Original Research Article

Nutritional Status, Feeding Pattern and Clinical Symptomatology among Healthy Pediatrics Age Group in Southwest Nigeria

Abstract

Background: Nutritional status is considered the best indicator and a non-clinical approach to optimizing a child's health care. It does not only directly reflect the socioeconomic status of the family but also, the efficiency of the health care system. The study aimed to assess clinical features and nutritional patterns inanapparently healthy pediatric age group.

Methods: The study was a descriptive cross-sectional design carried out among school children aged 6 to 12 years. A multi-stage sampling method was used. A semi-structured questionnaire was used for sociodemographic data. Physical examination for signs of malnutrition and anthropometry was done. Feeding patterns and types of meals were recorded. The WHO growth charts and BMI-for-age charts were used to compute Z-score (weight-for-age, height-for-age and BMI-for-age) and classify children into levels of nutritional status. Data were analyzed using SPSS version 21 and p-value < 0.05.

Results: It was observed that 47% of children were from a <4 family size, with the majority belonging to the middle socio-economic class. The majority had normal height and weight, while 8.8% were stunted and 4.3% were underweight. On a daily basis, 95% of the children feed 3 to 4 times and 91% consume essential nutritional diets.26.3% of the children had a persistent cough, 14.5% had persistent diarrhea, 14% had fever, 10.3% had abdominal pain, and 3.8% were on routine medications.

Conclusion: This study showed that most of the children had normal height and weight and their feeding pattern was adequate, although some were stunted and underweight and had disease symptoms. The fact that they appear healthy and are not present in the hospital does not suggest theabsence of diseases. It is therefore important to do regular checkups for these children so as to monitor their growth, improve their health and prevent diseases.

Keywords: clinical symptoms, child nutrition, nutritional deficiency, nutritional status, feeding pattern

Introduction

In developing countries, poor nutrition is associated with morethan 41% of childhood deaths annually[1] and about 30% of these children suffer from micronutrient deficiencies[2] which can be attributed to poor nutrition and feeding patterns. This is considered a major risk factor for child survival in Nigeria, increasing the risk of death from common diseases such as upper/lower respiratory tract infections, diarrhea disease, pneumonia, and measles among others.[3]

Globally, nutritional status is considered the best indicator of the well-being of young children.[4] It does not only directly reflect the socioeconomic status of the family or social well-being of the community but also, the efficiency of the health care system and the influence of the surrounding environment.[5] Annually, about one million Nigerian children die before their fifth birthday[6] and malnutrition contributes to more than half of these deaths,[7] making the country the second largest contributor to the under-five mortality rate in the world.[8]

Wasting, stunting and underweight are expressions of undernutrition and the anthropometric indicators for the assessment of a child's nutritional status. Such children have poor physical growth and brain development,[9] preventing them from thriving and living up to their full potential. Most children consume nutrient-poor foods like unhealthy snacks and beverages and refuse to take green leafy vegetables and fruits rich in nutrients. Eating foods rich in fibres and cereals, which constitute most of their diets, inhibitsthe absorption of nutritional elements from the intestine resulting in poor growth, overall well-being and predisposition to various childhood diseases.

Nigeria has the second highest burden of stunted children in the world with an estimated 2 million children suffering from severe acute malnutrition. TheReport also showed that 37% of children aged 6-59 months were stunted, 7% were wasted and 22% were underweightwith wide variations in these indices across states and geopolitical zones.[10] In Oyo state, 34.5% and 14.2% of children under-5 were stunted and severely stunted respectively: highest in southwest Nigeria. These children are unlikely to reach their full intellectual, social and economic potentials.[10]

However, food fortification has reduced significantly these deficiencies in the developed world but they still remain a significant cause of morbidity in developing countries like Nigeria.[11]Therefore, this study aimed to assess nutritional status, feeding patterns and prevailing clinical features among apparently healthy pediatric age groups in this study area.

Methods

Study Design

This study was a descriptive cross-sectional design carried out among approximately four hundred primary schools in OgbomosoNorth Local Government Area of Oyo State, South Western Nigeria. The local government is one of the 33 in the State with headquarters in Ogbomoso town. It has an area of 187.36km² and a population of 198,859 inhabitants according to the 2006 census.[12]Ogbomoso North Local Government Area is one of the five local government areas under Ogbomoso Educational Zone.

Comment [RR1]: Mentioned region is southwest in the title, deviation to region, confusing statement?

