Nutrient Intakes and Nutritional Status of Mothers and their Under-Five Children in a Rural Community of Oyo State, Nigeria

T.M. Fabunmi, O.O. Onabanjo*, E.B. Oguntona, O.O. Keshinro, J.A. Onabanjo, O.O. Obanla and O.O. Oyawoye

Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Nigeria

Abstract: Malnutrition in sub-Saharan Africa contributes to high rates of childhood morbidity and mortality which make it a public health concern in Africa. This study assessed the nutrient intakes and nutritional status of mothers and their under-five children in a rural community of Oyo State, Nigeria. A total of 500 households with a mother and child pair were sampled using a multi-stage sampling procedure. Information on household socio-economic status, hygiene practices, breastfeeding practices and clinical observation for signs of malnutrition were collected using pre-tested semi-structured questionnaires by trained interviewers. Weight for age (WAZ), weight for height (WHZ), and height for age (HAZ) for underweight, wasting and stunting, respectively were calculated and assessed by Epi Info software using the NCHS/WHO international reference values. BMI (weight/height^2) of mothers were also constructed from the measurements of mothers' weights and heights. The waist/hip ratio of mothers was also determined. An interactive 24 h recall repeated for three days was used to obtain data on food and nutrient intakes of the women. Information on foods consumed was converted into quantitative data of nutrients using Food Composition Table. The result showed a high proportion (81%) of mothers ate three times daily while 14% ate twice and 5% ate more than thrice daily. The mean daily intakes of calcium, vitamins A, B6, B12, niacin, and folate were found to be inadequate compared with the Recommended Intakes. The WHR of the mothers indicated that majority had low risk. Most of the mothers (69.2%) were normal, underweight 9.6%, overweight 15.8% and obese 5.4%. About 37% of the children were stunted, 18% were underweight and 14.3% were wasted. BMI correlated negatively with age ($r = -0.41$; $p < 0.05$), and positively with education ($r = 0.22$; $p<0.05$) and income ($r = 0.45$; $p < 0.05$). Clinical observation revealed PEM prevalence in 12% children while eyes pallor and palm pallor were present in 15% and 20% respectively. The nutritional status of mothers and their under-five children is poor with respect to the overall food consumption and micronutrient intake. Consequently, nutrition programmes in this area should include effective measures to promote nutritional status of mothers and children.

Keywords: Nutrient intake, Nutritional Status, Mothers, Under-Five Children, Nigerian.

INTRODUCTION

Nutritional deficiencies in sub-Saharan Africa have been found to contribute to the high rates of disability, morbidity, and mortality in Nigeria, especially among infants and young children [1, 2]. Thus, the importance of adequate nutrition for women and children cannot be overemphasized and remains a great concern in the country. In developing countries, children of 0-5 years of age form a large as well as "high risk" group and their nutritional status is of particular concern from the early years of life. Child nutrition has to start with the nutritional status of the pregnant woman. Majority of infant under-nutritional problems is frequently connected to small for gestational age birth weight and retarded weight gain afterwards [3]. The current health situation in Nigeria, as in many developing countries, is unsatisfactory, with women and children, particularly those in rural areas, being most affected. The situation of Nigerian children, like in many other developing countries, has worsened progressively in the last two decades, resulting in high child deaths and threats to future productivity and development [4]. Various nutrition surveys conducted in the country have also demonstrated the existence of hunger and malnutrition in children [5-10]. Most of these studies have showed that undernutrition characterized by stunting, wasting and underweight affects substantial proportion of the children. It has also been estimated that malnutrition underlies more than half of all infant and child mortality in sub-Saharan Africa [11]. In view of the deleterious effects of malnutrition on growth and development of children, this study was undertaken to assess the nutrient intakes and nutritional status of mothers and their under-five children in a rural community of Oyo State of Nigeria with a view to proffering suggestions for improvement and intervention.

MATERIALS AND METHODS

Study Design and Data Collection

The study was a community-based cross sectional survey carried out in Egbeda Local Government Area of Oyo State, Nigeria. The location of this research was purposively determined to be Oyo State. Oyo State is one of the 36 states of the Federal Republic of Nigeria created in February, 1976. The landscape consists of old hard rocks and dome shaped hills, which rise gently

*Address correspondence to this author at the Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture, PMB 2240, Abeokuta, Nigeria; Tel: +234-803-4054-644;
Fax: +234-039-243045; E-mail: onabanjo169@yahoo.com

