

Research Article

Prevalence of Wasting, Stunting and Obesity in Primary School Children in Aboh Mbaise Local Government Area, Imo State Nigeria

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The present study was designed to study the prevalence of nutritional indicator for malnutrition (stunting, wasting, and obesity) in primary school age children in Aboh Mbaise local Government Area of Imo State Nigeria. A total of 400 primary school children from six randomly selected primary schools, aged between five (5) and sixteen (16) years old were assessed. The WHO 2007 growth reference was used Z- score of <-2 and <-3 were used to identify underweight and severe underweight (in 5 to 9 years old), stunting and severe stunting, wasting, severe wasting, while $>+1$ and $>+2$ was used to identify overweight and obesity respectively. From the result obtained, 4.85% were underweight and 0.65% severely underweight 11.5% was stunted, and 4% were severely stunted 7.5% had wasting and 1.09 had severe wasting; 4.25% had overweight with 2.0% obsessed.

Keywords: Malnutrition; Obesity; Underweight**Introduction**

Since the creation of mankind malnutrition has been one of the greatest challenges facing mankind. This affects all ages with children having the greatest effect. This as observed by De-Onis et al., (2012) is because children have special nutrition needs because of their extensive growth and development [1]. Akubugwo et al., 2016 noted that growth and development is among the most and significant issues of man's life [2]. Also it has been observed that growth and development are influenced by both genetic and environmental factors, the genetic factors are fixed while the environmental factors can be controlled of the environmental factors nutrition plays a key role [3-5].

To asses adequate nutrition in a given population, child growth is universally used because it gives an estimate of the overall nutritional status and also the health of the population. Measurements of a child's growth provide the Key information for the presence of malnutrition, but weight and height measurements alone can lead to a failure to recognize other disease states like kwashiorkor and thus an underestimation of the severity of malnutrition in children [6]. It is universally accepted that the most commonly employed anthropometric measures of child nutritional status are wasting, underweight, obesity. According to Briend et al., (2015) these nutrition indicators are different in their own ways though closely related since they arise from nutritional causes like malnutrition and under nutrition [7]. They argued that wasting and stunting are both associated with increased mortality especially when both are present in the same child. It has been observed that wasting occurs as a result of short term starvation or malnutrition, stunting is an outcome of long term malnutrition and this is why it is termed chronic and the former acute. Obesity however, results when energy intake exceeds energy expenditure. In the developed world, childhood obesity

has reached epidemic levels while its prevalence is increasing in developing countries of which Nigeria is inclusive. However wasting and stunting seems to be more prevalent in under developed and in developing countries than in developed countries.

Wasting also known as low weight-for-length or thinness is characterized by reduced muscle mass which is often as a result of acute malnutrition and/or starvation. It reflects a recent and substantial weight loss often arising from various factors ranging from acute food shortage, malnutrition and even diseases or infections. It refers to low weight-for-height at $Z<-2$ SD of the median value of the NCHS/ WHO international weight-for-height reference.

Stunting on the other hand is described as low-height-for-age. It is a clinical condition that is characterized by a child's inability to attain the proper linear growth, often as a result of chronic malnutrition or/ and poor health conditions [8]. According to WHO's child growth standards, children are classified stunted when their height-for-age Z-score is less than $-2SD$ from the mean, and children are severely stunted when their Z-score is less than $-3SD$ from the mean [3]. Obesity according to Haslam and James (2005), is described as excess body fat. It means having too much body fat and/or body weight, which could be as a result muscle, bone, fat or body water. It is a medical condition that involves the accumulation of excess body fat such that it may have a negative effect on health, leading to reduce life expectancy and/or increased health [9]. According to WHO, (2015) an individual is classified as obese if the person's BMI is greater than $35\text{kg}/\text{m}^2$ [10].

This work was initiated to estimate the nutritional status of primary school children in Aboh Mbaise, Imo state, Nigeria in relation to nutritional indicators – wasting, stunting and obesity, when compared to internationally accepted growth reference/ standards.