Study Procedure

Multi-stage sampling method was used. All apparently healthy children aged 6 to 12 years in Primary (public and private) schools were recruited. There are 88 registered private and public primary schools in Ogbomoso North Local Government Area with 61 of them being private primary schools and 27 public primary schools in a ratio of 2:1. Ten percent (10%) each of the total schools in both private and public schools were selected in order to have a good representation and reasonable number of respondents from each school. Therefore, six (6) private schools and three (3) public schools were proportionately selected.The desired sample size was selected by proportional allocation of respondents from different classes in the selected public and private schools.

Height and weight Measurements

These were measured according to standard techniques. A portable Prestige Stadiometer (Seca 213, Columbia, MD, USA) was used for height measurement. Body mass index was calculated using the weight and the height as; Weight (kg)/Height^2 (m^2)[13]

The WHO growth charts and BMI-for-age charts were used to compute Z-score (weight-for-age, height-for-age and BMI-for-age) according to the WHO reference standard (WHO, 2007)[14]. These charts were used to convert raw anthropometric data (weight, height and age of the children) into an anthropometric Z-score used to classify children into levels of nutritional status (stunting, underweight, overweight and obesity). Stunting and underweight were calculated as height- for- age and weight- for- age Z- score below - 2 Z-score respectively, while overweight was BMI-for-age>2 Z-score and obesity was BMI-for-age >3 Z-score (5-19years).

Physical examination

This was carried out on each child for signs of malnutrition including dryness of the skin or dermatosis, hair loss, whitish discolouration of the nailbed, and angular stomatitisand evidence of clinical symptomatology.

Data Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 21 (International Business Machine Corporation (IBM) licensed SPSS). Data collected on the questionnaire were entered using numerical codes. Summary statistics entailed the use of

frequency, percentages, and graphical representation in the analysis of categorical variables such as sex, religion, ethnicity, family type etc. while means and standard deviation of continuous variables were obtained. All decisions were made at 95% confidence level and p at < 0.05.

Results

A total of 400 primary school children aged 6 to 12 years were recruited with a mean age of 8.35 ± 1.61. There was a female preponderance with a male to female ratio of 1:1.3. 79.3% children were from monogamous families, 15.2% from polygamous families and 5.5% had single parents. Forty-seven percent were from a family size with fewer than 4 persons, 39.7% with 4 to 6 persons, while 12.8% had a family size of 7 and above. 42.7% children belong to high socio-economic class, 44% were in middle socio-economic class, and 13.3% were in low socio-economic class. (Table I).

Table I: Socio-demographic characteristics of the study population.

Variables	No of children	Percentage (%)
Age (years)		
< 8	124	31.0
8 to 10	232	58.0
> 10	44	11.0
Mean (SD)		8.35 (±1.61)
Sex	188	47.0
Male	212	53.0
Female		
	225	56.3
Religion	171	42.7
Christianity	2	0.5
Islam	2	0.5
Traditional		
Others	375	93.7
	12	3.0
Ethnicity	10	2.5
Yoruba	3	0.8
Igbo		
Hausa	317	79.3
Others	61	15.2
Family type	22	5.5
Monogamy		
Polygamy	190	47.5
Single parents	159	39.7
Family size	51	12.8
< 4		
4 to 6	171	42.7
7 and above	176	44.0
Socio-economic class	53	13.3
High		
Middle		
Low		

The mean weight was 25.71 ± 6.61kg, (range of 13.10 to 53.0kg) whilst the mean height was 125.88 ± 11.22cm (range 95.0cm to 149.0cm). Eighty-six percent (86.7%) of the children had normal height, 8.8% were stunted and 4.5% had height above +2 Z - score. Three hundred and sixty-eight (92%) children had normal weight, 4.3% were underweight, 2% were obese and 1.8% were overweight (Table II)

Table II: Anthropometric indices of the study subjects

Parameters	No of children	Percentage (%)
Height-for-Age (n = 400)		
Stunting	35	8.8
Normal	347	86.7
Above +2 Z-score	18	4.5
BMI-for-Age (n = 400)		
Underweight	17	4.3
Normal	368	92.0
Overweight	7	1.8
Obese	8	2.0

Twenty six percent (26.3%) of the children had persistent cough, 14.5% had persistent diarrhoea, 14% had fever, abdominal pain in 10.3%, behavioral change in 9%, frequent passage of urine in 8% and 7.5% each had reduced urine output and body rash. About 3.3% of the children required oral mastication of food by their mother before being fed and 3.8% were on routine medications especially haematinics(Table III).

