (Pap) was made from either Maize, Guinea corn, Millet, which were used singly or in combination with Crayfish and Soya beans.

3.3 Weaning Practices

The feeding practices are illustrated [in Table 3. About one-third, 124 (33.2%) were exclusively breast fed for 6 months. Also, majority 261 (70.0%) were still being breastfed. Weaning was commenced for 152 (40.8%) children at 6 months while others were weaned before or after 6 months. One third were fed 4 or 5 times a day while over half, 199 (53.4%) were fed 3 times a day. Scheduled feeding was practiced by over half of the caregivers, 209 (56.0%), feeding on demand by 146 (39.1%) and force feeding by only 18 (4.9%). Majority were fed by their mothers, 327 (87.7%) while others were fed by other caregivers in addition. Over half were fed with plate and spoon, 206 (55.2%) as well as with cup and spoon, 83 (22.3%) while 80 (21.5%) were fed with bottle and only a few, 4 (1.0%) were fed with hand. Also, 295 (79.1%) used tap water in preparing the child's food; others used sachet water or bottled water. Hand washing was practiced all the time before feeding the children by 248 (66.5%) of the caregivers and sometimes by 125 (33.5%) of the caregivers.

3.4 Nutritional Status

Physical examination done to reveal some of the features of mal nutrition in the children included examination for the general appearance of the child, pallor, edema, skin rashes and hair texture. Majority, 366 (98.1%) were well kept; were not pale, 361 (96.8%); had no edema, 371 (99.5%); had no skin rashes, 315 (84.5%) and 371 (99.5%) had normal hair texture. Using WHO Anthro software [18], 33 (8.8%) were found to be overweight with WHZ >+2, while 26 (7.0%) were found to be wasted (moderate and severe) with WHZ of <-2. For HAZ, 80 (21.4%) were stunted (Moderate and severe) with HAZ of <-2. For WAZ, 22 (5.9%) were underweight (moderate and severe) with WAZ of < -2 as shown in Table 4

3.5 Relationship between Weaning Foods and Nutritional Status

Tables 5 and 6 show that the foods used for weaning were associated with the nutritional status of the children under study ($P < 0.05$).

Logistic regression and multivariate analysis was done to rule out feeding practices as confounding factors in the relationship between weaning foods and the nutritional status. It was found that family income and number of children in the family were confounding factors associated with Stunting where children from families that earned ≤100,000 Naira and those that had four children or more were associated with stunting. Also continued breastfeeding, age of initiating weaning foods, mode of feeding and hand washing practice which are all feeding practices were confounding factors associated with underweight.

Table 2. Weaning foods

Characteristics	Frequency N=373	Percent
Weaning foods and Types		
I- Locally made Cereals E.G. PAP	211	56.6
II- Commercially made Weaning Foods E.G. Cerelac, Custard, Gerber	96	25.7
III- Family Diet E.G. Mashed Potatoes or Yam, Agidi, Rice	12	3.2
IV- Locally Made Cereals + Commercially made weaning foods	25	6.7
V- Locally made Cereals + Family Diet	20	5.4
VI- Commercially Made weaning Food + Family Diet	2	0.5
VII (Not Weaned)	7	1.9
Content of Homemade Cereal (N=256) (Multiple Response)		
Maize/Guinea Corn/ Millet Without Soya Beans or Crayfish	167	65.2
Maize/Guinea Corn/Millet with Soya Beans or Crayfish	89	34.8

Table 3. Feeding practices

Characteristics	Frequency N=373	Percent
Was the child exclusively breast fed		
No	249	66.8
Yes	124	33.2
Is the child still on breast milk?		
Yes	261	70.0
No	112	30.0
At what age did you introduce other foods?		
6 Months	152	40.8
4-5 Months	105	28.2
Before 4 Months	94	25.1
After 6 Months	22	5.9
How Many times a day is the child fed?		
3 Times	199	53.4
4 Times	88	23.6
Less than 3 times	59	15.8
5 Times and above	27	7.2
How is the feeding done?		
Scheduled	209	56.0
on Demand	146	39.1
Force Feeding	18	4.9
Who feeds the child?		
Mother	327	87.7
Mother + Siblings	35	9.3
Mother+ Other caregivers	11	3.0
What is the child fed with		
Plate and Spoon	206	55.2
Cup and Spoon	83	22.3
Bottle	80	21.5
Hand feeding	4	1.0
What is the source of water used to prepare the child's food		
Tap water	295	79.1
Sachet water	48	12.9
Bottled water	30	8.0
How often does the caregiver wash the hands BEFORE Feeding the Child		
Always	248	66.5
Sometimes	125	33.5