Materials and Methods

Study Location

The study was conducted in Aboh Mbaise L.G.A Imo State. Aboh Mbaise is one of the local government areas in Imo state, Nigeria with its headquarter located in the town of Aboh and a population of about 195, 652 at the 2006 census. The postal code of the area is 462. Its geographical location in Nigeria is 5°27'N, 7°14'E/5.450°N and 7.233°E. The local Government was created in 1976. It has seven communities namely: Mbutu, Uvuru, Enyioyugu, Lorji, Amuzu, Nguru and Iagwa. The major occupation of the inhabitants is subsistence farming, cultivation of yams, cassava, palm fruits, fruits and vegetables. The climate of this locality is south east Nigerian type of altitude with a long rainy season and a short dry season.

Study Population

The study population was the children from Aboh Mbaise Local Government Area, Imo state, Nigeria. A total of four hundred (400) primary school aged children were selected for this study. All the children included for this work are those who were healthy. The ones who were sick or showed signs of sickness were excluded.

Ethical Approval

Before data collection permission was sought from the relevant school authorities. All study participants, parents/guardians gave informed consent before their children/wards were included in the study and the confidentiality of results was observed.

Data Collection

This present study was a descriptive and analytical cross sectional study. It took place in fourteen (14) primary schools. Data was collected by visiting the schools and taking anthropometric data from the children between June and July 2016. Other relevant information such as parent's socioeconomic status, children age, sex, etc was collected using structured pretested questionnaires.

Anthropometric Data

Weight measurement was done using electronic scale (Hanson model). The weight of each individual was taken to the nearest 0.1kg. The subjects were weighed standing erect in minimal clothing without shoes. The scale was checked daily with the same known weight to ensure it's in proper/perfect state before use. Height measurement was done using a 150 cm meter rule. Height measurement was taken with the subject standing erect on bare feet (removing their shoes and stockings). Data on the subject's birth weight as well as age were obtained from the school records.

Dietary Information/ Data

Dietary intake was assessed using a recall and qualitative food frequency questionnaires. Food samples were collected from the children placed in plastic containers and transported in an insulated container with ice to the laboratory for chemical analysis.

Data Analysis

Measurement of height and weight enabled us to determine the indices weight-for-height, height-for-age and body mass index, BMI.

These indices were determined by Z-scores. The overall prevalence rate of malnutrition was obtained by setting the threshold of normality and -2 to -3 Z score below the baseline average and 3 to

Table 1: Anthropometric Measurement Based on Age.

Age (yrs)	SEX	No. In age group	Weight (kg)	Height (cm)	BM 1 (kg/m ²)
5-6	Male	12	20.17±5.22	114.19±10.94	15.41±2.61
	Female	14	19.13±6.10	115.01±10.79	14.19±1.92
	Combined	26	39.30±11.32	229.20±21.73	29.60±4.53
7-8	Male	42	22.95±3.01	122.59±7.50	15.27±1.23
	Female	56	23.27±5.32	123.59±9.19	15.24±2.15
	Combine	98	46.22±8.34	245.76±16.69	30.51±3.59
9-10	Male	50	26.25±3.31	131.81±6.10	15.07±1.23
	Female	60	29.14±6.64	134.72±10.69	15.99±2.56
	Combine	110	55.39±9.95	266.53±16.79	31.06±3.79
11-12	Male	60	33.78±8.41	143.05±8.73	16.46±2.95
	Female	62	34.76±6.79	144.30±9.46	16.57±1.98
	Combine	122	68.54±15.20	287.35±18.19	33.03±4.93
13-14	Male	23	35.61±5.80	144.36±8.96	16.46±2.95
	Female	18	40.78±5.07	153.77±5.81	16.57±1.98
	Combine	41	76.39±10.87	298.13±14.77	32.80±3.75
15-16	Male	2	38.00±7.07	147.0±2.12	17.55±2.75
	Female	1	51.00±0.00	151.4±0.00	22.25±0.00
	Combine	3	89.00±7.07	298.4±2.12	39.80±2.27

2 and Z- score above the reference mean.