Table III: Clinical symptoms in the study population.

History	No of children	Percentage (%)
Persistent cough	105	26.3
Fever	56	14
Abdominal swelling or pain	41	10.3
Change in behavior	36	9
Frequent passage of urine	32	8
Vomiting	31	7.8
Reduced urine volume	30	7.5
Body rashes and skin peeling	30	7.5
Passage of watery stools	25	6.3
Easy fatigability	25	6.3
Generalized body swelling	19	4.8
Prolonged persistent / chronic diarrhoea	18	14.5
Pain during passage of urine	18	4.5
Passage of dark brown urine	17	4.3
Child on routine medication	15	3.8
Oral mastication of food by mother	13	3.3

Frequent yellowness of the eyes	11	2.8
Significant loss of hair	11	2.8
Previous blood transfusion	10	2.5
Types of medication		
Haematinics	14	3.5
Antimalaria	1	0.3

On a daily basis, 95% of the children feed 3 to 4 times, 3% feed 5 times or more, whilst 2% do not feed up to 3 times. Sixty eight percent of these children eat in between meals.
Over 91% of the study population consumesmilk, fish, meat and green leafy vegetables. Seventy seven percent consume meat and fish frequently, 45.8% of the children consume milk regularly whilst 58.3% often eat green leafy vegetables. Further, only 4% of the children were on haematinics. (**Table IV)**

Table IV: Feeding practices and intake of supplements among the children studied.

Practices	**No of children**	**Percentage (%)**
No of meals per day		
< 3 times	8	2.0
3 to 4 times	380	95.0
5 times and above	12	3.0
Consumption of milk		
Yes	367	91.8
No	33	8.3
Frequency of milk consumption		
Always (More than once/day)	25	6.8
Often (daily)	143	39.0
Sometimes (2 to 3 times per week)	134	36.5
Seldom	65	17.7
Consumption of meat/fish		
Yes	395	98.8
No	5	1.3
Frequency of meat/fish consumption		
Always (More than once/day)	76	19.2
Often (Daily)	229	58.0
Sometimes (2 to 3 times per week)	66	16.7
Seldom	24	6.1
Consumption of green leafy vegetables/fruit		
Yes	395	98.8
No	5	1.2

Frequency of green leafy vegetables/fruit		
Always (More than once / day)	39	9.9
Often (Daily)	191	48.4
Sometimes (2 to 3 times per week)	100	25.3
Seldom	65	16.4
In-between meals		
Yes	271	67.8
No	124	31.0
Child on blood supplementation		
Yes	16	4.0
No	384	96.0

Figure 1, 2 and 3 depict the commonly eaten food among the study population. The staple food is mainly carbohydrate. Spaghetti, rice, yam, bread and beans are common for breakfast while cassava based diet (amala and garri, usually eaten with okra soup and vegetables) and rice were normally eaten at lunch and dinner.

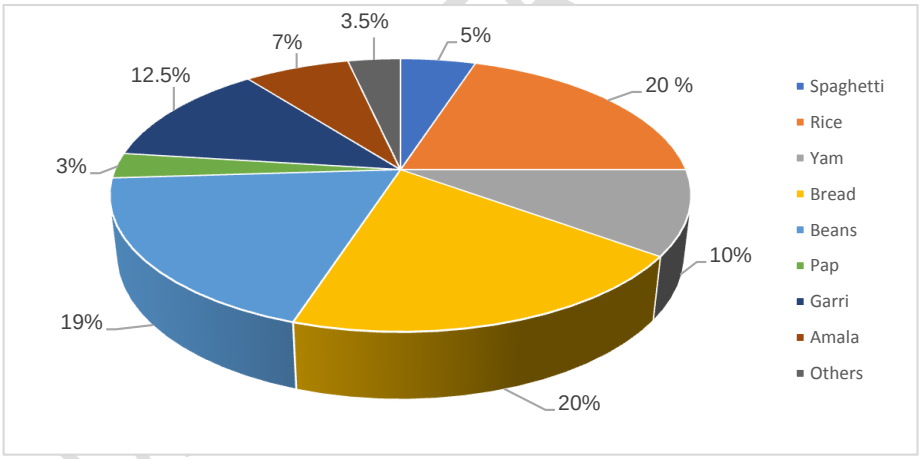

Figure 1: Distribution of common foods taken at breakfast
*Other meals include Potato, Cornmeal, Corn flakes, Noodles.

