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Dietary Pattern and Anthropometric Indices of 6-36 Months Old Children in Anambra State, Nigeria

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Abstract: Dietary pattern and growth monitoring are major components of child care practices. Anthropometry is a useful tool in assessing the nutritional status and monitoring the growth of children under-five years of age. The objective of this study was to assess the dietary pattern and anthropometric indices of children (6-36 months) in Anambra state, Nigeria. Four hundred (400) children were selected by systematic random sampling from three urban and six rural areas of two out of three senatorial districts in the state. Interviewer-administered questionnaire was used to collect data from mothers/care givers of the selected children and the data was analyzed using descriptive statistics. The anthropometric measurements were obtained using standard methods and the data were analyzed using WHO *Anthro* software version 3.2.2. Among others, the result showed that about 81% of the mothers/care givers defined complementary feeding correctly but 44.2% commenced complementary feeding before the right time (6 months). The children were fed complementary foods based mainly on starchy roots/tubers (91.5%) and cereals (92.8%) more than 3 times daily. More (72.5%) rural mothers included foods of animal origin in complementary foods than their urban counterparts (43.8%). About 30% of the mothers continued to breast-feed their children 3-6 times per day after the introduction of complementary food while 22% stopped breast-feeding before the child was 6 months of age. Scaling up nutrition intervention programmes through nutrition education using local resources and targeting mothers and women of childbearing age would improve mothers' child care practices and thus the dietary pattern of the children.

Key words: Children, dietary pattern, anthropometric indices

INTRODUCTION

Optimal nutrition and good dietary pattern are important determinants of a child's health, growth and development especially within their first five years of life. Childhood nutrition has been shown to have long term consequences and play a role in preventing the development of some chronic non-communicable diseases in adulthood (Michaelson *et al.*, 2000). The nutritional well being of children is a reflection of state of nutrition and health of households, communities as well as overall national human resource development of the nation. Dietary pattern is a major component of child care practices apart from socio-cultural, economic and demographic factors (WHO/UNICEF, 1998).

Malnutrition is a condition that results from consumption of unbalanced diets in which certain nutrients are lacking or low or in excess or in wrong proportion. All forms of malnutrition (under nutrition, over nutrition and micronutrient deficiencies) are one of the gravest threats to world's public health (WHO, 2005) and one of the widest spread public health problems in developing countries. Smith and Haddad (2000) estimated that Sub-Saharan Africa's share of malnourished children could rise by 15.9% (from 18.8-34.7%) between 1995 and

2020; thereby suggesting that the Millennium Development Goal of eradicating under-5s malnutrition by 2015 is not achievable. One in every three under-5s in developing countries according to Smith *et al.* (2003) is affected by malnutrition. This indicates increase in the various forms of malnutrition with potentially negative outcome for child growth (Ikeokwu, 2008).

Under nutrition is most likely to occur in children who are not adequately fed, not protected from frequent infection and do not receive adequate care (UNICEF, 1998). This form of malnutrition is the underlying cause of death of over 3.5 million children per year in Nigeria (High-level Task Force on Global Food Crisis, 2008). Nigeria is ranked 3rd after India and China on the global list of 20 countries that account for the world's under nourished children (UNICEF, 2008). Childhood overweight and obesity is also becoming common in developing countries like Nigeria. This is because of the consumption of too much food with high fat and sugar contents and lack of physical activity. WHO in 2005, estimated that as many as 20 million under-5 children were overweight. The prevalence of the overweight and obesity among children in Nigeria is on the increase. Major outcomes of childhood malnutrition in general are

morbidity, poor psychological and intellectual development (with serious consequences in adult life) and mortality. Morbidity and mortality are more among the malnourished children who also experience the greatest total burden of diseases (Fishman *et al.*, 2004). Malnutrition in children has been shown to be a function of a more complex social and behavioural determinants affecting their feeding and rearing and not only a problem of food supply. According to Kashyap and Sethi (2003) malnutrition in childhood is linked with their feeding practices. Therefore, parental characteristics, knowledge, attitude and practices toward child feeding and care are essential inputs in the child's nutritional status and health. Growth monitoring is an important tool used for early detection of under and over nutrition in children in general and under 5s in particular. Anthropometry is used to monitor growth in children. It is the measurement of various physical dimensions (weight, length/height, head and chest circumferences and skin-fold measurements) of the body which are sensitive to environmental factors notably nutrition during childhood. Indices such as weight-for-age, length/height-for-age, head and chest circumferences-for-age) derived from anthropometric measurements help to determine the degree to which physiological needs for growth and development are met during childhood (WHO, 2003). This study therefore, assessed the dietary pattern and anthropometry indices of children (6-36 months) in Anambra state, Nigeria.