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from about 500 meters in the southern part and reaching a height of about 1,219 metre above sea level in the northern part. The local government consists of thirteen [13] wards with women population of 178, 409 and the population of under-five children is 152, 180 [1]. The thirty [30] local government areas which make up the state were stratified into two; urban and rural, one local government was selected randomly from the rural sector for the study. The households were selected systematically. Sample-size estimation was calculated using a prevalence of malnutrition of 30% [12], a precision limit of 1%, and a confidence level of 95%. This gave a minimum sample size of 323. However, in other to make the sample size robust and to make up for drop-outs, it was increased to 500. For the 24-hr dietary recall, a sub-sample of 100 households was purposively determined and systematically selected. All households with at least one child below 5 years of age and their mothers; women of childbearing age (19-45years) who were in good health and not on special prescription were eligible. In a household with more than one eligible child, the interviewer selected the youngest. Oral consent was gotten from the head of the household. A well structured, pre-tested questionnaire administered by the trained interviewers was used to obtain information on the respondent's personal data (name, age, sex), socio-demographic (occupation, income level, educational level), anthropometric data, 24-hr dietary recall protocol, environmental hygienic practices and observation for clinical signs of malnutrition. The subjects were examined for signs of pallor, goiter, and overweight/obesity, PEM (Kwashiorkor and Marasmus). Information on household cleanliness, water source, type of toilet, cleanliness of the environment was collected.

Three non-consecutive 24-hour dietary recalls were carried out for each woman to estimate the dietary intake. The visits were unannounced. Food intake was not measured on festival days, when special foods are eaten. Detailed descriptions of all foods, beverages and vitamin and mineral supplements consumed between 00:00 and midnight the previous day, as well as cooking methods, was recorded. Exact recipes were collected for each woman's intake on each day. Quantities were estimated using seven household utensils and ~20 types of food models (e.g., fish, tomato, banana and meat). The average weight of each type of food equivalent to the portion sizes and fitting into the household utensils was estimated to the nearest gram. To calculate nutrient intakes, the Nigerian nutrient composition [13] database was used in calculating the nutrient intake. The group's mean intakes were calculated on the basis of each woman's mean intakes. Anthropometric measurements (height and weight) were made only on children under-5 and their mothers. Children were weighed in light clothes and without shoes with a battery operated digital bathroom scale to the nearest 0.01kg. Measurements were taken twice for each child and the average value was used for data entry. Length/height was measured with locally constructed length/height boards having reading increments of 5 mm. Children were measured supine until they were able to stand, and erect thereafter. The scales and length/height boards were checked and calibrated regularly with internal standards [14]. Height and weight measurements of the children, taking age and sex into consideration, were converted into Z-scores based on the National Center for Health Statistics (NCHS) reference population recommended by the World Health Organization [15].

Analysis of Data

Questionnaires were coded, and statistical analysis was done using the EPI Info software, version 6.02. Anthropometric indices were calculated using reference medians recommended by the World Health Organization (WHO) and classified according to standard deviation units (z-scores), based on the WHO criteria [16]. The indicators studied were, weight-for-age Z scores (WAZ), height-for -age Z scores (HAZ), weight-for-height Z scores (WHZ). The malnutrition thresholds according to NCHS/WHO standards are, between -2 Z scores and -3 Z scores for moderate, and < 3 Z scores for severe malnutrition. Descriptive statistics were used to summarize the prevalence of wasting, stunting and underweight, and to obtain frequencies and proportions for other variables. Inferential statistics were generated, and significance associations were tested between variables. Analysis of covariance was used to determine if differences in nutrient intakes existed for different age groups. Spearman's correlations were used to establish the associations between mothers BMI and age, education and income. The food intake data collected through 24-hr dietary recall were converted to nutrient intake using the Table of Food Composition by Oguntona and Akinyele [13].

RESULTS

The socio-demographic characteristics of the households studied are presented in Table **1**. The vast majorities (98.2%) of sampled household heads were male and most of the households consisted of three or

Table 1: Socio-Demographic Characteristics of the Household Heads

Variable	Frequency	Percentage
Sex		
Male	492	98.2
Female	8	1.8
Age		
<30	108	21.6
30 - 40	292	58.3
41 - 50	74	15.0
51 - 60	16	3.2
>60	10	2.0
Marital status		
Married	494	98.8
Divorced	1	0.2
Separated	3	0.6
Widow	1	0.2
Primary Occupation		
Farming	154	30.7
Trading	102	20.4
Civil servant	68	13.6
Artisan	116	23.4
Fisherman	1	0.2
Hunting	6	1.2
Others Specify	53	10.6

more persons. Household heads were mainly between age 30-40 years (58.3%) followed by 21.6% of those in the <30 age group. Two percent were above the age of 60 years. Out of the total respondents, 98.9% were married, 0.6% were separated with about 0.2% divorced. Eleven percent of the household heads had no form of education as compared to mothers (25.3%) without education. About 30.7% of household heads were farmers with about 23.4% as Artisan, 20.4% as traders and 13.6% as civil servants. Fishing was the occupational category with the lowest percentage of household heads (0.2%).