Table 4. Nutritional status by anthropometry

Characteristics	Frequency N=373	Percentage (%)
Weight-for-height Z-score (WHZ) (Wasting)		
Overweight (>+2)	33	8.8
Normal (-2 TO +2)	314	84.2
Moderate Malnourished (-3 TO <-2)	23	6.2
Severely Malnourished (<-3)	3	0.8
Height-for-age Z-score (HAZ) (stunting)		
Normal (-2 TO +2)	293	78.6
Moderate malnourished (-3 TO <-2)	44	11.8
Severely malnourished (<-3)	36	9.6
Weight-for-age Z-score (WAZ) (underweight)		
Normal (-2 OR +2)	351	94.1
Moderately malnourished (-3 TO <-2)	18	4.8
Severely malnourished (<-3)	4	1.1

Table 5. Relationship between weaning foods and overweight/ wasting in children aged 6-23 months

*Characteristics	Weight-for-height Z-score (WHZ) (Wasting)				Total	Chi-square (X ²) (p-value)
	Overweight Freq (%)	Normal Freq (%)	Moderate malnourished Freq (%)	Severely malnourished Freq (%)		
I	14 (6.64)	183 (86.73)	13 (6.16)	1 (0.47)	211 (100.0)	574.40 (0.001)*
II	12 (12.5)	77 (80.20)	7 (7.29)	0 (0.0)	96 (100.0)	212.11 (0.001)*
III	1 (8.3)	10 (83.3)	1 (8.3)	0 (0.0)	12 (100.0)	29.33 (0.001)*
IV	4 (16.0)	17 (68.0)	2 (8.0)	2 (8.0)	25 (100.0)	33.44 (0.001)*
V	2 (10.0)	18 (90.0)	0 (0.0)	0 (0.0)	20 (100.0)	60.80 (0.001)*
VI	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	Not derivable
Total	33 (9.02)	307 (83.88)	23 (6.28)	3 (0.82)	366 (100.0)	

*KEY: I- Locally made cereals e.g. pap, II- Commercially made weaning foods e.g. Cerelac, custard, Gerber, III- Family diet e.g Mashed potatoes or yam, Agidi, rice, IV- Locally made cereals + commercially made weaning foods, V- Locally made cereals + family diet, VI- Commercially made weaning food + family diet

Table 6. Relationship between weaning foods and stunting/ underweight in children aged 6-23 months

*Characteristics	Height-for-age Z-score (HAZ) (Stunting)			Total	Chi-square (X ²) (p-value)
	Normal Freq (%)	Moderate malnourished Freq (%)	Severely malnourished Freq (%)		
I	172 (81.52)	26 (12.32)	13 (6.16)	211 (100.0)	332.40 (0.001)*
II	68 (70.83)	14 (14.58)	14 (14.58)	96 (100.0)	91.13 (0.001)*
III	9 (75.0)	1 (8.33)	2 (16.67)	12 (100.0)	14.25 (0.001)*
IV	25 (100.0)	0 (0.0)	0 (0.0)	25 (100.0)	Not derivable
V	12 (60.0)	1 (5.0)	7 (35.0)	20 (100.0)	13.65 (0.001)*
VI	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	Not derivable
Total	288 (78.69)	42 (11.48)	36 (9.84)	366 (100.0)	

