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Feeding Pattern and Health Challenges of Nigerian Primary School Children in a Southeastern Urban Centre

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Author's contribution

This whole work was carried out by author CIN.

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ABSTRACT

Aims: To document the feeding pattern of public primary school children, with emphasis on the staple diet and skipped meals; and the influence of diet and certain maternal demographic characteristics on their health and nutritional status.
Study Design: This was a cross sectional descriptive study.
Place and Duration of Study: The study was done in Onitsha, Anambra state, South East Nigeria between September and December, 2010
Methodology: This was a cross sectional descriptive study with multistage sampling of 804 children aged 6 to 12years from 12 public primary schools in the area. Selection was based on the age and gender distribution in each school. Verbal and written explanation was given to the parents/care givers who were invited to the schools to respond to interviewer administered questionnaires. Information was obtained on the feeding pattern of their children and maternal demographic characteristics. The children of those who responded, thereafter, had their heights measured and were assessed for clinically obvious morbidities. Information obtained on the age of respondents was verified from the schools' registers. Data entry and analyses were done using Microsoft Office Excel 2007 and Statistical Package for Social Sciences (SPSS) version 16.
Results: There were 406 males and 398 females with a male to female ratio of 1.02:1. Their staple diet was cassava and rice. An average of 2.5% of the children skipped one meal daily. Breakfast, which was the only meal that had a significant effect on stunted growth, (F=24.177, p value=0.002) was skipped by 2.2% of the children on the day of

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interview. Only 1 of the children had a fruit within 24hours of the data collection. Fourteen percent of these children were stunted and the predominant morbidity observed was dermatophytosis. Most of the mothers (82%) were engaged in petty trading and menial jobs with 23.8% of them spending less than 500naira (3USD) on daily feeding. Maternal education and occupation were significantly associated with stunting in the children; $p<0.05$.

Conclusion: Provision of at least 1 free school meal, preferably breakfast, is advocated for children in public primary schools. This will help to improve the daily nutritional content of the meals of these children who are obviously from poor homes.

Keywords: Feeding pattern; staple diet; health; stunting.

1. INTRODUCTION

Nutritional deprivation in children negatively impacts the attainment of their full growth potential and mental development [1]. Many children, especially in developing countries, are however deprived of a balanced nutrition which is a basic human need [1]. The United Nations World Food Program documented that 66million children go to school hungry every day in these developing countries, with up to 23 million in Africa alone [1,2]. Globally, up to 400 million children have to go to bed hungry [3] Nutritional deprivation with consequent under nutrition which is an underlying factor in about 50% of childhood mortalities worldwide, thus, still remains a cause for public health concern [4]. Within the last decade, the health of hitherto ignored school aged children has come up on the global agenda [5]. Their nutritional status has been shown to be prime in achieving health as under nutrition negatively affects cognition, immune response (with increased risk of morbidity and mortality from disease) and growth with a long term effect on the quality of life, contribution to the workforce and economy of any nation [1,3,5].

Food security which is the ability to obtain safe, nutritious foods in socially acceptable and sustainable ways is important as children who frequently experience food insecurity are more likely to experience hunger and undernutrition [3]. Africa's indigenous foods are healthy and nutritious but unfortunately, diets offered to many children in developing countries are noted to often lack in variety, which is a key to specific optimal nutrient adequacy [3,6]. Peculiar feeding characteristics of different African populations thus need to be studied to document area specific feeding patterns as a prelude to measures that will correct inappropriate and inadequate feeding practices.

There is a paucity of data on the feeding pattern of children in the area of study. This study is thus important for evidence on food security or otherwise, and the health of the index population, with consideration of possible factors that may influence the status. The outcome of this study is expected to draw attention to the needs of school children in public schools for targeted interventional policies.

2. METHODS

This was a cross sectional, descriptive study of children aged 6 to 12 years who were randomly selected from 12 out of 80 public primary schools in Onitsha, Anambra state, Nigeria. Onitsha is a major commercial, educational and administrative centre in Anambra state being the commercial nerve–centre of the Eastern zone of Nigeria.

