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Feeding Practices and Determinants of the Nutritional Status of Pupils in a Public Primary School in Aladinma Owerri, Nigeria

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Abstract **Background:** Poor feeding practices with its consequence of malnutrition is a serious impediment to child health, growth and development. Thus, periodic assessment of the nutritional status and factors affecting it among this often neglected group remains imperative. **Objective**: To assess the feeding practices and determinants of the nutritional status of pupils in a public primary school in Aladinma Owerri, Nigeria. **Materials and methods:** This was a descriptive cross sectional study of 300 pupils of a selected public primary school in Aladinma Owerri, Nigeria. The sampling was done in two stages. Data was collected using a pre-tested semi-structured questionnaire and analysed using statistical package for social sciences version 22.0. Nutritional assessment was done using anthropometric parameters, while Chi-square test was used to identify statistically significant associations between variables. A p value of ≤ 0.05 was considered significant. **Results:** There were more females 158(52.7%) than males while the mean and median ages were 9.7±0.3 and 10.6±0.3 years respectively. Two hundred and sixty five (88.3%) of them fed at least thrice daily, 92(30.7%) skipped breakfast regularly, while 215(71.7%) had school meals during break period. There were statistically significant associations between Body Mass Index for age (Underweight, Normal and Overweight cum Obese) and [sex (p=0.0121); number of siblings (p=0.013), mothers' educational status (p=0.001) and number of meals per day (p=0.005)] respectively. **Conclusions**: School's policies and programs that focus on promoting feeding practices and improving childhood nutrition will benefit children.

Keywords: *Anthropometry, nutritional status, feeding practices, school children, Owerri Nigeria*

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1. Introduction

The United Nations System Standing Committee on Nutrition, [1] World Health Organization (WHO), [2] Centers of Disease Control and Prevention (CDC), [3] ,Council on Hemispheric Affairs [4] and the Partnership for Child Development (PCD) [5] posit that poor nutritional status in primary school age children is a major cause of low school enrolment, school absenteeism, reduced attention span, decreased learning ability, poor academic performance, repeating grades in school and early school dropout. This is also reflected in the World Declaration on 'Education for All'. [6,7]

Primary school age is a period of physical growth, mental development and social adaptation of a child. This age group (5–12 years old) is potentially vulnerable and susceptible to growth and general developmental challenges. Often, the adverse effects of poor nutrition at this age are not reversible and eating habits have not been established. [8] Childhood is a time when food preferences and habits are shaped.Feeding practices in early life are important in cognitive development of the child and overall well-being of an entire lifetime. [9,10] Furthermore, the school system could serve as an effective forum for inculcating healthy nutrition culture to the pupils.

Apart from contributing to a child's daily nutrient requirements, meals provided during school hours increase attention span, facilitate the ability to learn and alleviate short term hunger. [11] In addition, hunger may negatively influence children's concentration or performance in academic activities even if they are otherwise healthy and well-nourished. [5,12]

Nutritional status is an important indicator of the global wellbeing, growth and development of children. It measures the current body state of a person or a

population group, in relation to their level of consumption and utilization of nutrients. [13]

Among children, nutritional imbalance is an underlying cause of 2.6 million deaths annually and a third of child death globally. [14,15] The 2013 United Nation Children's Fund (UNICEF), WHO and World Bank estimate recorded that the number of overweight children worldwide increased from 32 million in 2000 to 42 million in 2013. [16] Children who are overweight or obese are at a higher risk of developing health problems such as type 2 diabetes, high blood pressure, respiratory problems like asthma, sleep disorders and liver disease. They may also suffer from psychological effects such as low self-esteem, depression and social isolation. In general, body mass index (BMI) is an inexpensive and easy-to-perform method of screening for weight categories that may lead to health problems. Though BMI does not measure body fat directly, research, however has shown that it correlates with more direct measures of body fat, such as skinfold thickness measurements, bioelectrical impedance, densitometry (underwater weighing) and dual energy x-ray absorptiometry (DXA). [17,18] Thus a high BMI can be an indicator of high body fatness.