*Characteristics	Weight-for-age Z-score (WAZ) (Underweight)			Total	Chi-square (X ²) (p-value)
	Normal Freq (%)	Moderate malnourished Freq (%)	Severely malnourished Freq (%)		
I	202 (95.73)	8 (3.79)	1 (0.47)	211 (100.0)	555.11 (0.001)*
II	91 (94.79)	5 (5.21)	0 (0.0)	96 (100.0)	245.34 (0.001)*
III	11 (91.67)	1 (8.3)	0 (0.0)	12 (100.0)	27.75 (0.001)*
IV	22 (88.0)	3 (12.0)	0 (0.0)	25 (100.0)	51.24 (0.001)*
V	17 (85.0)	0 (0.0)	3 (15.0)	20 (100.0)	37.05 (0.001)*
VI	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	Not derivable
Total	345 (94.26)	17 (4.64)	4 (1.09)	366 (100.0)	

*Statistically significant (p<0.05)

*KEY: I- Locally made cereals e.g. pap, II- Commercially made weaning foods e.g. Cerelac, custard, Gerber, III- Family diet e.g Mashed potatoes or yam, Agidi, rice, IV- Locally made cereals + commercially made weaning foods, V- Locally made cereals + family diet, VI- Commercially made weaning food + family diet

3.6 Discussion

The findings from this study [Table 2] showed that the predominant food used for weaning children aged 6-23 months in a military barracks in Port Harcourt was locally made cereal commonly called pap which is similar to the finding from the studies of Ijarotimi et al in Akure Nigeria [2]. The markets located within this military barracks sell different local cereals in

large quantity, which are always available and affordable. This reason as well as the low income of the parents [as shown in Table 1] seem to have contributed to the high proportion of children weaned with locally prepared cereals. Less than half of the children attending the immunization clinic at this military barracks were weaned at 6 months of age according to WHO recommendation [Table 3] This observation among the study sample may have been

accounted for by the low practice of exclusive breastfeeding.

The prevalence of malnutrition as determined by anthropometry and shown in Table 4 was 43.2% distributed as follows: Overweight 8.8%, Wasting 7.0%, Stunting 21.5% and Underweight 5.9% which is lower than the overall 61% prevalence of malnutrition in Rivers state from the 2013 NDHS [9] distributed as follows: Overweight 7.1%, Wasting 13.3%, Stunting 22.9% and Underweight 17.7%. Comparing the individual nutritional indicators obtained from this study to that of the NDHS, it was found that the prevalence of Overweight is high among the study population agreeing with the double burden of malnutrition in developing countries [10]. However, the prevalence of other forms of malnutrition appears to be decreasing tremendously apart from stunting whose decline is slow, corresponding to the UNICEF-WHO-World Bank joint malnutrition estimates [8].

This study as depicted in Tables 5-6 showed that there is an association between weaning foods and nutritional status (Overweight, Wasting, Stunting and Underweight) of the children studied ($P < .05$). The prevalence of all the forms of malnutrition was more associated with the use of locally made cereals (Pap) in weaning these children. The reason for this observation among the study sample could be the fact that those who supplemented the Pap with protein rich foods such as Crayfish and Groundnut were not of a reasonable proportion. It means that the locally made cereals are inadequate in terms of nutrient which could have contributed to the high prevalence of malnutrition among this group of children. Similarly, some weaning practices were also associated with the poor nutritional status meaning that weaning foods as well as feeding practices are associated with malnutrition.

4. CONCLUSION

Locally prepared cereals were used by the majority of the mothers to wean their children either singly or in combination with other foods.

Some poor weaning practices were noted to be practiced by some of the mothers. Over half of the children were weaned before or after 6 months of age which is contrary to the recommendations by the WHO. Likewise, scheduled pattern of feeding which does not reflect the appetite or situation of the children

was practiced by a large proportion of the mothers.

A high prevalence of malnutrition was found among the study population which is a call for urgent intervention aimed at curbing the menace of malnutrition. The poor nutritional status noted among the children studied was found to be associated with the weaning foods and poor feeding practices adopted by their mothers. Feeding with local cereals seemed to be most associated with malnutrition in the population studied agreeing with the fact that local weaning foods in Africa are inadequate nutritionally in terms of quality for weaning. This finding has implication for further research aimed at developing nutritionally adequate weaning foods for young children in Africa. There's also need to improve on nutritional education on weaning practices among women.