The schools were selected randomly after grouping them into 2 based on the population density of location, with an equal spread to high and medium density areas. No public primary school was located in the low density areas of Onitsha. The study was done from September to December 2010. The total population of the schools as at September 2010 was 43,089 children and the minimum sample size of 480 was determined using a standard formula [7]. This sample size was duplicated in accordance to the expected design effect to compensate for potential error encountered in employing multi-stage sampling method. The number per age group and gender of the children recruited into the study was representative of the distribution in the schools. Ethical approval was obtained prior to the commencement of the study from the Research and Ethical committee of the Nnamdi Azikiwe University Teaching Hospital and the Anambra State Universal Basic Education Board.

Their parents/ caregivers were invited (after due verbal and written explanation) to respond to interviewer administered pre structured questionnaires. Children whose parents declined consent and those who did not respond to the invitation to come to the school were excluded from this study. Questionnaires were administered by the researcher with 5 medical personnel as assistants. Information obtained included their biodata, maternal demographics, dietary history including a 24 hour recall. The respondents were asked to mention the foods eaten by the child as breakfast on the day of examination. They also mentioned the foods eaten as supper and lunch the day before including any in between snacks. The exact quantity of each meal could not be ascertained as there was no standard of measure and the parents were not given prior information to pay particular attention to quantity of food eaten by the child within the time frame of interest. Additional information was obtained on the children that had to share their meals from the same dish with their siblings or other children at home as is common in this environment.

The second stage of the study involved the general physical examination of the children whose parents had responded to the questionnaires. They were examined for pallor, oral hygiene, skin and hair changes, bony abnormalities and evidence of micronutrient deficiencies such as angular stomatitis. Thereafter, a measurement of the height of each selected child was obtained using a locally constructed and well calibrated wooden stadiometer. These assessments were carried out in the morning hours by the researcher alone.

Data entry and analyses were done using Microsoft Office Excel 2007 and SPSS version 16 software packages. Means and standard deviations were calculated where necessary and chi square test was used to compare proportions. The statistical tests were carried out at significance (p value) of less than 0.05. The height data was used to obtain the z-scores for height for age using the WHO/Z-score reference 2007. Stunting was defined by a z-score of height for age <-2 of the reference values and severe stunting by z-score of height for age <-3 of the reference values.

3. RESULTS

3.1 Biodata and General Characteristics

Eight hundred and four children were studied (design effect of 1.5). There were 406 males and 398 females with a male to female ratio of 1.02:1. The distribution according to age and gender is illustrated in (Table 1).The mean age was 8.9 years ± 1.9 years. The family size indicated by the number of children in each family ranged from 1 child to 11 children with an average of 5 children per family.

Table 1. Biodata and maternal characteristics of study population

Variable	Female	Male	Total
	N (%)	N (%)	N (%)
Age (years)			
6	61(15.3)	69(17)	130(16.2)
7	49(12.3)	40(9.9)	89(11.1)
8	68(17.1)	60(14.8)	128(15.9)
9	49(12.3)	50(12.3)	99(12.3)
10	86(21.6)	92(22.7)	178(22.1)
11	46(11.6)	56(13.8)	102(12.7)
12	39(9.8)	39(9.6)	78(9.7)
Total	398(49.5)	406(50.5)	804(100)
Maternal education			
No formal	15(1.9)	17(2.1)	32(4)
Primary	158(19.7)	157(19.5)	315(39.2)
Secondary	189(23.5)	189(23.5)	378(47)
Secondary/ additional	0(0)	1(0.1)	1(0.1)
Tertiary	30(3.7)	32(4)	62(7.7)
Not indicated	6(0.7)	10(1.2)	16(2)
Total	398(49.5)	406(50.5)	804(100)
Maternal occupation			
Unemployed	35(4.4)	25(3.1)	60(7.5)
Petty trader/artisan	324(40.3)	335(41.7)	659(82)
Junior civil servant(CS)/primary school teacher	29(3.6)	32(4)	61(7.6)
Intermediate CS/ Secondary school teacher/medium sized business	6(0.7)	7(0.9)	13(1.6)
Professional/senior CS/large scale business	1(0.1)	1(0.1)	2(0.2)
Not indicated	3(0.4)	6(0.7)	9(1.1)
Total	398(49.5)	406(50.5)	804(100)
Amount spent on daily feeding			
₦100-500	94(11.7)	97(12.1)	191(23.8)
>₦500-1500	256(31.8)	255(31.7)	511(63.6)
>₦1500	47(5.8)	54(6.7)	101(12.6)
Not indicated	1(1)	0(0)	1(1)
Total	398(49.5)	406(50.5)	804(100)