MATERIALS AND METHODS

This was a cross-sectional survey carried out in two out of the three senatorial districts in Anambra state. Each senatorial districts had seven local government areas and each local government area, had urban and rural areas. One urban and two rural areas were selected each, by random sampling from three out of the seven local government areas in each senatorial district. Nursery schools (12) and health centres (6) in each local government areas were first listed, 6 nursery schools and 3 health centres were selected by balloting from each local government. The sample size was based on 36% proportion of malnourished children in Nigeria (Kazeem, 2008) and determined using Yamane (1967) formula:

$$N = \frac{4P(1-P)}{w^2}$$

Where:

N = Total number of children required.

P = Proportion of the subjects assumed to have subnormal nutritional status = 36%

W = Required precision level or probability level = 5% (0.05)

$$N = \frac{4 \times 0.36 (1-0.36)}{0.05^2} = 368.4$$

The sample size was increased to 400 to account for contingences. The school registers of the selected schools were used for a systematic sampling (1:5 sampling interval) to select 266 out of 900 preschoolers and 134 out of 500 children who came for immunization at the selected health centre during the study period. Altogether 163 urban and 237 rural child and mother/care giver pair participated in the study.

Ethical clearance and approval was obtained from the hospital management board. The consent and cooperation of parents/care givers whose children were to participate in the study were sought through the school and clinic heads. Questionnaire and anthropometry were the tools used to collect data. The purpose and detailed procedures of the study were explained to the parents/care givers before the administration of the questionnaire. The questionnaire elicited information on personal data and food consumption pattern of the children and the mothers/care givers knowledge and attitude to child feeding and care practices. The data from the questionnaire were coded and entered into the computer and subjected to descriptive analysis (frequencies, means and percentages) using the Statistical Package for Social Sciences (SPSS) version 15.

The weight, length/height, head and chest circumferences of the children were measured using standard techniques. Children 6-24 months were weighed nude with beam balance while those 25-36 months were weighed with minimum clothing on a bathroom scale. All measurements were recorded to the nearest 0.01kg. A portable length board was used to measure the length of children 6-24 months lying down while the older children's heights were measured with a constructed vertical wooden rod affixed to a graduated non-stretch fibre glass tape, with arms hanging by the sides. Measurements were taken to the nearest 0.01cm. The head and chest circumferences of the children were measured with a narrow flexible non-stretch tape. For the head circumference, the tape was placed horizontally around the head at a level just above the eyebrows, ears and the most prominent bulge at the back of the head and reading taken at the nearest 0.01cm. To measure the chest circumference, the tape was placed at the nipple line round the chest and reading taken at the nearest 0.01cm. The anthropometric data was analyzed using anthropometric Z scores (WHO, 2006) and result categorized using WHO (2011) Anthro software version 3.2.2

RESULTS

Table 1 represents the mothers/care givers knowledge of child feeding practices. Over half of them in both urban (86.5%) and rural (81.8%) areas could define complementary feeding correctly. However, 44% of them in the state started complementary feeding earlier (4-<6 months) than the recommended time. The reasons advanced for introducing complementary food included breast milk no longer enough for the child (65.5%), child was old enough to eat other foods (16.5%) and child ate heavily (11.3%).

In Table 2, 30% of mothers in the state breast-fed their 6-36 months old children 3-6 times per day after they had commenced complementary feeding. This practice was observed more with the rural mothers (32.5%). Again it was observed that about half (46.2%) of the

mothers stopped breast feeding before the children's first birthday.

The complementary foods mostly used by the urban (50.3%) and rural (48.1%) mothers/care givers were traditional maize gruel and pre prepared commercial complementary foods (25.2 and 23.2% for urban and rural mothers, respectively) as shown in Table 3. In the state, the complementary foods were mostly (65.8%) family meal modified and fed to the children 3-6 times daily. Leftover of served portions were served to the older siblings but about 22% of mothers in the state (17.2% in urban and 25.3% in rural) forced the child to finish the served portion.