CONSENT

Informed consent was obtained from the mothers of the children that participated in the study.

ETHICAL APPROVAL

Approval to carry out the research was obtained from the ethics committee of university of Port Harcourt. Administrative consent was also obtained from the commanding officer of the 2 brigade medical centre (Now 6 Division Hospital) Port Harcourt barracks.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kliegman RM, Stanton BF, St. Geme III JW, Schor NF, Behrman RE. Nelson textbook of pediatrics, 19th ed, Elsevier Saunders. 2011;171-3.
2. Ijarotimi OS. Nutritional status and feeding practices of infants among low income nursing mothers in Ondo State, Nigeria. International Journal of Tropical Medicine. 2006;1(3):123-9.
3. WHO. Complementary feeding: Family foods for breastfed children. Geneva, WHO; 2000. (Cited 2016 May 9). Available:[WHO/NHD/00.1:WHO?FCH/CAH/00.6](http://www.who.int/nhd/00.1:WHO?FCH/CAH/00.6)

4. Alvisi P, Brusa S, Alboresi S, Amarri S, Bottau P, Cavagni G et al. Recommendation on complementary feeding for healthy full-term infant. Italian Journal of Paediatrics. 2015;41:36. DOI: 10.11 86/s 13052-015-0143-5
5. Imdad A, Yakoob MY, Bhutta ZA. Impact of maternal education about complementary feeding and provision of complementary foods on child growth in developing countries. BMC Public Health. 2009; 11(suppl 3):S25
6. USAID's Infant and young child nutrition project. Behavior change interventions and child nutritional status (lit. review); 2011. (Cited on 2015 Oct 4). Available: www.iycn.org/files/IYCN_comp_feeding_lit_review_062711.pdf
7. UNICEF-WHO-World bank. Levels and Trend in Malnutrition; 2014. (Cited on 2016 Jan 29). Available: www.data.unicef.org/corecode/uploads/documents/uploaded_files_pdfs_corecode/levelsandtrendmalnutrition_summary_2014_132.pdf
8. UNICEF-WHO-World bank jme brochure: levels and trends in child malnutrition; 2015. (Cited on 2015 Nov 5). Available: www.who.int/nutgrowthdb/jme_brochure
9. National Population Commission and ICF International. Nigeria Demographic and Health survey 2013. Abuja Nigeria and Rockville, Maryland USA. 2014;179.
10. Mezie-Okoye MM. Essentials of public health nutrition for Africa. Port Harcourt Nigeria: University of Port Harcourt Press. 2013;71-5.
11. Ruel MT, Hoddinott J. Investing in early childhood nutrition. IFPRI Policy Brief. 2008;8.
12. World Bank. Repositioning nutrition as central to development: a strategy for large scale action. Washington DC, USA; 2006. (Cited 2016 Mar 19). Available: www.unhcr.org
13. United Nations; 2015. (Cited 2016 Sep 2) Available: www.un.org/sustainabledevelopment/sustainable-developmentgoals
14. Lwanga SK, Lemeshow S. Sample size determination; A practical manual. WHO Geneva. 1991;25.
15. Akorede QJ, Abiola OM. Assessment of nutritional status of under five children in Akure South local government, Ondo state Nigeria. IJJRAS. 2013;14(3):671-81.
16. Ukegbu PO, Ukegbu AU. Assessment of nutritional status of institutionalized blind adolescent students in Umuahia, Abia State. Sky Journal of Medicine and Medical Sciences. 2014;2(9):079-84.
17. WHO multicentre growth reference study group. Complementary feeding in the WHO multicentre growth reference study. Acta Paediatr Suppl. 2006;450:27-37,56-65.
18. WHO. WHO Anthro for personal computers, version 3.2.2: Software for assessing growth and development of the world's children. Geneva: WHO; 2010. (Cited 2016 Sep 10). Available: <http://www.who.int/childgrowth/software/en>

© 2017 Onyeka and Mezie-Okoye; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://sciencedomain.org/review-history/19853>