

Dietary Pattern, Anthropometric Indices and Developmental Milestone of Children Aged 6-60 Months in Peri-Urban Communities East of Nigeria

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Abstract:

Background: Good nutritional status is of paramount importance for a child's physical, mental and social development after inter-uterine life.

Objective: Dietary pattern, anthropometric indices and developmental milestone of children aged 6-60 months in peri-urban communities were investigated.

Design: The children (236) were randomly selected from health centers and nursery schools in three selected communities. Data were collected with structured questionnaire and anthropometry. The questionnaire administered to the mothers of the children elicited information on their socioeconomic characteristics, dietary pattern and developmental milestones of the children. Anthropometric parameters of the children were measured using standard instruments and procedures. The mean length/height and weight of the children in relation to their ages were compared with WHO child growth standard. Data collected were statistically analyzed using SPSS version 16.

Results: Less than 6% of the mothers introduced complementary food at 6 months, 31.4% introduced before 6 months and 63.2% after 7 months. Majority (97.5%) of the mothers enriched complementary foods with fish (73.7%), infant formula (72.9%), soybean powder (66.5%) and egg (64.0%). A total of 10.6% and 1.7% of the children were moderately and severely stunted, respectively while 4.7% of them had moderate wasting. Underweight was observed more among children within 6 – 24 months. The mean ages for sitting, crawling, standing with support and standing without support reported in this study were 6, 7, 8 and 10 months, respectively.

Conclusion: Scaling up actions on optimal complementary feeding of children would go a long way in improving their nutritional status and physical development.

Keywords: Nutritional status, milestone, food consumption pattern, children, peri-urban Nigeria.

1. INTRODUCTION

Nutrition of children from birth to five years is as critical as that of the unborn ones. Good nutritional status is of paramount importance for a child's physical, mental and social development after inter-uterine life. Children under the age of five require more nutrients because they are usually very active and their growth is rapid. The under-fives (U5s) are susceptible to malnutrition and infection [1] and generally their nutritional status is used as an indicator of that of the community. The global child mortality rate was reported as 43 deaths per 1000 live births [2]. About half of the global under-five deaths occur only in five countries with Nigeria taking the second position after India. India and Nigeria account for more than a third of all under-five deaths globally and 45% of these deaths are attributed to undernutrition [3]. The Nigeria Demographic and Health Survey report [4] showed that 37% of U5s were stunted, 29% underweight and 18% wasted. Childhood undernutrition in the form of

kwashiorkor, marasmus, marasmic-kwashiorkor, anaemia and xerophthalmia are common in poor resource communities. According to Amosu *et al.* [5] low socioeconomic status is at the heart of the problems of childhood nutrition in Nigeria.

Dietary pattern epitomizes a general profile of food and nutrient consumption, described on the basis of the usual eating habits [6]. Good dietary pattern determines health and nutritional status and provides optimal opportunities for physical, emotional, social and educational development in children. Inadequate dietary intake and poor health which are the most significant immediate risk factors of child malnutrition are rooted in underlying (household issues such as household security, maternal and childcare practices, water and sanitation) and basic (societal issues such as cultural, political, economic and societal systems) determinants of malnutrition [7].

Motor behaviour is an essential aspect of child development which is usually assessed in terms of age of achievement of motor milestones. Studies have associated nutritional and health status to developmental milestone [8, 9]. Peri-urban areas are characterized by lack of infrastructure and deteriorating

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environment [10]. Children in such areas are mostly exposed to high risk of poor health, unsafe environment, poverty and malnutrition, which are detrimental to development. This study investigated dietary pattern, anthropometric indices and developmental milestone of children aged 6-60 months in peri-urban communities in east of Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in three peri-urban communities in Enugu State, Nigeria. The three peri-urban communities were purposively selected from the three senatorial zones in the State (Enugu-East, Enugu-West and Enugu-North) based on their locations.

Sample Selection

A list of health centers and nursery schools in the selected communities were compiled. A total of 236 children between the ages of 6-60 months were randomly selected from the health centers and nursery schools.