The distributions of regular hygienic practices as revealed in Table **2** shows that only 2.0% do not have a regular place for hand washing while less than half (46%) washes their hands outside their yard or compound. As expected, about sixty percent (60%) disposes their child's stool by throwing outside (shot put). Moreover, the commonest means of food preservation is by keeping warm (40%) and covering in the open (36%). Majority (91%) swept their environment daily while general cleanliness as observed by the interviewer is about 43% when any two of clean gutter, adequate refuse disposal or clean environment is used.

Table **3** shows the distribution of breastfeeding practices in mothers. Initiation of breastfeeding varies between less than 30minutes and more than an hour although two-fifth reported initiating breastfeeding more than an hour after birth. A majority (80%) gave colostrums to baby while 65.8% of the mothers are still breastfeeding. About 12.4% of the mothers did not give anything aside breast milk, 48.6% gave water only, 22.2% gave tea/herbal water, 8% gave other milk and 4.2% gave sugar water. Only 0.4% of the mothers gave honey at birth. About 36.9% of mothers gave food/fluid apart from breast milk in 3 months, 16.7% in 4 months and 12.8% exclusively breastfed for six months. 12.4% of the respondents are still breastfeeding. Forty nine percent of mothers never gave their baby fortified foods. About three quarter (74%) of the children received vitamin A dose during the last 6 months while 26% did not.

As shown in Table **4**, root and tubers intake was the most frequently consumed food with a daily percentage

Table 2: Hygienic Practices of Households

Hygienic practices	Frequency	Percent (%)
Washing of hands		
Nowhere	10	2.0
In house wash hand basin	260	52.0
Outside/Yard/Compound	230	46.0
Waste disposal		
Child used toilet	62	12.4
Throw outside (shot put)	296	59.2
Bury in the compound	13	2.6
Rinse away	83	16.6
Others	46	9.2
Preservation of food		
Not covered in the open	24	4.8
Covered in the open	182	36.4
In cupboard	82	16.4
Kept warm	197	39.4
In refrigerator	15	3.0
How often do you sweep		
Daily	454	90.8
Weekly	24	4.8
Others	22	4.4
Adequate water supply		
Running water	64	12.8
Borehole/well	411	82.2
Water collected in receptacle	14	2.8
Others	11	2.2
General cleanliness		
Clean gutter, adequate refuse disposal, clean environment	153	30.6
When any of the two above is adequate	215	43.0
When any of the above is adequate	75	15.0
None adequate	57	11.4
Total	**500**	**100.0**

of 67% with an average intake of 520g per meal. Cereals and legumes products ranked next recording 39% and 16% respectively per day. Most frequently consumed cereal and legume products included rice, maize, cowpea and groundnuts. The intake of fruits was not frequent with an average intake of 99g per day. Most frequently consumed fruit was banana. The intake of vegetables was frequent (93%) but in lesser amounts with an average intake of 42g per meal. Most frequently consumed vegetables were spinach (*Spinacia oleracea*), water leaf, (*Talinum triangulae*), amaranths (*Amaranthus spinosus*), ewedu (*Corchorus olitorius*) and okro (*Hibiscus esculentus*). The intake of meat and product was 36%, at an average quantity of 37g per meal. Milk and milk products as well as beverages were not frequent in their daily food intake. These consisted of powdered milk, sachet bournvita, milo, tea bags, as well as soft drinks.

Table **5** shows the energy and nutrient intakes of the mothers according to age groups. Seven subjects reported taking dietary supplements in the three

Table 3: Distribution of Breast Feeding Practices by Mothers (n=500)

Breast feeding practices	Frequency (%)	Percent (%)
Initiation of breast feeding after birth		
30 minutes or less	151	30.6
Between 30mins & 1 hour	146	29.6
More than 1 hour	196	39.8
Was the baby given colostrums		
Yes	399	79.8
No	101	20.2
Pre-lacteal food/fluid		
Nothing	62	12.4
Other Milk	40	8.0
Water only	243	48.6
Sugar only	21	4.2
Gripe water	5	1.0
Fruit juice	0	0.0
Tea/herbal water	111	22.2
Infant formula	20	4.0
Honey	2	0.4
Others (specify)	1	0.2
Exclusive Breastfeeding		
Still BF Exclusively	62	12.4
No exclusive	3	0.6
1 week	5	1.0
1 month	21	4.2
2 months	34	6.8
3 months	185	36.9
4 months	71	16.7
5 months	45	8.6
Use of fortified foods given (Flour, sugar, vegetable oil)		
Never	243	48.5
Sometimes	233	46.7
Often	16	3.2
Always	8	1.6
Did baby receive Vitamin A		
Yes	369	73.8
No	131	26.2

Table 4: Average Number of Set Meals and Daily Consumption (g) of Foodstuff by Mothers

		No of Set Meals / day		
FOOD GROUPS	**% daily intake**	**2(times/day)**	**3(times/day)**	**>3(times/day)**
Cereals	39	10	24	5
Root &Tubers	67	11	52	4
Beans & Legumes	16	4	10	2
Fruits	3	-	2	1
Vegetable	93	17	78	8
Meat & Product	36	10	22	4
Poultry	3	-	2	1
Fish	58	9	31	18
Cocoa beverages	3	-	1	2
Milk & Products	3	-	1	2