Foods and meals of the day the children were fed are shown in Table 4. Rural mothers included animal products (72.5%), fruits (57.3%) cereal (54.5%), fat and

Table 1: Mothers' knowledge of child feeding practices

Knowledge of child feeding practices	Urban		Rural		State	
	F	%	F	%	F	%
Meaning of complementary feeding						
Give child other foods in addition to breast milk	141	86.5	186	78.4	327	181.8
Give child other foods with no breast milk	7	4.31	16	6.8	23	5.7
Give child other foods only	13	8.0	13	5.5	26	6.5
Do not know the meaning	2	1.2	22	9.3	24	6.0
Total	163	100	237	100	400	100
Right time to introduce complementary food						
Less than 4 months	28	17.1	41	17.3	69	17.2
4-<6 months	70	43.0	107	45.1	177	44.2
6-9 months	40	24.5	54	22.8	94	23.5
10-12 months	8	5.0	17	7.2	25	6.3
After 12 months	17	10.4	18	7.6	35	8.8
Total	163		237	100	400	100
Reason for choice of time						
Child is old enough	24	14.7	42	17.7	66	16.5
Family and friends advise	2	1.2	16	6.7	18	4.5
Child eats heavily	19	11.7	26	11.0	45	11.3
Cultural practice	3	1.8	-	-	3	0.7
Breast milk no enough	112	68.7	150	63.3	262	65.5
Past experience	3	1.8	3	1.3	6	1.5
Total	163	100	237	100	400	100

F: Frequency, %: Percentage

Table 2: Breast-feeding practices of children 6-36m months

Frequency of breast-feeding per day	Urban		Rural		State	
	F	%	F	%	F	%
Once	32	19.6	33	13.9	65	16.2
3-6 times	46	28.2	77	32.5	123	30.7
On demand	35	21.5	50	21.1	85	21.3
When child cries	26	15.9	59	24.9	85	21.3
When I like	12	7.4	13	5.5	25	6.3
When there is no other food for child	12	7.4	5	2.1	17	4.2
Total	163	100	237	100	400	100
When did you stop breast feeding						
<6 months	37	22.7	51	21.5	88	22.0
6-11 months	73	44.7	112	47.3	185	46.2
12-24 months	50	30.7	71	29.9	121	30.2
24-<36 months	3	1.8	3	1.2	6	1.5
Total	163	100	237	100	400	100

F: Frequency, %: Percentage

Table 3: Mothers attitude and child feeding practices

Mothers attitude and child feeding practices	Urban		Rural		State	
	F	%	F	%	F	%
Foods used for complementary feeding						
Pre-prepared commercial foods	41	25.2	55	23.2	96	24.0
Maize gruel (<i>pap</i>)	82	50.3	114	48.1	196	49.0
Maize pudding with soup (<i>agidi with soup</i>)	14	8.6	21	8.9	35	8.6
Spiced cowpea pudding (<i>moi-moi</i>)	9	5.6	12	5.1	21	5.3
Bambara groundnut pudding (<i>okpa</i>)	6	3.6	8	3.3	14	3.5
Mashed yam with palm oil	4	2.4	14	6.0	18	4.5
Mashed rice and stew or jellof rice	7	4.3	13	5.4	20	5.0
Total	163	100	237	100	400	100
How complementary food is prepared						
Separate from family meal	30	18.4	44	18.6	74	18.5
Family meal modified	106	65.0	157	66.2	263	65.8
Family meal unmodified	27	16.6	36	15.2	63	15.7
Total	163	100	237	100	400	100
Feeding frequency per day						
Once	12	7.4	1	0.4	13	3.3
2 times	45	27.6	62	26.2	107	26.7
3-5 times	99	60.7	170	71.7	269	67.3
>5 times	7	4.3	4	1.7	11	2.7
Total	163	100	237	100	400	100
If child does not finish served portion						
Force child to finish the served portion	28	17.2	60	25.3	88	22.0
Throw away the leftover	28	17.2	29	12.2	57	14.3
Store to serve the child later	42	25.8	60	25.3	102	25.5
Serve leftover to older siblings	65	39.8	88	37.1	153	38.2
Total	163	100	237	100	400	100

F: Frequency, %: Percentage

Table 4: *Foods and meals of the day children were fed

Foods used for feeding the children	Urban		Rural		State	
	F	%	F	%	F	%
Starchy roots/tubers	142	35.5	224	56.0	366	91.5
Cereals	153	38.3	218	54.5	371	92.8
Legumes	130	32.5	146	36.5	276	69.0
Animal products including insects and larvae	175	43.8	290	72.5	465	116.3
Fat/oil	147	36.8	188	47.0	335	83.8
Fruits	118	29.5	229	57.3	347	86.8
Vegetables	140	35.0	173	43.3	313	78.3
Beverages/fizzy drink	63	15.8	32	8.0	95	23.8
Meals of the day complementary food is fed the child						
Breakfast	149	91.4	189	79.7	338	84.5
Lunch	150	92.0	203	85.7	353	88.3
Dinner	157	96.3	230	97.0	387	96.8
Snack	145	89.0	52	21.5	197	49.3