Ethical Approval

Ethical clearance was obtained from the ethical committee of the Ministry of Health in the State before consent form was given to the parents of selected children and school authorities to sign. The purpose and nature of the study were explained to the parents.

Data Collection

A validated interviewer administered questionnaire (to the mothers) was used to collect data on parental and child background, child feeding practices and developmental milestones. Mothers who could not recall the ages the developmental milestones were attained were asked to skip the developmental milestone questions. Anthropometric measurements (weight and length/height) of the children were obtained by the researchers. Length/height was measured using infantometer and standard meter rule as the case may be. Weight measurement was taken using spring weighing scale. Readings were recorded to the nearest 0.1 cm and 0.1kg for length/height and weight, respectively. The heights and weights of the children in relation to their ages were compared with WHO child growth standard [11].

Data Analysis

The responses on the questionnaire were coded and analyzed using Statistical Package for Social Science (SPSS) version 16.

RESULTS

Table 1 showed that 6.8%, 17.4%, and 73.6% of the mothers had no formal education, completed primary and secondary education, respectively. The fathers who completed primary and secondary education were 25.4% and 64%, respectively. Less than half the mothers and fathers (32.6% and 37.7%, respectively) of the children were civil servants, 12% and 22% of the fathers were subsistence farmers and petty traders, respectively. Monthly income of between ₦16,000 – ₦25,000 was earned by 45.8% of the mothers and 42.4% of the fathers.

About 26% of the children were within the age range of 48 – 60 months, 7.6% males and 5.1% females were within 6 - 11 months (Table 2).

Table 3 revealed that 5.5% of the children were breastfed exclusively for 6 months, 12.3%, 8.9% and 63.2% of the mothers introduced complementary food at less than 4 months, 5 months and above 6 months, respectively. About 19% of the mothers used only locally available foods to prepare complementary foods while others used either proprietary commercial foods only or in combination with local foods.

Foods occasionally consumed by the children (Figures 1a, 1b and 1c) were cassava (28.9%), yam (17.8%) and beans (16%). The percentage of the children who consumed fruits occasionally was greater than those who consumed vegetables (Figure 1c).

Table 4 showed the anthropometric indices of the children. Moderate and severe stunting was found in 10.6% and 1.7% of the children, respectively while 4.7% of them were moderately wasted. Prevalence of moderate and severe underweight was 14.0% and 3.4%, respectively. A total of 11.4% and 2.1% of the children within the age range of 6-24 months were moderately and severely underweight, respectively. Wasting was more (2.5%) among the 25-48 months age group and stunting more among the 49-60 months age group.

Table 5 showed the age of milestone attainment of the children. The mean ages for head control without support, sitting, crawling and standing without support

Table 1: Socioeconomic Status of the Parents

Variables Educational Level	Mothers		Fathers	
	Frequency	Percentage (%)	Frequency	Percentage (%)
No formal education	16	6.8	-	-
Primary school	41	17.4	60	25.4
Secondary school	173	73.6	151	64.0
Tertiary education	2	0.8	10	4.2
Total	236	100	236	100
Occupation				
Subsistence farming	38	16.1	17	12.0
Civil servants	70	32.6	89	37.7
Petty traders	65	27.5	52	22.0
Housewife	16	6.8	-	-
Manual worker	7	3.0	33	14.0
Student	17	7.2	-	-
Others	16	6.8	45	19.1
Total	236	100	236	100
Monthly Income (₦)				
<₦5000	33	14.0	14	5.9
₦5000 - ₦15000	29	12.4	20	8.5
₦16,000 – ₦25,000	108	45.8	102	43.2
>₦25,000	66	28.0	100	42.4
Total	236	100	236	100