Table 5: Mean ±SD Energy and Nutrients Intake of the Mothers by Age Group

Nutrients		**Age (years)**				
	<19	**19 – 29**	**30 – 39**	**40 - 49**	**All**	**% RDA**
Energy (Kcal)*	2445 ± 434	2392 ± 319	2758 ± 563	3026±729	3007 ±217	137
Protein (g)	55 ±20.3	61 ±12.3	58 ± 13.5	66 ± 28.8	60 ± 2.7	109
Fats (g)*	53 ± 12.2	50± 28.2	47 ± 22.7	64 ± 38.0	50 ± 2.7	77
Iron (mg)	45 ± 6.0	52 ±4.5	53±6.2	49± 8.1	48±7.8	267
Zinc (mg)*	16.1±1.1	17.2±1.8	22.1±4.8	26.4±3.9	22.1±4.4	451
Calcium (mg)*	548 ±31.1	579±35.0	634±37.6	624 ±15.5	589±21.2	53
Potassium (mg)*	481±11.8	561±9.1	582±9.2	375±19.2	502±17.1	11
Phosphorus (mg)*	536 ± 31.0	871±38.9	839±28.6	885± 40.4	818±41.9	82
Vitamin A (RE)*	18±7.1	16±3.1	27±9.1	35±4.0	24±3.8	36
Vitamin B_6 (mg)	0.5±0.4	0.2±0.2	0.3±0.1	0.5±0.1	0.5±0.1	25
Niacin (mg)	2.5±1.3	2.0±0.3	2.9±2.7	3±2.2	2.8±1.7	11
Vitamin C (µg)*	24±19	21±17	35±10	19±15	25±11	42
Folate (mg)*	23±16.2	18±16.2	17±9.4	17±12.0	19±6.6	4
Vitamin B_{12} (mg)	0.1±0.2	0.2±0.1	0.2±0.1	0.3±0.2	0.2±0.1	10

*significant differences ($p<0.05$) in the intakes by age group (ANCOVA).

months prior to the study. Three subjects took a multivitamin and two took vitamin C supplements, these were not included in the dietary analysis. Mothers between the age groups 40-49 yrs had higher intakes of energy and most of the nutrients but there were significant differences ($p<0.05$, ANCOVA) in energy, fats, zinc, calcium, potassium, phosphorus, vitamin A, C and folate by age group. The result of mean energy and nutrient intakes showed that mothers consumed adequate foods to meet requirements like energy, protein, iron and zinc requirements, while other nutrient intakes were low.

Table **6** shows the prevalence of malnutrition in children by gender. Overall, slightly more than a third (37%) of the children was stunted, higher among boys (40.8%) than girls (34.7%). The prevalence of underweight was 18% with almost a fifth of the boys and 17.3% of the girls. Overall, the prevalence of wasting was 14.3% and was found to be more prominent among girls (17.5%) than boys (11.1.7%).

Table **7** shows the distribution of the health risk of the respondents based on waist-hip ratio, 78% of the respondents had normal (low risk) waist- hip ratio. The

Table 6: Prevalence of Malnutrition Among Children According to Gender

Variables	Male	Female
Stunting (%)	40.8	34.7
Mean (%)	37	
Underweight (%)	20	17
Mean (%)	18	
Wasting (%)	11.2	17.5
Mean (%)	14.3	

Table 7: Nutritional Classification (BMI)

Nutritional Status	Ranges	Percentages
BMI		
Underweight	16.00-18.49	9.6
Normal weight	18.50- 24.99	69.2
Overweight	25.00- 29.99	15.8
Obese	30 and above	5.4
Health Risk based in WHR		
Normal (low risk)	< 0.80	78
Moderate risk	0.81 -0.85	14
High Risk (obese) above	0.85	8
Total		**100**

percentage of high health risk as indicated by high risk WHR (obese) among the respondents was 8%. Distribution of nutritional status using Body Mass Index showed that majority (69.2%) of the respondents fell within the normal range of body mass index (BMI). 9.6% of women were suffering from chronic under nutrition. 15.8% of women of childbearing age were overweight and 5.4% were obese. The socio-demographic characteristics by BMI of mothers are presented in Table **8**. BMI correlated negatively with age ($r = -0.41$; $p < 0.05$), and positively with education ($r = 0.22$; $p<0.05$) and income ($r = 0.45$; $p < 0.05$).

