PREVALENCE OF MALNUTRITION AND UNDERWEIGHT AMONG SCHOOL BOYS IN OGBALGA BAYELSA STATE, NIGERIA

Abstract

Aim: This study assess the prevalence of malnutrition and underweight among school boys in Ogbia LGA, Bayelsa state. **Methods:**The was a cross sectional study consisting of 250 school boys within the ages of 5-10yrs selected randomly from five communities during school period. Data were obtained using weight scale balance calibrated in (kg), metre rule (m), muac tape (cm) and well-structured questionnaire. The weight for age, height for age, MUAC and BMI methods used in this study was in accordance with WHO, IAP and NCHS classification. Results from this study shows a significant difference (<0.05) between the weight , height and BMI of school boys in Ogbia, Oloibiri/Otuogidi when compared with Otuabagi/otuakeme. Themuac mean value for the entire age 5-10yrs in Ogbia axis was 17cm compared with Otuabagi axis of 16cm with no significant p-value observed. Carbohydrate (56.8%) dietary food was mostly consumed regularly in comparison with carbohydrate/protein (32%), protein (8%) and vegetable/vitamins (3.2%) among the children. More so 78.4% of the study population have not been deworm for the past over 3months and above. However 21.6% of the study population are deworm within 3month intervals. This study further observe 41.6% among the children as underweight falling below the 1st percentile level with just 13.2% in the median green line zone having normal weight in both communities. However 15.2% are within the 97th percentile while 1.6% are above this zone. The weight for age regarding PEM classification shows 55.89% and 0.74% children suffering from severe and very severe malnutrition in Ogbia, Oloibiri/Otuogidi though 32.37% are PEM free compared with 66.68% normal children in Otuabagi/otuakeme, however 28.07% and 1.75% are suffering from severe and very severe cases of malnutrition in the just two mention communities above .**Conclusion:** The combination of the entire percentages from the different communities considered in this study shows 1.2% and 43.2% prevalence rate of very severe and severe malnutrition compare with 48% PEM free among boys in Ogbalga while 44% and 16.8% are underweight and overweight/obese compared with 13.2% on the green median zone of normal weight for age. Intervention strategies that include appropriate children feeding with micronutrients should be implemented to reduce the burden of under nutrition in addition to effective regular deworming to help reduce the burden of weight deficit among children in the state.

Keywords: Malnutrition, PEM, Weight, Height, BMI, MUAC

Comment [SAS1]: Define the abbreviation MUAC

Comment [SAS2]: Explain abbreviation NCHS

Comment [SAS3]: Results start with out Heading

INTRODUCTION

Comment [SAS4]: Uniform the writing pattern as prescribed by journal

Malnutrition is the imbalance of essential nutrient-intake or reduction in the utilization of nutrients needed by the body to carry out normal physiological function. This is a global issue affecting millions of children in both rural and urban environment worldwide. Malnutrition includes under nutrition ie insufficient protein and micro-nutrients in diet result in weight deficit, stunting (ht for –age), wasting (wt-for ht) and over nutrition that usually leads to overweight and obesity

(Ahmed et al., 2013).The FAO reported in 2023 that 9.2% of world population are undernourished with Africa having a prevalence rate of 19.7% in 2022. Citizens of countries with inadequate food supply has high rate of PEM and risk of developing infections that may be life threating in later life (Shilpa & Frank, 2023).

Malnutrition endanger the survival, development and growth of children. Among these micronutrients deficiencies are vitamin A, iodine, iron, and zinc (Aamer*et al*., 2012).Nutritional deficiencies is on the increase in poor countries with associated risk factors such as poverty, low educational level, food insecurity, lack of medical awareness, environmental pollution, infections etc. About 50% of pediatric morbidity and mortality in sub-Saharan Africa is linked to malnutrition that lead to chronic disease development during adulthood (Mao *et al*., 2024).

Malnutrition related to various diseases in a public health concern and should be prioritized in Nigeria and among state governors. Studies have shown that most admitted community children is due to inability of meeting daily energy requirement of protein and micronutrient. Several conferences have been held by the ESCNM directing attention on malnutrition consequences with captions such as fight against malnutrition in Warsaw 2011 to enlighten the general public in other to raise nutrition awareness into daily practice (Stanislaw *et al*., 2014). The existence and continuation of the human raise depend on the balance of dietary intake of dietary food from childhood to adulthood. Physiological role of food is classify into carbohydrates as energy giving food, protein as body building and repair of worn out tissues, vitamins protect and regulate body activities like temperature, blood clot, waste removal etc (Gbaey, *et al*., 2009; Deaton, 2009; Natasha, 2014).