On the other hand, undernutrition accounts for 11 % of the global burden of disease. [19] Children who are undernourished have lower resistance to infection and are more likely to die from common childhood ailments such as malaria, diarrheal diseases and respiratory infection. According to the Growth and Assessment Surveillance Unit of the WHO in 2010, the global prevalence of undernutrition among school-aged children, as indicated by the prevalence of stunting, was approximately 28% (171 million children). [15,20] In developing countries, the prevalence is as high as one in three. [19] Stunting (low height-for-age) is a manifestation of chronic undernutrition. [5] Stunted children do not reach their full growth potential, become stunted adolescents and in adulthood, the functional consequences include reduced work capacity as well as increased risk of maternal mortality in women and adverse birth outcomes. [20]

Nutritional assessment is essential in instituting intervention programs aimed at reducing poor health indices associated with poor nutrition. [13] Efforts at reducing malnutrition in developing countries have been focused on under five children. Also previous studies were mostly on under five years in neglect of this pre-adolescent group. However, available data show that school age children may not be better nourished than younger children as they have several risk factors for malnutrition. [10,21,22,23] Therefore the present study was conducted to assess the feeding practices and determinants of the nutritional status of pupils in a public primary school in Aladinma Owerri, Nigeria.

2. Methodology

2.1. Description of Study Area

This study was carried out in Aladinma Housing Estate in Owerri Municipal, one of the three local government areas that constitute Owerri the Capital of Imo State in South East Nigeria. It had an area of 8km^2 and a population of 127,213 as at the 2006 census. [24] Owerri is a metropolitan city hosting important educational institutions ranging from the primary to the tertiary level. Aladinma Housing Estate is a high brow area in the state capital, where people of high socio-economic status live. The predominant occupations of the residents are trading and civil service. One public primary school was selected for the study, Aladinma Estate Primary School comprising about 725 pupils.

2.2. Study Design

This was a school based descriptive cross-sectional study conducted between May and June, 2014.

2.3. Study Population

The study population comprised all primary school children in Aladinma Estate Primary School.

2.3.1. Inclusion Criteria

Children aged 5-12years and who gave their assent/parental consent.

2.3.2. Exclusion Criteria

Children who refused assent and children of parents who refused consent, absenteeism for up to a period of six months, gross physical deformities of the limbs and spine, evidence of chronic illness, and absence from school during the study period were the exclusion criteria.

2.4. Sample Size Determination

Using the Cochran's formula for sample size estimation in a population greater than 10,000. [25]

$$n = Z^2pq / d^2$$

where, Z = standard normal deviate set at 1.96 which corresponds to 95% confidence interval.
p= A study on nutritional status of semi - urban Nigerian school children using the 2007 WHO reference population reported that (39.4%) had one or more forms of malnutrition (underweight, stunting, thinness, overweight or obesity). [26] Thus p= 0.39
q= complementary prevalence (1-p) =1- 0.39 =0.61
d= level of precision usually set at 0.05.

$$n = (1.96)^2 \times 0.39 \times 0.61 / 0.05^2 = 366.$$

Then a conversion was made using the formula for the calculation of minimum sample size for populations less than 10,000, nf = n /1+ n /N, [25] where, N = target population= 725.

$$nf = 242 \text{ pupils.}$$

Anticipating a response rate of 90%, an adjustment of the sample size estimate to cover for non- response rate was made by dividing the sample size estimate with a factor f, i.e. n/f, where f is the estimated response rate. [25] Thus the calculated sample size =242/0.90 = 269 pupils. However, 300 questionnaires were distributed.

2.5. Sampling Technique

The sampling of participants was done in two stages. The first stage involved the use of stratified sampling

technique to get the proportion of 50 pupils each from the six classes that would make up the total population of 300. The second stage involved simple random sampling technique using a table of random numbers with the class register as the sampling frame, to select the pupils that were studied until the required sample size was obtained.