DISCUSSION

The aim of the current study was to assess the nutrient intakes and nutritional status of mothers and their under-five children in a Nigerian community. Proper feeding practices during infancy and childhood are essential for attaining and maintaining proper nutrition and health, and for development of infants and children [17]. Several factors have been associated with poor childhood growth in low income countries. Of these, the most commonly identified explanatory variables include suboptimal weaning from breast

Table 8: Correlations (r_s) between Mothers BMI and Age, Education and Income (n=500)

Variable	Age	Education	Income
BMI Classification			
Underweight (16 – 18.49 kg/m^2)			
Normal weight (18.50 – 24.99 kg/m^2)			
Overweight (25.00 – 29.99 kg/m^2)			
Obese (30 and above)			
Mean BMI	-0.41*	0.22*	0.45*

r_s = spearman correlation, *correlation coefficient is significant at 0.05 level (2-tailed).

feeding, enteral and other infections, and inadequate dietary intakes. The first two, complementary feeding and a concomitant increase in the incidence of enteral infections -have received special attention, because their occurrence presumably coincides in time with the typical age of onset for growth faltering. This study revealed that breastfeeding is a common phenomenon in the area of study, although, exclusive breastfeeding was not practiced by all mothers. World Health Organization have reported that almost all rural Nigerian mothers and the majority of urban mothers breastfeed their babies, at least for the first few months. Despite widespread prevalence in Nigeria, breastfeeding is not as effective as it could be in promoting good child nutrition and health because of suboptimal breastfeeding practices. A review of global trends in breastfeeding noted that many indicators such as prevalence of exclusive breastfeeding, percentage of six to twelve month-olds breastfeeding, and duration of breastfeeding were much lower in Nigeria, particularly in urban areas, than in most other countries in the African region [18]. In this study, majority of the respondent practiced exclusive breastfeeding which could be attributed to the nutrition education concerning benefits of breastfeeding practices given to the mothers during their antenatal and postnatal clinic or it could also be attributed to the nature of the mother's occupation which gives room for closeness of the mother and child. Scientifically, it has been proven that breast milk is a complete food, and that breast milk alone is sufficient to nourish a child for at least the first six months of life [19-21]. Also, quite a number of study have reported on various benefits of exclusive breastfeeding practices, like health, economic, environmental etc, to infants, mothers, families, and society [22-25]. Study of the breast-feeding practices of the children revealed that about 60 percent of mothers initiated breastfeeding within one hour of child birth out of which majority are mothers of primary education. This percentage is higher than the national figure of between 34 - 38.5% [26] and also support the findings of other studies [27-29] that reported breastmilk initiation within the first 24 hours. Studies have also showed that more urban than rural women give colostrum to their infants, whereas, more rural than urban women reported breastfeeding immediately [26]. Colostrum (yellow milk) is the breast milk that women produce in the first few days after delivery known to contain antibodies that provide passive immunity which is passed to the neonate and provide the first protection against germs.

Appreciable proportion of respondents claimed to use colostrum. It could be however that education is beginning to have influence on the use of colostrum. When the level of mother's education for example is cross-tabulated with the use of colostrum, it appears that there is a positive relationship. This shows that the higher the mother's education, the higher the use of colostrum. This study revealed that majority of the mothers without formal education did not give colostrums after delivery because of the belief that the milk was dirty, traditionally and culturally harmful. This strong relationship observed between educational attainment and baby's colostrum consumption at the first three days of birth corresponds with the findings of earlier studies [30].

Generally pre-lacteal foods are known to interfere with early attachment of the infant to the breast. This study shows that the most common pre-lacteal feeds are water, herbal water and other milk of which water is highest. Among the dominant reasons advanced for giving pre-lacteal foods are perceived delayed lactation, health benefits to mothers and babies, tradition/culture and the crying of the child. This may be connected to the general perception of most mothers that breast milk alone cannot satisfy infants and that water and herbal teas (agbo) are obligatory to quench thirst and promote normal development. Dickin [31] reviewing the literature on infant feeding practices in Nigeria noted that the use of water and an herbal infusion as agbo as prelacteal feeds are mostly practiced among the Yoruba (the major ethnic group in southwestern Nigeria). The belief is that this herbal infusion serves as medicine required for the development of the child. It is therefore a considered important to supplement breast milk. This practice was also reported by study Davies – Adetugbo, [32] in rural Osun communities. This practice may predispose the children to diarrhea infection from contamination of the supplement given through the water used in preparing it. It is a common knowledge of the absence of public water supply especially in rural areas in Nigeria which have exposed households to sourcing for unhygienic water to feed their children.

Majority of the mothers also introduced complementary foods between 1-4months. This may be a result of their perception of lactation insufficiency after 3 months. The implication of this is that complementary foods may have been started too early for majority of the infants. This raises serious health and nutrition issues. Traditionally, home prepared complementary food of maize and combination of

maize gruel and millet has been shown to be preferred by majority of the mothers as against commercially marketed foods for the infant. The reason may be that maize is cheaper and readily available all year round compare to the commercially available ones that are not within reach of most mothers. According to local knowledge of the mothers or caregivers, the early introduction of water, herbal teas and complementary foods is designed to enhance child survival, while these are supposed to do the exact opposite by the WHO /UNICEF rationale, by exposing the infants to contaminations early, thereby increasing diarrhea morbidity and mortality.