*: Multiple response, F: Frequency, %: Percentage

Table 5: Mean weight, length, head and chest circumferences of the urban and rural children

Age (month)	Urban				Rural			
	Wt (kg)	Ht (cm)	Hc (cm)	Chc (cm)	Wt (kg)	Ht (cm)	Hc (cm)	Chc (cm)
6-8	12.69	60.60	44.25	45.5	8.30	59.50	44.00	45.50
9-11	11.60	65.10	46.20	46.8	11.00	63.20	45.00	46.00
12-24	13.00	73.30			13.60	66.40		
25-36	14.90	81.30			15.50	81.30		

Wt: Weight, Ht: Height, Hc: Head circumference, Chc: chest circumference

oil (47%) in complementary foods more than their urban counterparts. These foods were mostly fed to children at dinner by 97% of rural and 96.3% of urban mothers.

Table 5 presents the mean weight, length/height, head and chest circumferences of the children in urban and rural areas. All the age groups except the 25-36 months

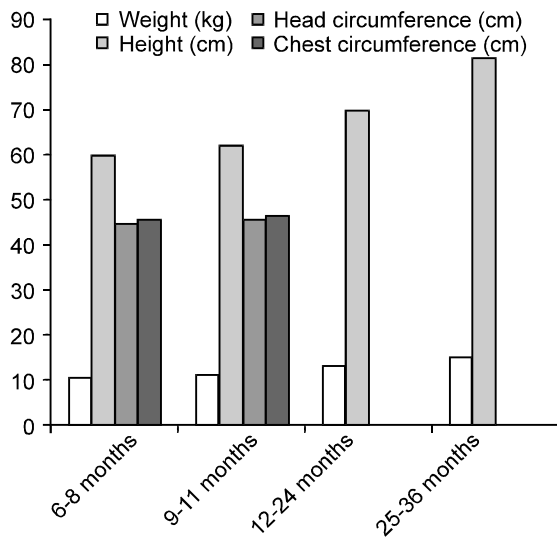


Fig. 1: Mean weight, length/height, head and chest circumferences of the children in Anambra state

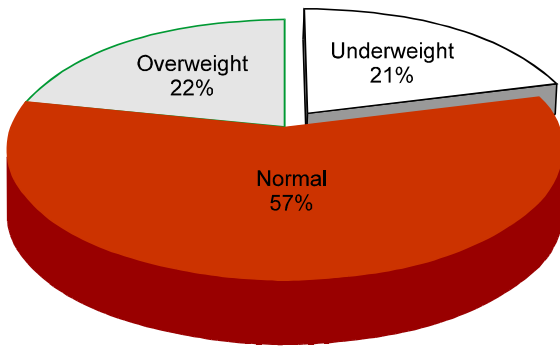


Fig. 2: Weight-for-age index of the children in the state

old in urban area had higher mean weight and height than their rural counterparts. The 25-36 months old children in rural area had mean weight of 15.50kg against their urban counterparts 14.90kg.

The mean weight and length/height of the children in the state according to age range as shown in Fig. 1 were 10.49kg and 60.0cm, respectively for 6-8months; 9-11months had 11.34kg weight and 62.20cm height, 12-24 months 13.28kg weight and 70.39cm height. The 36-60 months old weighed 15.18kg with 81.23 cm height.

Twenty-one percent (21%) of the children in the study area were underweight, 22% were obese and 57% had normal weight-for-age (Fig. 2). Stunting was high (86.0%) but there were some odd 10% of children who were tall-for-age (Fig. 3). Wasting was observed in 19% of the children (Fig. 4).

DISCUSSION

Majority of the mothers in the study area knew the meaning of complementary feeding but more than half of them introduced complementary foods earlier than the