The proximate composition of the food samples were determined according to the method described by AOAC 1980 [11].

Statistical analysis

Anthropometric evaluations and cut offs (Z-score) were based on WHO 2007 reference for children and adolescents 5-19 years of age with nutritional indicators of weight-for-height, height-for-age and body mass index-for-age Z-score for male and female children respectively. The WHO Anthroplus software for assessing growth of the world's children adolescents aged 5-19 years (version 1.0.4) was used. Analysis of variance (ANOVA) was used to determine significant difference between treatments, Least Square Difference (LSD) was used to analyse sample means ($p < 0.05$). Also mean, standard deviation from mean and simple percentage were used to show prevalence (Table 1).

From the information above

1. Age group, 11-12 years had the highest frequency of 122
2. The result in the table above shows the anthropometric measurement of children assessed based on their age group (Table 2).

From the result on table 2, based on WHO 2007 reference;

- Age group 5-6 years have the highest prevalence of underweight at 7.695, followed by age 9 at 7.32% and the least, 7-8 years at 3.06%. Severe underweight as seen in age group 5-6 years had a prevalence of 3.85. Age groups 7-8 and 9 year-olds had no prevalence of severe underweight.
- Age group 15-16 years have the highest prevalence of stunting at 33.33%, and severe stunting, followed by age group 13-14 years at 17.07 and 14.63 for stunting and severe stunting respectively.
- Age group 15-16 have the highest prevalence of wasting at 33.33%, followed by age group 13-14 years at 9.76% and the least was observed in age group 7-8 years at 6.12%. Severe wasting on the other hand showed its highest prevalence in age group 5-6 years at 3.85%, followed by age groups 9-10 and 7-8 years at 1.82% and

Table 2: Prevalence of Underweight, Stunting, Wasting, Overweight and Obesity in all 400 Children Assessed, Showing the Various Age Groups.

Nutritional Indicator	Age group (Yrs)	Number Assessed	% Below cut-off		% above cut-off		% At Risk	% Healthy Growth
			< -2	< -3	>+ 2(+ 2)	>+ 3(> + 2)		
BMAZ	5 to 6	26	7.69	3.85	-	7.69	46.15	34.62
	7 to 8	98	3.06	-	1.02	1.02	68.37	26.53
	9	41	7.32	-	-	-	60.98	31.71
	Combine	165	4.85	0.61	1.61	1.82	63.03	29.09
BMAZ	5 – 6	26	11.54	7.69	26.92		15.38	38.46
	7 – 8	98	22.24	1.02	12.27		17.35	56.12
	9 – 10	110	9.09	5.45	10.91		17.27	57.27
	11 – 12	122	10.66	2.46	9.02		27.87	50.00
	13 – 14	41	17.07	14.63	-		36.55	31.02
	15 – 16	3	33.33	33.33	-		33.33	-
Combine	400	11.50	4.00	0.75		22.50	51.25	
BMAZ	5 – 6	26	7.69	3.85	3.85	7.69	34.62	42.31
	7 – 8	98	6.12	1.02	7.14	2.04	21.43	62.24
	9 – 10	110	6.36	1.82	2.73	1.82	30.00	57.27
	11 – 12	122	8.20	-	4.10	1.64	28.69	57.38
	13 – 14	41	9.76	-	-	-	34.15	56.10
	15 – 16	3	33.33	-	-	-	-	66.67
Combine	400	7.50	1.00	4.25	2.00	27.75	57.50	

Table 3: Overall Prevalence of Underweight, Stunting, Wasting and Obesity in all 400 Children Assessed.

Nutritional Indicator	Number assessed	% below cut-off		% above cut-off		% at Risk	% Healthy Growth
		< -2	< -3	>+2	>+3		
WAZ	165	4.85	0.16	0.16	1.82	63.03	29.09
HAZ	400	11.50	4.00	0.75		22.50	51.25
BMAZ	400	7.50	1.00	> + 1	> + 2	27.75	57.50
				4.25	2.00		

1.02% respectively. The rest age groups (13-14 and 15-16) showed no prevalence of severe wasting in children of these age groups.