Most of the mothers (82%) were engaged in petty trading and menial jobs. Maternal educational attainment was generally low in the population with 47% completing secondary education. The percentage of mothers with post secondary school education was 7.8% while up to 4% had no form of formal education. The level of education influenced the job cadre of the mothers with most of the poorly educated engaged in menial jobs. Up to 65% of the parents claimed that their income was not sufficient for their daily feeding, with 23.8% of them spending less than ₦500 (3USD) on daily feeding. Most of the mothers (63.6%) spent between ₦500 to ₦1500 (3-9USD) on daily feeding. See (Table 1).

3.2 Feeding Pattern

3.2.1 Early feeding

The exclusive breastfeeding rate amongst these children was 16%. The average age for introduction of cereals was 4.4 months ± 2 months and the staple cereal was maize in the form of pap in 697(87%) of the children, but without fortification in 47 (7%) of them. The average age for introduction to family diet was 6.8 months ± 2.9 months.

3.3 Twenty Four Hours Dietary Recall

Cassava was the staple diet closely followed by rice (both of which are carbohydrate based diets).Cassava was either eaten plain, mixed with oil or, minimally laced with local soup of undetermined quality, as is the feeding culture of the people. Rice was also eaten with local soups or stews which usually formed a small and negligible proportion of the food. Maize was the staple diet during their infancy. The major protein containing diet eaten in the population of study was plant-based-Beans and was taken by 10.6% of the children as breakfast, 12% as lunch and 7.6% as supper. None of the children had an egg in the period and the fish or meat (animal proteins) which may be a part of some soups or stews was so negligible that it was not mentioned by any of the respondents. Only one child had a fruit within 24hours of the data collection. Breakfast was skipped by 2.2% of the children (F>M) while lunch and supper were skipped by 3.6% and 1.6% respectively. Sixty percent of those who had breakfast were fed on carbohydrate based meal of processed wheat, (especially in the form of white bread eaten plain or with “tea”, a term in this area that means sweetened cocoa drink occasionally laced with milk for the more affluent- 8.5% of them took just “tea” for breakfast), cassava and rice; 77.6% had carbohydrate based lunch of rice, cassava and yam; while 79% had carbohydrate based supper of rice, cassava and yam (Table 2). A combination of 2 foods was consumed by 3.5% of the children as breakfast, 2.6% as lunch and 1.5% as supper. Thirty six percent of the population ate their meals alone while the rest had to eat from the same dish with their siblings and other children in the house.

Table 2. Twenty four hour recall of types of food eaten by the study population

Type of food	Breakfast n=804(%)	Lunch n=804(%)	Supper n=804(%)
Beans	110 (13.7)	84 (10.4)	55 (6.8)
Cassava based	162 (20.1)	134(16.7)	429(53.4)
Maize	35 (4.4)	3 (0.4)	11 (1.4)
Rice	160(19.9)	367(45.6)	129 (16)
Processed wheat	166(20.6)	24 (3.0)	47 (5.8)
Yam	42 (5.2)	11 (14.2)	71 (8.8)
Plantain	17 (2.1)	4 (0.5)	19 (2.4)
Potato	8 (1)	9	2 (0.3)
Cocoa drink	68 (8.5)	-	-
Skipped	18 (2.2)	29 (3.6)	13 (1.6)
Others	18 (2.2)	36 (4.5)	28 (3.5)