2.6. Data Collection Technique

Data collection in this study was done using pre-tested, semi- structured questionnaires developed from review of relevant literatures. All questions were written in English language and pre-tested on parents of similar set of pupils outside the study area Imo State. This was done, to check for the reliability, validity, appropriateness of format, wording and time needed to fill the questionnaire. Thereafter the instruments were reviewed by colleagues, necessary adjustments and corrections were effected before administering the questionnaire to the study participants.

The questionnaire is divided into three sections (A-C) to obtain data on A) the socio- demographic characteristics of the respondents; B) respondents' feeding practices, e.g. number of times respondents eat in a day, 24 hour dietary recall, what respondents eat during break period; C) anthropometric measurements, e.g. weight, height, BMI. Information on sections A and B of the questionnaire was filled by the parents on behalf of their children and finally was returned to the research team. The Anthropometry of the pupils was measured by the research team. Height and weight were measured according to the WHO standard procedures. [27] The height of each subject was measured to the nearest 0.1 cm using a locally manufactured wooden stadiometer with a sliding headpiece. The subject stood without shoes on the basal part of the device with feet together. The shoulders, the buttocks, and the heels had to touch the vertical measuring board. The children stood with their eyes in the Frankfort horizontal plane. The weight of each subject was measured without shoes to the nearest 0.1 kg, using a standardized digital scale (Hanson H 1000). The BMI was calculated as weight (kg) divided by the square of the height (m^2) (kg/m^2) and BMI percentiles for age were calculated using BMI calculator developed by Halls.[28] This was compared to America's weight and used to classify the subjects into underweight, normal weight, overweight or obese. [28]

To ensure data quality, training of data collection team, standardization of measurements, pretesting of procedures and materials, and field monitoring of data collection were done. Timely availability of the study instruments, meeting of data collection team at the end of every day to share experiences and submit completed forms, and solving field problems were ensured.

2.7. Data Management and Analysis

The data were scrutinized and entered into the computer. Data cleaning was done by carrying out range and consistency checks. Descriptive and analytical statistics of the data were carried out using international business machine-statistical package for social sciences (IBM-SPSS) Windows version 22.0. [29] Tests of statistical significance were carried out using Extended Mantel-Haenszel Chi square tests for proportions**. A p value of ≤ 0.05 was considered significant.** Descriptive data were presented as simple frequencies and percentages.

2.8. Ethical Consideration

Approval was obtained from the appropriate authorities in the studied school. Verbal consent was obtained from their class teachers before commencement of study. Assent of the respondents and consent of their parents were also solicited and obtained for the conduct and publication of this research study. Study participants were free to refuse or withdraw from the study at any time without any penalty. All authors hereby declare that the study has been examined and approved by the Department of Community Medicine Madonna University and University Hospital Ethics Committee, Nigeria and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

3. Results

Table 1 shows the socio- demographic characteristics of respondents. A total of 300 respondents participated in the study. The response rate was 100%. There were more females 158(52.7%) than males while the mean and median ages were 9.7±0.3 and 10.6±0.3 years respectively. All respondents were Christians and 185(61.7%) were living with both parents. Two hundred and fifty five (85.0%) of the pupils' mothers attained at least secondary level of education while 244 (81.3%) of them had at least four siblings.

Table 1. Distribution of respondents' socio-demographic characteristics

Characteristics	Frequency (N=300)	Percentage (%)
AGE GROUP		
5-7	61	20.3
8-10	104	34.7
≥11	135	45.0
Mean age = 9.7±0.3 Years		
Median ages = 10.6±0.3 years		
SEX		
Male	142	47.3
Female	158	52.7
RELIGION		
Christianity	300	100.0
CARETAKER		
Both parents	185	61.7
Father alone	8	2.7
Mother alone	31	10.3
Guardian	76	25.9
MOTHERS' EDUCATIONAL STATUS		
Nil formal	12	4.0
Primary	33	11.0
Secondary	61	20.3
Tertiary	194	64.7
NUMBER OF SIBLINGS		
≤3	56	18.7
≥4	244	81.3
HOUSE TO SCHOOL DISTANCE		
< 10 Minutes	148	49.3
> 10 Minutes	152	50.7