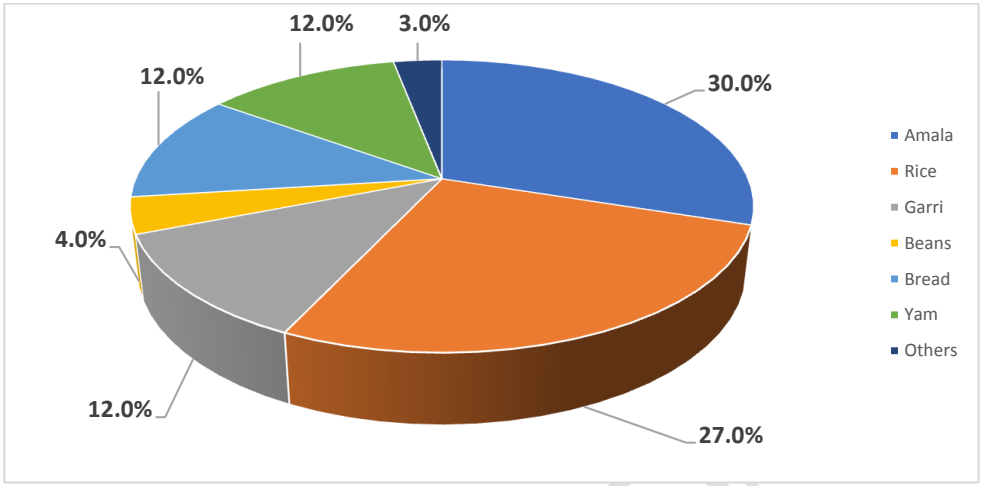

Figure 2: Distribution of common foods taken at lunch
*Other meals include Semovita, Pounded Yam, and Solid pap

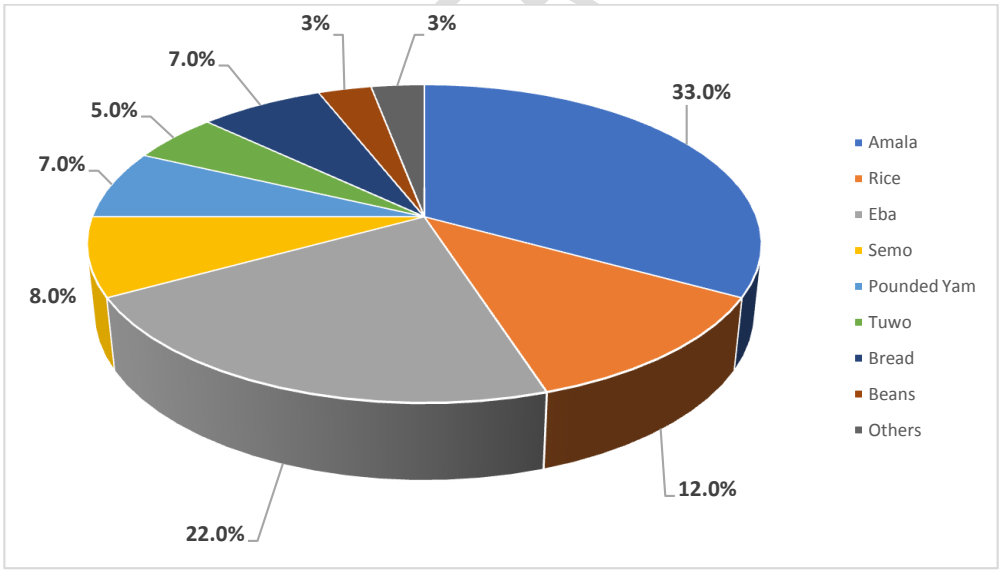

Figure 3: Distribution of common foods taken at dinner

Discussion

A total of 400 primary school children aged 6 to 12 years were recruited with a mean age of 8.35 ± 1.61. There was a female preponderance with a male-to-female ratio of 1:1.3. The majority of children were from monogamous families. It was observed that the majority were from a family size with fewer than 4 persons, while 12.8% had a family size of 7 and above. The majority of children belong to the high socio-economic class, and 13.3% were in the low socio-economic class.