The excellent performance of children in school depend on healthy dietary intake to a greater extent including culture and environmental psychological wellbeing. The intake of regular dietary food in their balance proportion will go a long way to improve the body's ability to fight against various illness and improve life expectancy. However body weight alone without other body variables measured can be misleading because tall children are generally heavier than short. Body mass index is a useful parameter in addition to weight change however increase in BMI percentile according to WHO and CDC shows that alteration in BMI level among children are associated with high risk of obesity in later life (Indumathi*et al.,* 2017).Substantial burden of malnutrition among children in Nigeria is approximately 32% with an estimate of two million being afflicted with severe

acute malnutrition. Several factors such as parent's inability to access health facilities, poverty and low educational level have contributed immensely to the increase of malnutrition among children (Patricia *et al.*, 2024).

MATERALS AND METHODS

Study Design: This study employed a cross-sectional method with the ultimate goal of assessing the nutritional status of school boys between the ages of 5-10yrs in ogbia LGA.

Study Population: The population study of 250 boys was drawn from nursery/primary schools located in ogbia, Oloibiri, Otuogidi, Otuabagi and otuakeme communities using a random sampling method.

Data Collection / Instrument: Structured questionnaire was used to obtain information regarding the age, diet, consistency in deworming, parents occupation/ educational level, weight, height, BMI, MUAC etc from the children.

MUAC: The upper arm circumference was measured using the muac tape comprising red, yellow and green section calibrated in cm after the folding of the hand portion of their cloths to the proximal region of the deltoid muscle.

Weight: Shoes and objects in their pockets were removed by the participants before taking each individual weight using bathroom scale balance made in China with the pointer adjusted to the zero mark level. The scale was placed on a level plain surface and is calibrated in kilograms.

Height: The height was taking with a metre rule calibrated in metres with no shoes worn and a ruler for leveling of hair at the vertex for accurate measurement.

Consent: Ethical approval was granted by the institution and official permission was also sorted out from directors in-charge of the schools visited.

Body Mass Index: The BMI was analyzed using the squares of the height in metres to divide the weight in kilograms.

Weight for-Age: This was determine using the WHO standard normal weight to divide weight of study population and then multiplied by 100.

Inclusion Criteria: Only school boys that have resided within Ogbia LGA consistently for the past three years and fall into the category of age 5-10yrs were recruited for this study.

Exclusion Criteria: School girls**,** boys residing outside Ogbia LGA and below 5yrs and above 10yrs were excluded from this study.

Statistical Analysis: This was done using excel and spss version 23.0.

RESULTS AND DISCUSSION

Table 1: Age and Frequency Distribution of the Study Population According to Communities

Communities	5yrs. N (%)	6yrs N (%)	7yrs N (%)	8yrs N (%)	9yrs N (%)	10yrs N (%)	Total N (%)
Ogbia	30(12)	15(6)	2(0.8)	1(0.4)	-	1(0.4)	52(20.8)
Oloibiri	34(13.6)	14(5.6)	2(0.84)	1(0.4)	-	-	52(20.8)
Otuogidi	20(8)	14(5.6)	1(0.4)	1(0.4)	-	-	42(16.8)
Otuabagi	48(19.2)	14(5.6)	4(1.6)	-	2(0.57)	-	67(2.4)
Otuakeme	36(14.4)	6(2.4)	2(0.8)	-	-	2(0.57)	37(14.8)
Aggregate							250(100)

Boys within the ages of five years make up the highest percentage of the study population.

Table 2: Anthropometric Indices of the study population

Parameters	Ogbia-Oloibiri	Otuabagi-Otuakeme	Mean diff	t	Degree of freedom	p-value
Weight(kg)	17.56±6.90	19.93±5.78	-2.37	-2.04	124	0.03
Height(m)	1.23±0.16	1.22±0.15	0.01	-2.10	121	0.02
BMI(kg/m²)	11.69±4.31	14.22±8.59	-2.53	0.23	124	0.02
Muac (cm)	17±0.11	16±0.01	1	0.23	114	0.72

P-value <0.05 is considered significant

Comment [SAS5]: Explain the statistical test significance and value highlight with *

Table 3: Percentile Weight for Age Boys - Ogbia, Oloibiri and Otuogidi

Age (yrs:month)	<1st N (%)	3rd N (%)	15th N (%)	Median N (%)	85th N (%)	97th N (%0	>97th N (%)
5:11	42 (30.88)	-	2 (1.47)	6 (4.41)	12 (8.82)	20 (14.71)	2 (1.47)
6:11	28	-	-	5	10	-	-

	(20.58)			(3.68)	(7.35)		
7:11	-	-	-	4 (2.94)	1 (0.74)	-	-
8:11	-	2 (1.47)	1 (0.74)	-	-	-	-
9:11	-	-	-	-	-	-	-
10.0	-	-	1 (0.74)	-	-	-	-

Note: All weight measurement are in kilograms. The prevalence of underweight is 52.93% in these communities when the sum total (%) of 3rd and <1st percentile are included.