In this present study, it was observed that large proportion of mothers consumed varieties of foods like tuber, cereal, legumes, fruits and vegetables. However, it could also be deduced from the study that the main dietary intakes of the study population is starch-based with limited consumption of fruits and vegetables. These observation could be attributed to the economic crisis and the adjustments being undertaken in Nigeria [33, 34]. In the developing countries, several studeis have reported that the real income of a household is indeed an important determinant of child and maternal nutritional wellbeing [35]; and that purchasing power of a family dictates the level of household food security and types of diets that are ultimately consumed by household members [36].

The influence of socioeconomic characteristics on the women's BMIs revealed significant association between BMI and socioeconomic characteristics such as occupation and income of households examined. This is consistent with the findings of previous studies which established that the income earned by women is more likely to be spent on food and other basic household needs than income earned by men, thereby having positive effect on the nutritional status of both mother and child [37]. The significant effect of income and occupation of household heads on BMI in this study is also being established by the research on the determinants of child and maternal malnutrition in Nigeria [38].

The study found that chronic malnutrition was more prevalent than acute malnutrition, raising concerns about persistent and potentially worsening suboptimal nutritional practices in the area. Nigeria appears to have made little progress in reducing undernutrition in the past few decades, with the present study showing an increase in the percentage of stunting although levels of wasting and underweight have decreased. Thus, the lack of improvement in stunting prevalence over the past decade is noteworthy, as it is indicative of the persistence of chronic undernutrition and an indication of long standing dietary deficiency in a sizable proportion of children in the country. These figures correspond with NDHS 2003 study [39] as well as the report from FCNS 2003 in South West Nigeria [12]. In comparing our results with other studies from neighboring countries, which have assessed nationally representative samples of children below five years in recent years, it emerges that Nigeria is in a better position for stunting than the average for some African countries, but worst off with respect to wasting, although some West African countries (Benin, Niger, and Mali in particular) as well as Chad from Central Africa show extremely high levels of wasting, even higher than those for Asian countries [40]. However, compared with a more developed country, such as South Africa, Nigeria has poorer indicators for stunting, underweight and wasting. The most recent national study conducted in South Africa reported prevalence of 18% stunting, 9.3% underweight, 4.5% wasting [41]. This shows that Nigerian children have a very high prevalence of stunting, underweight and wasting based on the World Health Organization (WHO) criteria to indicate levels of child malnutrition [42, 43]. This magnitude of malnutrition in this survey deserves urgent attention knowing the consequence of malnutrition as it affects survival and health, education and the economy of the nation.

We found a higher prevalence of stunting among boys than among girls. The cause of this discrepancy is not well established in the literature, but there is a belief that boys are more sensitive by environmental stress and insults such as infections and diseases than girls [44, 45]. If so, boys may be more likely to display impact of chronic undernutrition, especially in environments like Egbeda where various others stresses are at play, like repeated infections and exposure to toxins and air pollutions. This finding is consistent with the research conducted by Elfindri and Dasvarma [46] that found more prominent malnourished male aged between 6-47 months in Indonesia, particularly in rural areas. This finding is also in support of the findings from cross sectional studies conducted in Ghana and Tanzania [47]. These findings are similar to a study of 16 demographic and health surveys in sub-Saharan Africa that revealed that, 10 countries in sub-Saharan Africa, under-five male children are more likely to become stunted than their female counterparts [48]. Wasting is usually due

to recent illness and/or insufficient dietary intake caused by food shortages, feeding practices, or other events. The prevalence of wasting is not consistent with below 5% in most impoverished settings in developing countries, provided there is no severe food shortage.

The body mass index of mothers showed that large proportion of the respondents was normal. This could be one of the beneficial effect exclusive breastfeeding has on the nutritional well-being of the mothers. It has been proven that breastfeeding practices hasten recovery from pregnancy and childbirth episode, and it also provides lifelong health advantages, such as prevention of breast cancer, returning to pre-pregnancy weight [49, 50]. The present study also showed that 9.6 percent of the mothers fall below the cut-off of 18.5 compare with 11.6 percent of women in the reproductive age group (15-49 years) at the national level, indicating that a sizeable proportion of the women were chronic energy deficient (CED). Chronic energy deficiency has serious implications for morbidity and low productivity of women. This condition is associated with a higher prevalence of low birthweight predisposing to a higher infant mortality. Obesity is significant as a risk factor for serious non-communicable diseases, including cardiovascular disease, hypertension and stroke, diabetes mellitus, and various forms of cancer.