Table 2. Feeding practices of respondents

Characteristics	Frequency (N=300)	Percentage (%)
NUMBER OF MEALS PER DAY		
≤ 2	35	11.7
≥3	265	88.3
SKIPS BREAKFAST		
Regularly	92	30.7
No	126	42.0
Sometimes	82	27.3
CLASS OF FOOD EATEN OVER 24HOURS		
More Protein	3	1.0
More Carbohydrate	279	93.0
Both	18	6.0
SCHOOL MEAL		
Yes	215	71.7
whole meal	*35*	*11.7*
snacks	*180*	*60.0*
No	85	28.3
HAVE HOME FARMS		
Yes	179	59.7
No	121	40.3
HOME GROWN FARM PRODUCE (n= 179)*		
Carbohydrate	90	50.3
Vegetables	46	25.7
Poultry	56	31.3
Variety	43	24.0

* Multiple responses

Table 2 summarizes the feeding practices of respondents. Two hundred and sixty five (88.3%) of the pupils fed at least thrice daily. Ninety two (30.7%) of the respondents skipped breakfast regularly, while the 24hour nutritional dietary intake recall showed that 279(93.0%) took more of carbohydrate. Two hundred and fifteen (71.7%) of them had school meals during break period, comprising 35(11.7%) who had whole meal and 180(60%) that fed on snacks. Only 179(59.0%) had farms in their homes.

Table 3 highlights the anthropometric characteristics of respondents. Majority of the respondents had normal weight for age, 133(44.3%) males and 143(47.7%) females; normal height for age, 133(44.3%) males and 146(48.7%) females, normal weight for height, 107 (35.6%) males and 110(36.7%) females and a greater percentage (79.7%), 117(39.0%) males and 122(40.7%) females of respondents had normal BMI. Underweight was 3% each in both males and females while overweight was 2% in females. Stunting was 1.3% each in both males and females. Wasting was 38(12.7%), 14(4.7%) in males and 24(8.0%) in females. Using BMI for age, only a few of them were underweight 17% (males 8%, females 9%), overweight (males 0.3%, female 1.3%) and obese was 1.7% in females. There were no statistically significant associations between sex and nutritional statuses [weight for age ($\chi2$=1.0966, p=0.297); height for age ($\chi2$=0.176, p=0.675); weight for height ($\chi2$=1.2806, p=0.259)] respectively, while there was a statistically significant association between sex and BMI for age ($\chi2$=6.349, p=0,012).

Table 3. Anthropometric characteristics of respondents

Characteristics	Frequency (Percentage)			Test statistic	p value
	MALE	FEMALE	TOTAL	Extended Mantel-Haenszel $\chi2$	
WEIGHT FOR AGE					
Underweight	9 (3.0)	9 (3.0)	18 (6.0))		
Normal weight	133 (44.3)	143 (47.7)	276 (92.0)	1.0966, df=2	0.2966
Overweight	0 (0.0)	6 (2.0)	6 (2.0)		
Total	**142 (47.3)**	**158 (52.7)**	**300 (100.0)**		
HEIGHT FOR AGE					
Stunting	4 (1.3)	4 (1.3)	8 (2.6)		
Normal height	133 (44.3)	146 (48.7)	279 (93.0)	0.1761, df=2	0.6748
Tall	5 (1.7)	8 (2.6)	13 (4.3)		
Total	**142 (47.3)**	**158 (52.7)**	**300 (100.0)**		
WEIGHT FOR HEIGHT					
Wasting	14 (4.7)	24 (8.0)	38 (12.7)		
Normal	107 (35.6)	110 (36.7)	217 (72.3)	1.2806, df=2	0.2586
Above normal	21(7.0)	24 (8.0)	45 (15.0)		
Total	**142 (47.3)**	**158 (52.7)**	**300 (100.0)**		
BODY MASS INDEX FOR AGE					
Underweight	24 (8.0)	27 (0.9)	51 (17.0)		
Normal	117 (39.0)	122 (40.7)	239 (79.7)	6.349, df=2	0,012
Overweight/obese	1 (0.3)	9 (3.0)	10 (3.4)		
Total	**142 (47.3)**	**158 (52.7)**	**300 (100.0)**		