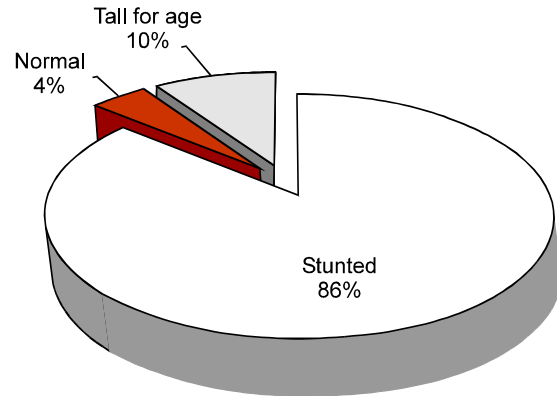


Fig. 3: Height-for-age index of children in the state

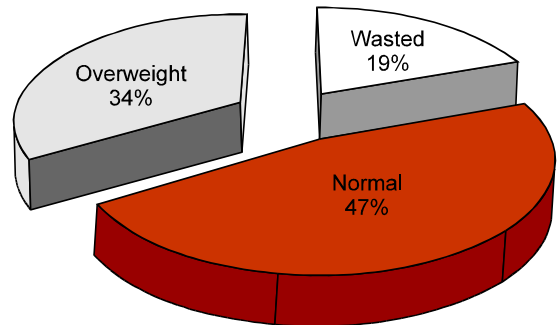


Fig. 4: Weight-for height index of the children in the state

WHO (2003) recommended time of 6 months. This practice which was observed more in rural than in urban area, supports the findings of Nnanyelugo *et al.* (2003). It has been documented that both early (before 6 months) and late (after 6 months) introduction of complementary foods is associated malnutrition (Bloss *et al.*, 2004; Muller *et al.*, 2003). This is because the child is either denied nutrients in breast milk (in case of early introduction) or made to consume less nutrients (in case of late introduction). The result of this study also revealed that a good percentage (46.2%) of the mothers continued breast feeding for up to 11 months after the introduction of complementary food while 30% continued for 24 months. This result is in line with the UNICEF (2008) data which showed that just over half of 6-9 month old and 39% of 20-23 month old children are breast-fed in addition to complementary feeding. The finding also supports that of Ayoya *et al.* (2010) which showed that West African mothers usually breast feed for 18-24 months.

About 65% of the mothers commenced complementary feeding because they felt breast milk was no longer satisfying the child's hunger. This is correct because at six months, the nutrient content of breast milk alone can no longer satisfy the child's needs (WHO, 2001). Most of the mothers fed their children maize gruel but about 23% of the rural respondents used per-prepared commercial

complementary foods. This trend normally observed in urban areas (with possible negative consequences for the child's growth) and now seen in rural areas might be attributed to nutrition transition. Mothers in Anambra state used a variety of foods in complementary feeding. This is a reflection of the fact that over 60% of the mothers used modified family meals to feed the children. Animal products, fruits, cereals and starchy roots and tubers were the foods mostly offered to the children. The higher occurrence of animal products in the meals of the rural children than their urban counterparts could be attributed to source and availability. It was easier for rural mothers to add some cheap sources of animal products such as insects and larvae to their meals than for the urban mothers. The frequency of complementary feeding of the children (3-6 times per day) in this study was in accordance with the WHO (2004) guidelines for feeding young children. It is important to feed young children frequently because of their small stomach capacity; infrequent feeding according to Dewey and Brown (2003) can affect the child's growth.

Although the rural mothers in this study appeared to have fed their children better, the mean the anthropometric indices of the urban children were higher than those of their rural counterparts except for 12-24 months old. The sanitary practices of the rural mothers were poor and these could have lead to frequent infection and thus could have affected the anthropometric indices of the children. Generally, stunting (86%) was observed more in the children in the state than overweight (22-34%), underweight (22%) and wasting (19%). Stunting which is a reflection of linear growth that failed to reach genetic potential as a result of poor diet and disease (ACC/SCN, 1996), was found to be high in this study. This finding did not support an earlier work by Ibeanu *et al.* (2012) which found a low prevalence of stunting in a peri-urban community in the same state; it however, supports the estimation of the WHO (2011) that 2 out of 5 under 5 children in developing countries are stunted. In Nigeria, the prevalence of stunting was 41% in 2008 (Nigeria Demographic and Health Survey, 2008) but a study by Nnam and Steve-Edemba (2012) found 63.5% of under-5 children in orphanages in the Federal capital territory Abuja in Nigeria to be short for age. These present reports might indicate rising prevalence of stunting in Nigeria. Overweight was also high in the study area considering the fact that more than half of the study population were rural dwellers who should consume more of traditional foods. This finding suggests co-existence of double burden of malnutrition in the study area.

Conclusion: This study revealed gaps in the young children feeding practices which affected their

anthropometric indices and thus their nutritional status. A variety of actions are needed because factors implicated with malnutrition are multi-faceted. However nutrition education targeted at mothers and women of child-bearing age on the use of available local resources as well as continued breast-feeding after the commencing complementary feeding would be effective and sustainable ways of reducing malnutrition among this age group.

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