In conclusion, the study showed that large proportion of mothers practiced exclusive breastfeeding. Nutritional status of mothers and their under-five children in Egbeda Local Government Area are poor with respect to the overall food consumption and micronutrient intake. Mean nutrient intakes for some nutrients are low compared to the recommendation. The evidence contributes to the growing scientific consensus that tackling childhood stunting is a high priority and that organizations and government focusing on preventing malnutrition use integrated approach to include mothers and children below five years. Consequently, nutritional intervention programmes to improve the micronutrient intake of the mothers in the study area are essential.

REFERENCES

[1] National Planning Commission (NPC) and United Nations Children's Fund (UNICEF) 2001.

[2] Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJ. Selected major risk factors and global and regional burden of disease. Lancet 2002; 360: 1347-60. http://dx.doi.org/10.1016/S0140-6736(02)11403-6

[3] Brandis HA. German National Academy of Science. Nutritional Requirements for Small Children 2010; p. 2.

[4] Federal Ministry of Health (FMOH) Nigeria. Integrated maternal, newborn and health strategy 2006.

[5] Addo AA. Assessment of nutritional status of urban pre-school children in Northern Nigeria Nig. J Nutr 1984; 4(2): 131-141.

[6] Nnanyelugo DO. The incidence of latent protein – energy malnutrition among the under fives. Nig J. Nutr 1982; 3: 11-24.

[7] Addo AA, Kareem MF, Sampson TI, Jubrini CL. Anthropometry and nutrient intake of Nigerians school children from different ecological zones. Ecol Fd Nutr 1988; 21: 271-85. http://dx.doi.org/10.1080/03670244.1988.9991041

[8] Nigerian Demographic and Health Survey. Demographic and Health Surveys. Federal Office of Statistics, Lagos, Nigeria 1990.

[9] FGN/UNICEF. The nutritional status of women and children in Nigeria Federal Government of Nigeria Abuja and UNICEF Lagos. Fourth report on the world nutrition situation. Geneva: ACC/SCN in collaboration with the International Food Policy Research Institute 1994.

[10] Federal Government of Nigeria; United Nations Children's Fund. Report of the Multiple Indicators Cluster Survey (MICS). United Nations Children's Fund, Lagos, Nigeria 1999.

[11] Pelletier DL, Frongillo EA, Schroeder DG, Habicht J-P. The effect of malnutrition on child mortality in developing countries. Bull World Health Organ 1995; 73: 443-8.

[12] Maziya-Dixon B, Akinyele IO, Oguntona EB, Nokoe S, Sanusi RA, Harris E. National food consumption and Nutritional Survey 2001-2003 Summary IITA, Ibadan Nigeria 2004; pp. 10- 33.

[13] Oguntona EB, Akinyele IO. Nutrient Composition of Commonly Eaten Foods in Nigeria – Raw, processed and prepared. FBFI Publishers, Ibadan, Nigeria 1995; pp. 7-108.

[14] Gibson RS. Nutritional Assessment. *A* Laboratory Manual New York Oxford: Oxford University Press 1993.

[15] World Health Organization. A Growth Chart for International Use in Maternal and Child Health Care. WHO, Geneva, Switzerland 1978.

[16] World Health Organization. Multicentre Growth Reference Study Group. WHO Child Growth Standards: methods and development: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. Geneva, Switzerland: World Health Organization 2006.

[17] Kumar D, Goel NK, Mittal PC, Misra P. Influence of infant-feeding practices on nutritional status of under-five children. Ind J Pediatr 2006; 73: 417-21. http://dx.doi.org/10.1007/BF02758565

[18] WHO. Breastfeeding counselling: a training course WHO, UNICEF 1993.

[19] American Academy of Pediatrics. Breastfeeding and the use of human milk. Pediatrics 1997; 100: 1035-9. 15.

[20] Institute of Medicine. Nutrition during lactation. Washington, DC: National Academy Press 1991.

[21] WHO/UNICEF. Innocenti Declaration on the protection, promotion and support of breastfeeding. Geneva 1990.

[22] Weaver L, Arthur H, Bunn J, Thomas J. Human milk IgA concentration during the first year of lactation. Arch Dis Child 1998; 78: 235-9. http://dx.doi.org/10.1136/adc.78.3.235

[23] Labbok MH. Effects of breastfeeding on the mother. Pediatr Clin North Am 2001; 48: 143-58. http://dx.doi.org/10.1016/S0031-3955(05)70290-X

[24] Ball TM, Wright AL. Health care costs of formula feeding in the first year of life. Pediatrics 1999; 103: 870-6.

[25] Gartner LM, Morton J, Lawrence RA, Naylor AJ, O'Hare D, Schanler RJ, *et al*. Breastfeeding and the use of human milk. Pediatrics 2005; 115: 496-506. http://dx.doi.org/10.1542/peds.2004-2491

[26] Nigerian Demographic and Health Survey. Preliminary Report 2008.

[27] Fagbule A, Adedoyin MA. Knowledge, attitudes and beliefs towards breast-feeding in Ilorin. W Afr J Med 1987; 6: 83-9.