- Age group 7-8 years had the highest prevalence of overweight at 7.14%, followed by age group 11-12 years at 4.10% and the least on the table is age group 9-10 at 2.73. The rest age group (13-14 and 15-16) showed no prevalence of overweight of children in those age groups.

The highest prevalence of overweight as shown on the table was seen in age group 5-6 years at 34.62%, followed by 13-14 years having a prevalence of 34.15% and the least prevalence seen in age group 7-8 years at 21.43%. Children in age group 15-16 showed no prevalence of obesity (Table 3).

From the result on table 3, based on WHO 2007 reference;

- Age group 5-6 years have the highest prevalence of underweight at 7.69%, followed by age 9 at 7.32% and the least, 7-8 years at 3.06%. Severe underweight as seen in age group 5-6 years had a prevalence of 3.85. Age groups 7-8 and 9 year-olds had no prevalence of severe underweight.

- Age group 15-16 years have the highest prevalence of stunting at 33.33%, and severe stunting, followed by age group 13-14 years at 17.07 and 14.63 for stunting and severe stunting respectively.

- Age group 15-16 have the highest prevalence of wasting at 33.33%, followed by age group 13-14 years at 9.76% and the least was observed in age group 7-8 years at 6.12%. Severe wasting on the other hand showed its highest prevalence in age group 5-6 years

at 3.85%, followed by age groups 9-10 and 7-8 years at 1.82% and 1.02% respectively. The rest age groups (13-14 and 15-16) showed no prevalence of severe wasting in children of these age groups.

- Age group 7-8 years had the highest prevalence of overweight at 7.14%, followed by age group 11-12 years at 4.10% and the least on the table is age group 9-10 at 2.73. The rest age group (13-14 and 15-16) showed no prevalence of overweight of children in those age groups.

The highest prevalence of overweight as shown on the table was seen in age group 5-6 years at 34.62%, followed by 13-14 years having a prevalence of 34.15% and the least prevalence seen in age group 7-8 years at 21.43%. Children in age group 15-16 showed no prevalence of obesity.

Based on WHO, 2007 reference, table 19 above indicators that;

- Out of 165 Children Assessed, 4.85% were underweight, 0.61% were severely underweight, 63.03% were a Risk of being underweight and 29.09% had healthy weight.

- Out of 400 children assessed, 11.50% were stunted, 4.00% were severely stunted, 0.75% were tall, 22.50% were at risk of having stunted growth and 51.25% had healthy linear growth.

- For wasting, 7.50% of 400 children assessed had low BMI-for-age (wasted) and 1.00% were severely wasted.

- For overweight, 4.25% Of 400 children assessed were overweight

Table 4: Overall Prevalence of Underweight, Stunting, Wasting, Overweight and Obesity in all 400 Children assessed, based on Parents Educational Attainment.

Nutritional Indicator	Number Assessed	Educational Attainment	Mean Z-score \pm SD		% below cut-off		% above cut-off	
			Father	Mother	Father	Mother	Father	Mother
BMIAZ	165	None	-4.13 \pm 6.14	-3.88 \pm 4.38	25	-	-	-
		O' level	-4.10 \pm 6.78	-4.79 \pm 5.86	24.44	38.55	-	-
		1 st degree	-3.50 \pm 6.70	-1.47 \pm 3.91	120.00	70.00	-	-
		Post graduate	-0.97 \pm 3.02	-2.79 \pm 2.09	-	-	-	-
BMAIZ	400	None	-6.79 \pm 12.83	-8.45 \pm 11.18	140.07	202.14	-	-
		O' level	-6.99 \pm 15.08	-8.77 \pm 14.84	201.64	242.13	-	-
		1 st degree	-1.72 \pm 9.58	-4.84 \pm 7.08	159.68	145.00	-	-
		Post graduate	-4.07 \pm 8.70	-1.73 \pm 5.45	121.98	114.29	-	-
BMIAZ	400	None	-9.21 \pm 10.32	-6.87 \pm 8.70	119.15	90.50	22.22	23.38
		O' level	-6.79 \pm 11.50	-8.30 \pm 11.36	86.55	200.00	62.97	63.42
		1 st degree	-10.56 \pm 9.25	-3.37 \pm 6.71	122.22	12.50	34.29	71.07
		Post graduate	-1.70 \pm 5.84	-0.33 \pm 3.72	7.69	12.50	73.08	79.17

- For obesity, 2.00% of 400 children assessed were obese.
- However, 27.25% of the 400 children assessed showed risk of being wasted, while 57.50% had healthy weight (Table 4).