Table 2: Age and Gender Distribution of Children

Age group (Months)	Males		Female		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
6 – 11	18	7.6	12	5.1	30	12.7
12 – 23	6	2.5	8	3.4	14	5.9
24 – 35	26	11	24	10.1	50	21.2
36 – 47	8	3.3	19	8.1	27	11.4
48 – 60	62	26.3	53	22.6	115	48.7
Total	120	50.7	116	49.3	236	100

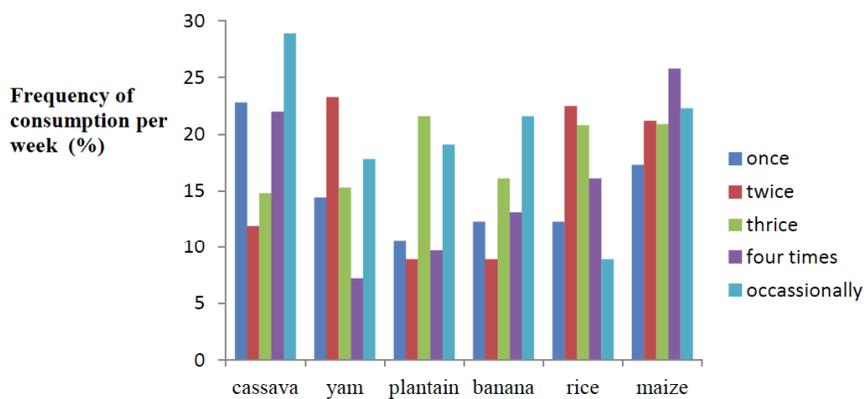
Table 3: Child Feeding Practices

	Frequency	Percentage (%)
Age of introduction of complementary food		
< 4 months	29	12.3
4 months	24	10.2
5 months	21	8.9
6 months	13	5.5
>6 months	149	63.2
Total	236	100

(Table 3). Continued.

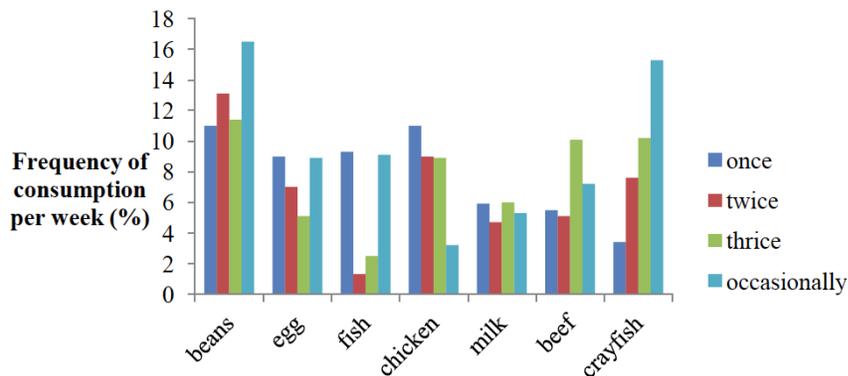
	Frequency	Percentage (%)
Source of foods for complementary feeding		
Local stables only	45	19.1
Proprietary commercial foods only	14	5.9
Both sources	177	75.0
Total	236	100
Enrichment of child's food		
Enriched	230	97.5
Not enriched	6	2.5
Total	230	100
Foods used for enrichment*		
Egg	151	64.0
Fish	174	73.7
Meat	100	42.4
Milk	172	72.9
Ground crayfish	112	47.5
Groundnut paste	90	38.1
Soybean powder	154	66.5

*Multiple response.



Starchy foods

a



Protien rich foods

b

(Figure 1). Continued.