[28] Ojofeitimi EO. Breast-feeding Patients in a Nigerian maternity centre. Clin Pediatr 1981; 20: 412-14. http://dx.doi.org/10.1177/000992288102000608

[29] Ojofeitimi EO, Elegbe IA. The Effect of Early Initiation of Colostrum Feeding on Proliferation of Intestinal Bacteria in Neonates. Clin Pediatr 1982; 21: 39-42. http://dx.doi.org/10.1177/000992288202100106

[30] Salami LI. Relationship Between Breastfeeding Status of Children aged 0-24months in Nairobi, Kenya. AJFAND 2006; 6(2): 1-12.

[31] Dickin KL. Reviewing of the literature on the infant feeding practices in Nigeria. Wellstart International, USA 1995.

[32] Davies-Adetugbo AA. Socio-cultural factors and the promotion of exclusive breastfeeding in rural Yoruba communities of Osun State, Nigeria. J Soc Sci Med 1997; 45: 113-25. http://dx.doi.org/10.1016/S0277-9536(96)00320-6

[33] Osmani SR. Poverty and nutrition in South Asia. Abraham Horwitz lecture delivered at the Symposium on Nutrition and Poverty held on the occasion of UN ACC/SCN 24th Session, Kathmandu. Nepal 1997; pp.17-21.

[34] Ijarotimi OS, Oyeneyin OO. Effect of economic restructuring on household food security and nutritional status of Nigerian children. J Food Agric Environ 2005; 3: 27-32.

[35] Cornia GA. Poverty, food consumption, and nutrition during the transition to the market economy in Eastern Europe. Am Econom Rev 1994; 84: 297-302.

[36] Coakley A. Healthy eating: food and diet in low income households. Administration 2001; 49: 87-103.

[37] Doan RM, Popkin BM. Women's work and infant care in the Philippines. Soc Sci Med 1993; 36(3): 297-304.

[38] Ajieroh V. A quantitative analysis of determinant of child and maternal malnutrition in Nigeria. Nig Strat Sup Prog 1997; Brief No. 11.

[39] National Population Commission (NPC) Nigeria and ORC Macro. Nigeria Demographic and Health Survey 2003. Calverton, Maryland: National Population Commission and ORC Macro 2004.

[40] Chiabi A, Tchokoteu PF, Takou V, Fru F, Tchouine F. Anthropometric measurements of children attending a vaccination clinic in Yaounde, Cameroon. Afr Health Sci 2008; 8(3): 174-79.

[41] Labadarios D, Swart R, Maunder EMV, *et al*. Executive summary of the National Food Consumption Survey Fortification Baseline (NFCS-FB-I): South Africa, 2005. S Afr J Clin Nutr 2008; 21(3)(Suppl 2): 245-300.

[42] Gorstein J, Sullivan K, Yip R. Issues in the assessment of nutritional status using anthropometry. Bull World Health Organ 1994; 72(2): 273-83.

[43] Allen L, Gillespie S. What works? A review of the efficacy and effectiveness of nutrition interventions. UN ACC/SCN and Asian Development Bank 2001.

[44] Parraga IM, Assis AM, Prado MS, Barnetto ML, Reis MG, King CH, *et al*. Gender differences in growth of school aged children with Schistosomiasis and Geohelminth Infection. Am J Trop Med Hyg 1996; 55: 150-56.

[45] Wells JCK. Natural selection and sex differences in morbidity and mortality in early life. J Theoret Biol 2000; 202: 65-76. http://dx.doi.org/10.1006/jtbi.1999.1044

[46] Elfindri, Gouranga LD. Child Malnutrition in Indonesia. Bull Indonesian Econom Stud 1996; 32(1): 97-111. http://dx.doi.org/10.1080/00074919612331336908

[47] PCD (The Partnership of Child Development). The anthropometric status of schoolchildren in five countries in the Partnership of Child Development. Proc Nutr Soc 1998; 57: 149-58. http://dx.doi.org/10.1079/PNS19980021

[48] Wamani H, Tylleskar T, Astrøm AN, Tumwine JK, Peterson S. Mothers' education but not fathers' education, household assets or land ownership is the best predictor of child health inequalities in rural Uganda. Int J Equity Health 2004; 3: 9. http://dx.doi.org/10.1186/1475-9276-3-9

[49] Heinig MJ, Dewey KG. Health advantages of breastfeeding for mothers: a critical review. Nutr Res Rev 1997; 10: 35-56. http://dx.doi.org/10.1079/NRR19970004

[50] Labbok MH. Effects of breastfeeding on the mother. Pediatr Clin North Am 2001; 48: 143-58. http://dx.doi.org/10.1016/S0031-3955(05)70290-X

[51] Lawrence RA, Lawrence RM. Breastfeeding: a guide for the medical profession. 5th edition. Mosby, St. Louis 1999.

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http://dx.doi.org/10.6000/1929-4247.2013.02.01.7