From the table 4 above:

Children of first degree fathers and Mothers had the highest prevalence of underweight at 120% and 70% respectively, followed by children of parents with no educational attainment for fathers and 29% and 38.55% for o' level parent's mothers. In both cases, children of post graduate parents showed no prevalence of underweight. Children of O' level parents had the prevalence of stunting at 201.64% and 242.13% for fathers and mothers respectively, followed by children of first degree father at 159.14% respectively. The least prevalence of stunting was seen in children of Post-graduate parents at 121.28% and 114.29% for fathers and mothers respectively.

Children of first degree fathers and O' level mothers showed the highest prevalence of wasting at 122.225% and 200% respectively, followed by children of parents with no educational attainment at 119.15% and 90.50% respectively, representing fathers and mother. Children of post-graduate parents showed the least prevalence of wasting and 7.69% and 12.50% for father and mothers respectively, including children of first degree mothers at 12.50%.

Also, children of post-graduates parents had the highest prevalence of overweight at 73.08% and 79.17% for fathers and mothers respectively, followed by children of O' level fathers at 62.97% and children of first degree mothers at 71.07%. The least was seen in children of parents with no educational attainment (i.e. father and mother) at 22.22% and 23.285 for father and mother respectively.

Discussion

This study provides information on the nutritional status and food pattern of primary school children in Aboh Mbaize, Imo state Nigeria. Data obtained from this study confirmed the presence of malnutrition in Aboh Mbaize.

Underweight

In this study underweight prevalence was examined among one hundred and sixty five (165) children between 5-9 years of age with 4.85% being underweight, 0.16% severely underweight.

This result is lower compared to the assessment carried out by

UNICEF in 2007 which stated that Imo state had an underweight prevalence of 10.4%, (Nigeria UNICEF, 2007). This decrease in underweight prevalence observed could be attributed to good and improved nutrition of young children in the study.

Furthermore, parents educational attainment contributed to the prevalence level observed in the study. It has been reported by Akubugwo et al.,(2016) that the level of literacy, income and occupation of a household is an important determinant of a child's nutrition and wellbeing. Also studies by Manshid (2005) have established that the purchasing power of a family dictates the level of household food security and types of diets that are ultimately consumed by household members.

Stunting

Stunting also referred to as low height-for-age. In this study 11.5% of the total population studied (400) were stunted with 4% severely stunted. This prevalence is lower than that observed in Imo state of children of the same age group, 23.5% by Nigeria- UNICEF. The prevalence of stunting was more in female children 10.43% and severe stunting was more in female 4.27% than in males 3.70%.

The highest prevalence of stunting was seen in age group 15-16 had prevalence of stunting at 33.33% and severe stunting at 33.33%. Also age group 13-14 had prevalence of 17.0% and severe stunting of 14.64%. This could be due to pubertal period as it has been reported that females grow more than their male counterparts at the onset of puberty.

Wasting

Wasting also known as low weight- for-height or low body mass index- for- age. The present study revealed a total wasting prevalence of 8.5%, with 7.50% being wasted and 1.0% severely wasted. The observed prevalence is lower than the National prevalence of wasting in Nigeria and also that of Imo state which are 14% and 11.9% respectively (NDHS, 2008; UNICEF (2015) [12,13]. This decrease could be as a result of improvement in the nutrition of children in the study area as our findings showed that most of school children come to school with snacks and food packs which was not the norm before now.