Table 3. Number of stunted children based on type of meal consumed

	Beans	Cassava	Maize	Rice	Wheat	Yam	Skipped	Others	Total	F	P value
Breakfast											
Stunted	12	34	8	26	16	3	5	9	113	24.177	0.002(MC)
Not stunted	98	128	27	134	150	39	13	102	691		
Lunch											
Stunted	9	19	1	52	2	16	7	7	113	8.441	0.349
Not stunted	75	115	2	315	22	98	22	42	691		
Supper											
Stunted	6	58	2	25	4	11	2	5	113	10.219	0.294
Not stunted	49	371	9	104	43	60	11	44	691		

F= Fischers test; MC=Monte Carlo significance (based on 10,000 sample)

Table 4. Effect of maternal demographics on chronic malnutrition

Maternal education	Stunting		Total	F	P value
	No n=691(85.9%)	Yes n=113(14.1%)	n=804(100%)		
No formal	25(3.1)	7(0.9)	32(4)	9.638	0.042
Primary	262(32.6)	53(6.6)	315(39.2)		
Secondary	330(41.1)	48(6)	378(47)		
Secondary and additional	1(0.1)	0(0)	1(0.1)		
Tertiary	59(7.3)	3(0.4)	62(7.7)		
Not indicated	14(1.7)	2(0.3)	16(2)		
Maternal occupation					
Unemployed.	50(6.2)	10(1.2)	60(7.5)	11.663	0.028
Petty trader/artisan.	559(69.5)	100(12.4)	659(82)		
Junior civil servant/primary school teacher.	60(7.5)	1(0.1)	61(7.6)		
Intermediate civil servant/secondary school teacher/medium sized business.	11(1.4)	2(0.3)	13(1.6)		
Professional/senior civil servant/large scale business.	2(0.3)	0(0)	2(0.3)		

F=Fischers exact test

3.4 Health and Nutritional Status

One hundred and thirteen (14% of population) of the children were moderately or severely stunted, with fifteen of them (1.9% of population) being severely stunted. Sixteen percent had clinically identifiable health challenges, the commonest being skin infections (9.1%) and predominantly dermatophytosis (7.6%) (mainly Tinea capitis), followed by dental caries in 2.6% of the children. See (Fig. 1). Other health problems identified in 1(0.1%) to 2(0.3%) of the children, for each condition, as represented by "others" in (Fig. 1) included squint, ear discharge, conjunctivitis, dental plaques and anarchy, vitiligo, pallor, fluffy hair, visible wasting and alopecia. Three of the children had 2 morbidities each- Ringworm/wasting (1) and Ringworm/dental caries (2).