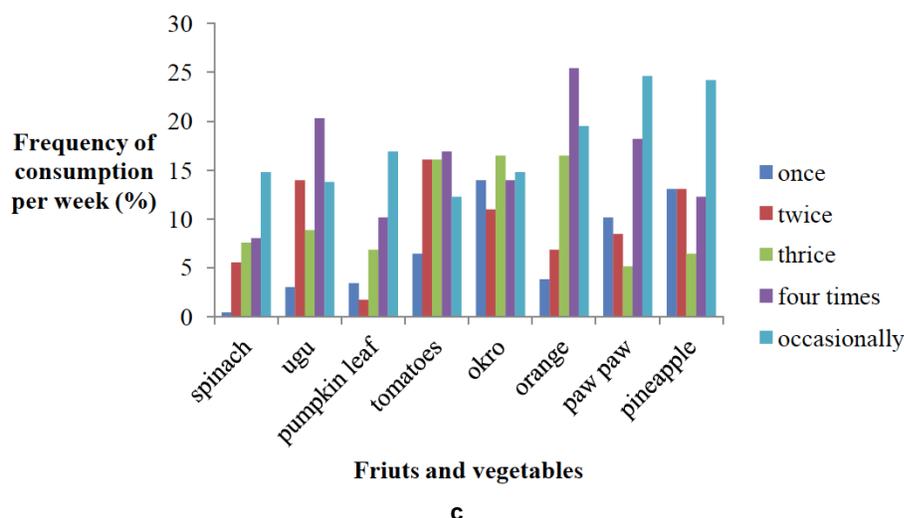


Figure 1: a: Consumption frequency of starchy foods. b: Consumption frequency of protein rich foods. c: Consumption frequency of fruits and vegetables.

Table 4: Anthropometric Indices of the Children Based on Age Group

Variables	6-24 months		25-48 months		49-60 months		Total	
	F	%	F	%	F	%	F	%
Weight-for-age (underweight)								
Normal	49	20.8	88	37.3	58	24.6	195	82.6
Moderate	27	11.4	5	2.1	1	0.4	33	14.0
Severe	5	2.1	3	1.3	-	-	8	3.4
Total	81	34.3	96	40.7	59	25	236	100
Height-for-age (stunting)								
Normal	78	33.1	90	38.1	39	16.5	207	87.7
Moderate	2	0.8	4	1.7	19	8.1	25	10.6
Severe	1	0.4	2	0.8	1	0.4	4	1.7
Total	81	34.3	96	40.6	59	25	236	100
Weight-for-height (wasting)								
Normal	80	33.9	90	38.1	55	23.3	225	95.3
Moderate	1	0.4	6	2.5	4	1.7	11	4.7
Severe	-	-	-	-	-	-	-	-
Total	81	34.3	96	40.6	59	25	236	100

F=Frequency
Percentage (derived using the total number of children).

Table 5: Age (Month) of Milestone Attainment by the Children

Developmental milestones	Median	Mean	Range
Head control without support (F = 189)	3.0	3.6	3.0 – 7.0
Smiling/social smile (F= 186)	3.0	3.6	3.0 – 6.0
Grabbing objects (F= 171)	5.0	5.7	5.0 – 8.0
Sitting (F= 169)	6.0	6.3	6.0 – 9.0
Crawling (F= 142)	7.0	7.3	7.0 – 9.0
Standing with support (F= 160)	8.0	8.6	8.0 – 10.0
Standing without support (F= 120)	10	9.7	9.0 – 13.0

F= frequency.

were 3.6, 6.3, 7.3 and 9.7 months, respectively. The median ages of crawling and standing with support were 7.0 and 8.0 months, respectively.

DISCUSSION

The World Health Organization (WHO) recommends that infants be exclusively breastfed for six months, followed by timely introduction of nutritious complementary foods at six months, with continued frequent on – demand breastfeeding for up to two years of age. Only 5.5% of mothers in this study introduced complementary food timely. In a similar study by Ndiokwelu *et al.* [12] 31.5% of mothers residing in urban communities in Enugu State introduced complementary foods at 6 months. This difference could be due to study location as urban dwellers are more educated and informed hence more likely to understand the benefits of exclusive breastfeeding and timely introduction of complementary food.