The highest prevalence of wasting was seen among 15-16 years old 33.33% followed by 13-14 years old at 9.76% both age groups

having no evidence of severe wasting. This was observation mainly seen among the female children screened. This could be as a result of the recent trend of young females having a trimmed shape, thereby losing some weight as some confirmed that even though they came to school with food pack, they fail to eat the food just to avoid adding weight.

Obesity/Overweight

This is commonly referred to as high weight for height or high BMI- for- age. In this present study, the prevalence of overweight among the 400 children studied is 4.25% with 2% being obsessed.

Age group 13-14 years and 15-16 years showed no prevalence of overweight and obesity while age groups 5-6 years and 7-8 years showed the highest prevalence of obesity and overweight at 7.69% and 7.14% respectively. The least prevalence of overweight was seen in 9-10 years old at 2.73%. This observation is higher than that observed by Nigeria, UNICEF (2007) [14], which is placed at 2%. This could be due to an increase in availability and affordability of food products in Nigeria within the period of study.

Conclusion

The present study assessed nutritional status of primary school children from Aboh Mbaise Local Government Area of Imo State Nigeria. There was prevalence for all the nutritional indicators assessed. 4.85% of 165 children assessed were underweight and 0.61% was severely underweight. Of all 400 children assessed 11.50% were stunted with 4% being severely stunted. Also 7.50% of all 400 children assessed had wasting, with 1% being severely wasted; while 4.25% of all 400 children assessed were overweight and 2.0% obsessed.

The result showed that parent's educational attainment has a significant role in the healthy growth of children. This is based on the fact that parent's educational attainment showed observable differences in nutritional indicators of the children assessed.

References

1. De-Onis M, Blossner M, Borghi E. Prevalence and trends of stunting among pre-school children, 1990-2020. *Public Health Nutr.* 2012; 15: 142-148.

2. Akubugwo E.I, Obi I.K and Osuocha K.U Assesment of Nutritional status of Pre-school Age children in Abia North District Nigeria. *Int J. nutria sci.* 2016; 1: 1001-1006.
3. Cogil B. Anthropometric indicators measurement guide. Food and Nutrition technical assistance project Academy for Educational development Washington D.C. 2003; 2-11.
4. Akubugwo EI, Okafor IN, Ezebwio FC, Nwaka AC. and Okafor SO. Prevalence of stunting amongst pre-school age children from selected towns in Anambra south senatorial zone. *Int. J life sci. Bio phama res.* 2013; 2: 127-136.
5. Chartage A and Saha S. A study on knowledge and practice of mothers regarding infant feeding and nutritional status of under-five children attending immunization clinic of a medical college. *Int J Nutri wellness.* 2007; 5: 292-319.
6. Christopher D, John B, Watkins IN and Atan C. Nutrition in pediatrics in basic science clinical application. Deiker B.S. Humilton. 2008: 127-141.
7. Brined A, Khara T, and Dolan C. Wasting and stunting, similarities and differences: Policy and programmatic implications. *Food and Nutrition Bulletin.* 2015; 36: 15-23.
8. Manshid D, Noori AD and Anwar TM. Childhood obesity, prevalence and prevention. *Nutrition Journal.* 2005; 4: 24.
9. Haslam DN and James WP. Diastolic Dysfunction and Left Ventricle Remodeling in Men with Impaired Fasting Glucose. *Obesity. Lancet Review.* 2005; 366: 1197-1209.
10. World Health Organization. Global Database on child growth and malnutrition: Description: child indicators and their interpretation. Geneva. 2015.
11. AOAC. Official methods of Analysis. Association of official analytical chemistry 15th edition. 1-50.
12. Nigeria Demographic and Health survey. Federal office of statistics Lagos, Nigeria ORC macro, Calverton Maryland U.S.A. 2008.
13. WWW. Unicef.org/ socialpolicy/files/Nigeria. Retrieved. 04-11-2015.
14. Nigeria Postal Services, NIPOST. Post offices with map of L.G.A NIPOST, Nigeria- UNICEF Global study on child poverty and disparities. 2007.