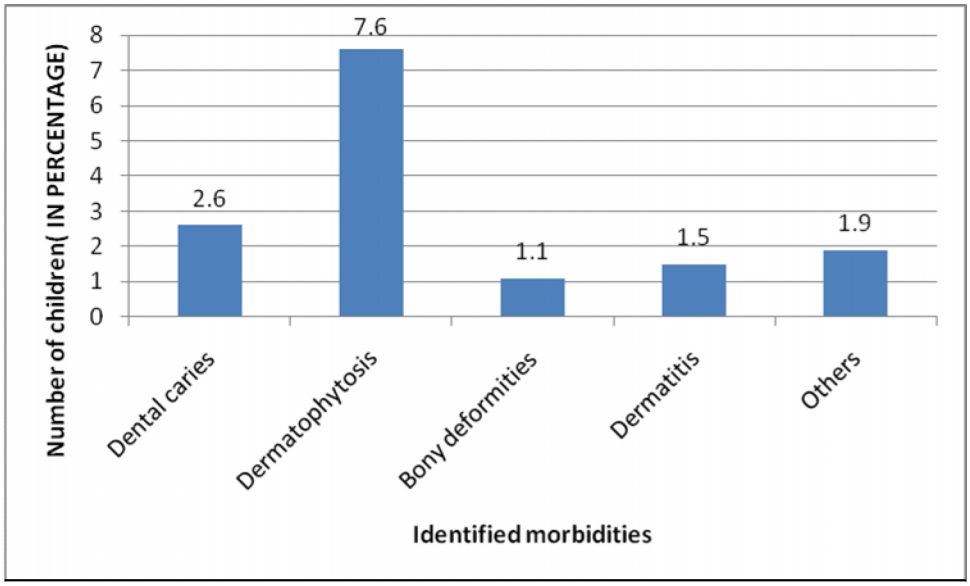

Fig. 1. Abnormal physical examination findings in the children

3.5 Factors Affecting Nutritional Status

Most of the mothers were poorly educated and engaged in menial jobs and these were significantly the mothers of most of the children that were stunted (Table 4 above). Fifty three percent of all the children that were stunted were born to mothers that had either no formal or a primary education who formed 43% of the population. Breakfast was the only meal of the day found to have a significant effect on stunting. (F=24.177, p value=0.002) (Table 3 above). Ninety eight percent of those that were stunted ate cassava at least once within 24 hours of the data collection while 91.2% had eaten rice.

4. DISCUSSION

The feeding pattern of the children in this study is poor with a lack of variety in their diet and a minimal protein intake which was consumed by a very small percentage of the children studied within 24hours of the data collection. Their major source of protein was from plants and this was found to have been consumed by only about 10% of the population within 24

hours preceding the dietary recall. These are growing children who require energy in addition to protein in order to achieve their full growth potential. It is important to note that diversification in diets is recommended for optimal protein quality and to derive full benefits of a high carbohydrate diet as found in the study [8].

The staple diet of these children was basically tubers (cassava) and cereal based (rice). Processed wheat in the form of bread was a major component of breakfast. Cereals and roots/tubers are components of a healthy diet worldwide but need to be consumed with pulses, fruits and vegetables [8]. These were almost missing in the diet of these children. Their dietary pattern is similar to what has been documented in other studies in and outside Nigeria [9-11]. The average staple diet in Africa contains about 46% cereals, while roots and tubers make up about 20% and animal products make up just about 7% [9]. However, it has been ascertained that staple diets generally do not meet up with a populations nutritional needs and there is need for a variety of foods especially in children and other nutritionally vulnerable groups [9]. The choice of meals in the index study appeared to be based on convenience and availability rather than an attempt to give nutritionally balanced meals. Wheat in form of bread, the commonest breakfast, is relatively cheap and readily available. Cassava which was the commonest supper is also relatively cheap, easily preserved and perceived to give energy which may be the reason for its preference. The poor and poorly educated may be more interested in maximum energy purchased with minimum funds. Amongst the children studied, cassava was either eaten plain, mixed with oil or majorly with local soup, the quantity or quality of which is dependent on fund available. The soup is usually prepared with two or more of palmoil (fats/oils), vegetable(minerals/vitamins), salt, pepper and occasionally some fish or meat(animal protein). These soups, and stews made with oil and tomato may form a miniscule accompaniment to these diets in the area of study with the quality and quantity being suspect because of the prevailing poverty. Rice, the commonest lunch can easily be bought from road side hawkers in the urban centre and is also easy to prepare with minimal ingredients. In Nigeria, dairy products and meat is a luxury which many cannot afford. Many of these poorly educated women may not know the importance of fruits in the daily diet of their children resulting in its absence in their diet. The practice of sharing meals is part of the prevailing tradition and this is obvious from the fact that a greater proportion of the children had to eat with others. The amount of food consumed by a child may be based on ‘survival of the fittest,’ and parents may not be able to reliably quantify the amount eaten.

The underlying poverty and poor maternal education as indicated in this study may be responsible for the lack of variety in food choices, in addition to the consumption of refined grains which are cheaper than whole grain. Many of these mothers may be unaware of the health implications of their choices, and where they are, may not be able to afford anything better. It is well known that the European staple diet that consists more of animal products and variety with recent emphasis on increased fruit and vegetable intake, is not affordable to the common Nigerian [9]. In the index group, many live on barely 3USD a day and majority of them claimed they hardly had enough to spend on basic daily feeding. Such poverty will predispose to purchase of the ‘cheaper’ staple foods to survive, without much regard for healthy choices and the implications. Food preference may also be determined by the ability or otherwise of these women to cook in their homes as source of energy (kerosene) for cooking is also not affordable. The amount of money spent on daily feeding by about a fifth of the mothers can hardly purchase up to 3 litres of kerosene in present day Nigeria. Many of these women who are petty traders may thus depend on roadside food hawkers with the children getting unbalanced diet and convenient cheap foods.