Table 4 shows the relationship between subject and anthropometric characteristics of respondents. There were statistically significant associations between BMI for age (Underweight, Normal and Overweight cum Obese) and [mothers' educational status ($\chi2$=11.329, p=0.001); number of siblings ($\chi2$=6.232, p=0.013) and number of meals per day ($\chi2$=7.901, p=0.005)] respectively. There were no statistically significant associations between BMI for age and [age ($\chi2$=0.0393, p=0.843) and pupils' caretaker ($\chi2$=0.914, p=0.176) respectively.

Table 4. Relationship between subject and anthropometric characteristics of respondents

Characteristics	Frequency (Percentage)					Test statistic Extended Mantel-Haenszel $\chi 2$	p value
	Underweight	**Normal**	**Overweight**	**Obese**	**Total**		
AGE							
5-7	8	51	2	0	61		
8-10	20	81	1	2	104	0.0393	0.843
≥11	23	107	2	3	135	df=4	
Total	**51**	**239**	**5**	**5**	**300**		
CARETAKER							
Both parents	28	151	2	4	185		
Father alone	3	5	0	0	8	0.017,	0.914
Mother alone	8	22	1	0	31	df=6	
Guardian	12	61	2	1	76		
Total	**51**	**239**	**5**	**5**	**300**		
MOTHERS' EDUCATIONAL STATUS							
Nil formal	2	7	2	1	12		
Primary	5	26	1	1	33		
Secondary	11	47	1	2	61	11.329	0.001
Tertiary	33	159	1	1	194	df=6	
Total	**51**	**239**	**5**	**5**	**300**		
NUMBER OF SIBLINGS*							
≤ 3	9	43	2	3	57		
≥ 4	42	196	2	3	243	6.232	0.013
Total	**51**	**239**	**5**	**5**	**300**	df=2	
NUMBER OF MEALS PER DAY*							
≤2	51	232	4	4	291		
≥ 3	0	7	1	1	9	7.901	0.005
Total	**51**	**239**	**5**	**5**	**300**	df=2	

* Statistically significant association - p≤0.05.

4. Discussion

A major strength of this study is the high response rate (100%) achieved. This is same with the response rate in the study by Falade *et al*., on the nutritional status of pupils of a selected public primary school in Ile-Ife, Osun State, Nigeria. [30] Though the Osun study presented an equal sex distribution as opposed to the index study where a slight majority of the pupils (52.7%) were females, this difference is most likely rather methodological. A study among randomly selected primary school pupils in Sagamu showed 52.9% were females. [26]

The present study indicated the feeding practices among primary school pupils in Aladinma Owerri, Nigeria which may reflect the common eating patterns among the families. The findings of our study showed that about three in every ten of the respondents skipped breakfast regularly. This finding corroborates the position of the World Food Program that 23 million primary school age children in Africa and 66 million across the developing countries of the world attend classes hungry. [22] Though our study revealed that (88.3%) of the pupils studied fed at least thrice daily, showing that they may have made up with other meals even after missing breakfast. However, breakfast is considered the most important meal of the day in a balanced diet. More so, the extra demands on school age children at school and in some scenarios, walking long distances to school creates a need for more energy by the children. [5]

Culturally, a large portion of Nigerian staple foods comprises carbohydrate. From our findings, about nine in ten respondents reported they fed at least thrice daily. A 24hour nutritional dietary intake assessment showed that about the same ninety percent of them took more of carbohydrate. This result is consistent with those of several studies which reviewed that presently, there is a very low consumption of micronutrient-rich foods such as vegetables, fruits and milk by large number of children. [31,32,33]