Family size is significantly associated with malnutrition status; wasting, stunting and underweight.As family size increases malnutrition status increases, and the reason is that with familiesincreasing size, resources become scarce, and less nutrition and carefor children are reduced.[15]Community-level socioeconomic factors play a crucial role in the prevalence and incidence of malnutrition. Even currently, malnutrition is still emerging as a severe community health and for a long time recognized as a consequence of poverty. Children from low socioeconomic household status are 2.5 times more vulnerable to malnutrition than middle or upper socioeconomic household status.[16]

Also, the majority of children in this study had normal height, however, 8.8% were stunted and 4.5% had a height above +2 Z - score. Furthermore, the majority had normal weight, 4.3% were underweight, 2% were obese and 1.8% were overweight. Moreso, the majority had normal height-for-age Z-score (HAZ) and BMI-for-age Z-scores (BMIZ) respectively. The prevalence of stunting and underweight were 8.8% and 4.3% respectively. These findings are comforting compared to thereport from a meta-analysis which assessed the nutritional status of children in regional rural Nigeria in which results showed that 38.9%, 38.1%, and 10.6% of the rural children were stunted, underweight, and wasting, respectively, while only 12.5% were well-nourished.[17]

The prevalence of stunting is higher than that of underweight in our study, pointing to the likelihood that the major problem is chronic malnutrition and these prevalence rates are lower than findings from previous studies[11,17,18] where higher prevalence rates for stunting and underweight were recorded. The difference in the prevalence rates might be attributable to inadequate intake of nutrients and geographical location, as most of those study populations were from rural areas with low socioeconomic status.

However, in spite of the fact that the majority of the children who participated in this study were apparently healthy, 26% had a persistent cough, 14.5% had persistent diarrhoea, 14% had fever, 10.3%, had abdominal pain,7.5-8% had urinary symptoms and body rash. Moreover, 3.8% were on routine medications, especially haematinics. These clinical symptomatologies are features of salient diseases which are either poorly treated or remain undiagnosed probably due to the poor socioeconomic status of parents or the overall nutritional status of the children.

On a daily basis, the majority of the children feed 3 to 4 times, 3% feed 5 times or more, whilst 2% do not feed up to 3 times. More than half of these children eat in between meals. The majority of the study population consumes milk, fish, meat and green leafy vegetables frequently, while only 4% of the children were on oral haematinics. This study also demonstrated

Comment [RR2]: Please specify in % of participants had need of admission to hospitals to check recurrence,
In this study awareness of nutritious food, the importance of hygiene should be focused to prevent disease in near future and preserve their health,

the commonly eaten food among the study population. The staple food is mainly carbohydrates. Spaghetti, rice, yam, bread and beans are common for breakfast while a cassava-based diet (amala and garri, usually eaten with okra soup and vegetables) and rice were normally eaten at lunch and dinner. It is believed that these differences in feeding patterns resulted from a low standard of living, low purchasing ability and poor availability of avariety of food in this part of the country, all of which have an effect on feeding practices. Although there is a paucity of data on food variety and consumption in this environment, however, higher vulnerability to food insecurity is associated with households' lower socioeconomic status because nutritious food affordability is closely associated with purchasing power. Households facing limitations in social and economic development most probably face issues in physical growth due to the consumption of poor food variety and inadequate access to safe water.[15]

Although this study demonstrated a low prevalence rate of stunting and underweight, it was observed that most of the children in the categories could be suffering from long-term chronic malnutrition, which negatively affects both mental and physical improvements in childhood. Decreasing food purchasing ability, dietary changes and low social status as well as infectious diseases may have a role in the nutritional status of these children.

In developing countries, bio-fortification could focus on improving the quality of coarse cereals and fodders along with community participatory approaches to enhance agricultural biodiversity. This approach could contribute to reducing malnutrition and poverty, reducing food insecurity and improving sustainability, though further research is needed in this domain.[10]

Conclusion

The study demonstrated a low prevalence rate of stunting and underweight compared to reports from similar studies. But the prevalence of stunting is still higher than other forms of malnutrition in our study pointing to its chronicity. These children also had features of salient diseases despite the fact that they appear healthy and did not present in the hospital, and the feeding pattern of themajority although adequate involves eating of carbohydrate-based diet majorly. It is therefore important to counsel the parents on aproper balanced diet and do regular checkups for these children so as to monitor their growth, improve their health and prevent diseases.

Ethical Consideration

Ethical clearance was obtained from the Research and Ethics Committee of LTH, Ogbomoso. Approval was also obtained from Oyo State Ministry of Education and the Headmasters/ Headmistresses of the selected schools.

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