In this study, a majority of the children had 3 meals daily which is satisfactory for their ages. The average prevalence of daily skipped meals of 2.5% with skipped breakfast of 2.2% is lower than what was got in South Western Nigeria [11]. Olusanya documented a 10.3% prevalence of skipped breakfast in public schools in a rural community in Ogun state [11]. The prevalence of skipped breakfasts obtained in this study is also much lower than those obtained from studies in the developed countries [12,13]. Data obtained from 4,377 children in the Netherlands revealed a 5% prevalence of skipped breakfasts in primary school children and 13% prevalence in secondary school children [12]. It is however, still unacceptable that some of the children in this study don't have the basic 3 square meals in a day. Although an average of 2.5% appears low, it is still of concern that some of these children have to go to school hungry. Studies on school children have consistently documented the importance of the first meal of the day which affects subsequent feeds, overall nutritional status and health, and the attendant interference with cognition and learning in school [11-13]. In this study, meals were not missed by children in the highest echelon but mainly by those whose mothers were involved in petty trading. This may be because meals may not be prepared at home and the child may have to go to school before the food hawkers come out for the day or the mothers may need to make sales in order to get some money to purchase food. It may also be because breakfast is not considered to be a very important meal which could be skipped in favour of the others. However, breakfast omission has been found to diminish speed and accuracy on tests of visual and auditory short-term recall and cognitive functions unrelated to memory with potential educational and public health implications [13]. That many more girls skipped breakfast in this study is similar to findings from other studies. Onyiriuka found that skipping of meals was commonest in urban adolescent school girls in Nigeria and linked this to attempt to avoid weight gain [14]. The larger percentage missing lunch may be because these children are in school at lunchtime.

The dietary pattern may predispose the children to macro and micronutrient deficiency with attendant morbidity. A high prevalence of stunting has been found in some children who subsist on inadequate protein containing diets, with the fraction of dietary energy derived from protein being inversely correlated with stunting in many populations [15]. Even though no significant association was established, there was a relatively higher prevalence of stunting amongst the poorest of the index children. The pattern of health problems identified is similar to findings amongst school children in and outside Nigeria [16-20]. A study on the nutritional status and morbidity pattern among governmental primary school children in Nepal revealed that the commonest diseases identified were skin disease in 20% closely followed by dental caries in 19.8% [16]. The pattern in the index study is strikingly similar, though with lower prevalence. Other community and hospital based studies have documented a high prevalence of dermatophytosis amongst school children in Africa ranging from 5 to about 15% [17-20]. The factors implicated include warm climate, poor living environment and personal hygiene, poor health seeking behavior, childhood interaction patterns, poorly educated parents with low paying jobs, compromised immune system as also seen in malnourished children. The children in this study had more than 90% of the mothers poorly educated and in low paying jobs. These mothers may not have the time or the knowledge to ensure good personal hygiene. Dental caries in these children may be related to increased consumption of sweet foods and poor dental hygiene. These children are in schools surrounded by small shops and roadside hawkers. These children may easily buy cheap, low quality sweet snacks from them and these will predispose them to dental caries.

5. CONCLUSION

This study has shown that school children have myriads of health and nutritional challenges which should no longer be ignored. There is thus need for improved nutritional content of food for children and availability of health services. With the steadily increasing global food prices, government intervention is definitely needed either to put more income in the hands of women, or to provide at least one basic meal, preferably breakfast on the tables of these children in school.

6. LIMITATIONS OF THE STUDY

There is the possibility of bias in this study in relation to the study design which is flexible. The exact quantity and quality of the meals could not be ascertained as there was no standard of measure. Finally the poor attitude to harmless research leading to non consent by some parents, may have caused the exclusion of important subjects.

CONSENT

Written and informed consent was obtained from the parents/ caregivers of the children after due verbal and written explanation on the nature of the study.

ETHICAL APPROVAL

Ethical approval was obtained prior to the commencement of the study from the Research and Ethical committee of the Nnamdi Azikiwe University Teaching Hospital and the Anambra State Universal Basic Education Board.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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