In the current research, more pupils, about seven out of ten, had school meals during break period, comprising (11.7%) who had whole meal and (60%) that fed on snacks. Moaadeli *et al*., in Darab City, Iran (though among secondary schools students) reported that more respondents used unhealthy snacks (64.9%) compared to those who consumed healthy foods (35.1%). [34] The current trend is that children often leave their homes early, skip breakfast and spend lengthy period in school daily, thus only one home meal is probably guaranteed. [5] Breakfast should account for 25% of the total daily energy intake. An inadequate breakfast is usually compensated with greater intakes between meals or a greater percentage of the total daily energy intake in the remaining meal. In this context, school meal should provide children with at least a third of the daily nutrient requirements. [35] However, obtaining the full range of nutrients, implies that a child needs to consume a good variety of foods from different food groups, every day and in the right mix. [36] Therefore ensuring an increased availability of fruits, vegetables, whole grains, and low-fat dairy products as components of meals pupils eat in school may be an effective strategy in promoting healthy eating behaviors and food preferences among these children.

Our findings illustrated that most of the participants had normal weight for age, normal height for age, normal weight for height and normal BMI for age. Cross-sectional studies carried out in Makurdi, Nigeria [37,38] and in urban area of Meerut India, [39] majority of the children

(54.6% and 56.3%), were found to be normal as per their weight for age and height for age respectively.

Our study findings showed that underweight was 3% each in both males and females. This is less than the national average of 18% according to the 2013 National Demographic and Health Study (NDHS). [40] Also higher prevalence of underweight (29.9%, 25.4%, 25.5%, 51.7%, 52.2%, 52.7%) have been reported among school children in various parts of Nigeria; Enugu South-East. [10], Uyo South South [41], Sagamu [26], Abeokuta [42] and Ile Ife South West [43] and Makurdi North Central [37,38] respectively. There was no statistically significant association between sex and weight for age (p=0.297), but other studies have reported that boys were significantly more underweight. [26,32,37]

Also, our study found that stunting was 1.3% each in both males and females. Several researchers in Nigeria have reported prevalence ranging from 14.2% to 52.7%. [10,26,37,38] While studies in public primary schools in urban area of Meerut and Garhwali Himalayan village India, stunting was present in 56.1% and 43.8% of children respectively. [39,44] There was no statistically significant association between sex and height for age (p=0.675). In this regard, Black and colleagues reported that girls tended to be more stunted compared to boys. [19]

In addition, our study results showed that wasting was (12.7%). However, a study in urban and rural areas of Enugu Nigeria documented prevalence rate of wasting as 25.5%. [10] These differences may be attributed to variations in socioeconomic statuses of the pupils' families, culture, feeding habits and environmental factors. Our study was done in high socioeconomic residence in the State capital.

The present study, examined the relationship between participants' BMI for age (Underweight, Normal and Overweight cum Obese) and some variables of interest. Significant relationships were observed between BMI for age and [sex, number of siblings, mothers' educational status and number of meals per day respectively. This finding agrees with the results of a descriptive cross sectional study done in Indonesia, which showed associations between nutritional status of primary school children and some independent variables such as household members (p=0.05), supplementary food support from the school (p=0.04) and mother's education (p=0.05). [45] Nutritional status of pupils have also been linked with family size, total number of children ever born to a woman, food insecurity and food safety and mother's education. [45,47] Mothers with higher level of education may have more knowledge on the role of food on the health status and academic performance of children compared to less educated ones. [48,49] Higher level of education among mothers may also ensure equitable distribution of household resources thus enhancing provision of food for the children.

Limitation of the study: This study is based on self-reports and is subject to social desirability bias due to the sensitive nature of some of the questions.

5. Conclusions

Majority of the participants had normal weight for age, normal height for age, normal weight for height and normal BMI for age, gender, number of siblings, mothers' level of education and number of meals per day were found to be the important underlying factors influencing the nutritional status of pupils. Improving school's policies as well as implementing programs that focus on promoting healthy feeding practices and enhancing childhood nutrition will benefit children. Efforts at female education and empowerment should be intensified in view of the obvious influence of female education on the nutrition of school children.

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None.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

Author **CCN** was involved in the design, analysis of data, interpretation of results, write up of this study and editing of the main paper, **ALI, KAU, CBD and SKO** were involved in the design and editing of the main paper, **HOA, EOO, MTG** and **SAI** were involved in the design and implementation of the study. All authors read and approved the final manuscript.

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