The present study showed that 19.1% of the mothers used only local foods sources for complementary feeding, 5.9% used proprietary commercial foods only while 75% used both sources. Use of local staples for complementary feeding should be encouraged especially among rural and peri-urban dwellers because they are available, affordable and accessible. The local foods fed to the children were mainly based on cereals, starchy roots and tubers. These are the most predominant foods produced in the study area. This showed that availability was the factor considered while selecting foods for households in the study area. Soybean was the main food used to enrich the cereal/starch roots and tuber complementary foods. This is in line with other studies [13, 14] where legumes, roots and tubers were reported as the commonest locally available and cheap staple foods in Nigeria. Infant formula was added to the starchy porridges by some mothers but the quantity used is questionable considering the fact that they are expensive.

The subjects consumed more fruits than vegetables. These crops are available and easily accessible in the area. Studies [15, 16] have shown that children prefer fruits to vegetables because of their sweet flavour. Children in general do not like eating vegetables especially when they are not introduced early. Wind *et al.* [17] identified availability of vegetables in homes as a factor that influences its consumption among children. Children are more likely

to eat vegetables if they are introduced in acceptable form early enough. More than 40% of the parents earned monthly income ranging between ₦16,000 – ₦25,000 and several studies have shown association between socioeconomic status and child nutritional status [18, 19]. According to Badham and Sweet [20] decrease in the national stunting rate is usually indicative of improvement in the overall socioeconomic conditions of a country. The present study showed that 14% and 3.4% of the children were moderately and severely underweight, respectively. In addition 10.6% and 1.7% were moderately and severely stunted, respectively. This is in line with the prevalence of underweight (19.4%) reported among under-5 children in rural communities in Lagos State Ogun State, Nigeria but in contrast with the prevalence of stunting (43.3%) among the same population [21].

WHO [22] defined underweight as weight-for-age < -2 standard deviation (SD) of the WHO Child Growth standards median. The prevalence of underweight was more among the age group between 6 – 24 months. This age range includes the period of transition from exclusive breastfeeding to complementary feeding. It is well documented that traditional complementary foods in Nigeria are inadequate both in quantity and quality because of the base ingredients [23, 24]. Low economic status recorded in this study area may have aggravated the situation, in the sense that mothers find it difficult to fortify traditional complementary foods especially with animal foods which have better nutrient bioavailability. Income influences dietary quality by making healthy foods more or less affordable and accessible [25].

Stunting is defined as height-for-age < -2 SD of the WHO Child Growth standard median [22]. Greater proportion of the children who were stunted was within the age group of 49 – 60 months. Stunting is the result of prolonged nutritional inadequacies from early childhood, it often results in delayed mental development, poor school performance and reduced intellectual capacity [22]. Victora *et al.* [26] reported that the prevalence of stunting in developing countries starts to rise at about 3 months of age and then slows at around 24 months. The present study did not follow the same trend as the prevalence of stunting was on the increase till 60 months of age. No case of severe wasting was recorded in the present study however, 4.7% of the children were moderately wasted. Wasting (weight-for-height < -2 SD) in children is a symptom of acute undernutrition, usually as a consequence of

insufficient food intake or a high incidence of infectious diseases [22].

The median age for sitting alone, crawling, standing with and without assistance among children from five countries as reported by WHO [27] were 5.9, 8.3, 7.4 and 10.8 months, respectively. In the present study, the median ages of crawling and standing without support were earlier than reported in the WHO [27] study. However, the median ages of sitting and standing with support were delayed. Kuklina *et al.* [8] associated motor development with growth and dietary quality. Inadequate child feeding practices, high prevalence of underweight and moderate stunting observed in this study could be responsible for the delayed development milestones of the children. This affirms the report of Groos [28] which stated that growth retardation (malnutrition) is associated with the delay of important motor skills and hence delays the child's opportunity for action. In addition, genetics and validity of data collection are possible factors that may be responsible for the variations in age of milestones attainment across geographical regions. There is need to scale up action on optimal complementary feeding of children to improve their nutritional status and thus age of attainment of developmental milestones.

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Received on 20-11-2017

Accepted on 10-02-2018

Published on 28-02-2018

<https://doi.org/10.6000/1929-4247.2018.07.01.4>

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