Table 4: Percentile Weight for Age Boys - Otuabagi and Otuakeme (kg)

Age (yrs:month)	<1st N (%)	3rd N (%)	15th N (%)	Median N (%)	85th N (%)	97th N (%0	>97th N (%)
5:11	30 (26.32)	-	-	10 (8.78)	24 (21.05)	18 (15.79)	2 (1.75)
6:11	2 (1.75)	-	-	8 (7.02)	10 (8.78)	-	-
7:11	2 (1.75)	-	4 (3.51)	-	-	-	-
8:11	-	-	-	-	-	-	-
9:11	-	2 (1.75)	-	-	-	-	-
10.0	2 (1.75)	-	-	-	-	-	-

Note: All weight measurement are in kilograms. The percentage of children with stunted growth and underweight is 31.37% when 3rd and <1st zone are added. However 17.54% in the red zone and above are overweight/obese

Table 5: Percentile Weight for Age Boys Combined (kg)

Age (yrs:month)	<1st N (%)	3rd N (%)	15th N (%)	Median N (%)	85th N (%)	97th N (%0	>97th N (%)
5:11	72 (28.8)	-	2 (0.8)	16 (6.4)	36 (14.4)	38 (15.2)	4 (1.6)
6:11	30 (12)	-	-	13 (5.2)	20	-	-

					(8)		
7:11	2 (0.8)	-	4 (1.6)	4 (1.6)	1 (0.4)	-	-
8:11	-	2(0.8)	1 (0.4)	-	-	-	-
9:11	-	2 (0.8)	-	-	-	-	-
10.0	2(0.8)	-	1(0.4)	-	-	-	-

Note: All weight measurement are in kilograms. Total prevalence of underweight from the study population is 44% while 16.8% are overweight / obese

Table 6: Height for Age Boys in the Study Population

Age (yrs.)	Ref(m)	Within normal	%	Below normal	%	Aggregate (%)
5	1.08	48	19.2	120	48	168(67.2)
6	1.16	34	13.6	29	11.6	63 (25.2)
7	1.21	2	0.8	9	3.6	11(4.4)
8	1.27	-	-	3	1.2	3(1.2)
9	1.32	-	-	2	0.8	2(0.8)
10	1.38	1	0.4	2	0.8	3(1.2)
Total	Ref.	85	34	165	66	250 (100)

Note: All Height measurement are in metres

Table 7: PEM Classification of Studied Male Children Weight for Age (Ogbia, Oloibiri&Otuogidi)

Age (yrs.)	Normal >80% (n)	%	Mild malnutrition 71-80% (n)	%	Moderate malnutrition 61-70% (n)	%	Severe malnutrition 51-60 (n)	%	Very Severe malnutrition <50%(n)	%
5	22	16.18	-	-	12		50	36.77	-	-

						8.82				
6	16	11.77	-	-	1	0.74	25	18.38	1	0.74
7	5	3.68	-	-	-	-	-	-	-	-
8	-	-	1	0.74	1	0.74	1	0.74	-	-
9	-	-	-	-	-	-	-	-	-	-
10	1	0.74	-	-	-	-	-	-	-	-

Note: Classifications are based on NCHS, IAP, WHO

Table 8: PEM Classification among Male Children Weight for Age in Otuabagi&Otuakeme

Age (yrs.)	Normal >80% (n)	%	Mild malnutrition 71-80% (n)	%	Moderate malnutrition 61-70% (n)	%	Severe malnutrition 51-60 (n)	%	Very Severe malnutrition <50% (n)	%
5	56	49.13	-	-	-	-	28	24.56	-	-
6	16	14.04	-	-	-	-	4	3.51	-	-
7	4	3.51	-	-	-	-	-	-	2	1.75
8	-	-	-	-	-	-	-	-	-	-
9	-	-	2	1.75	-	-	-	-	-	-
10	-	-	-	-	2	1.75	-	-	-	-

Note: Classifications are based on NCHS, IAP (2014), WHO (2024)

Table 9: Prevalence of Malnutrition among Male Children in Ogbia LGA

Age (yrs.)	Normal >80% (n)	%	Mild malnutrition 71-80% (n)	%	Moderate malnutrition 61-70% (n)	%	Severe malnutrition 51-60 (n)	%	Very Severe malnutrition <50% (n)	%
5	78	31.	-	-	12	4.	78	31.	-	-

		2				8		2		
6	32	12.8	-	-	1	0.4	29	11.6	1	0.4
7	9	3.6	-	-	-	-	-	-	2	0.8
8	-	-	1	0.4	1	0.4	1	0.4	-	-
9	-	-	2	0.8	-	-	-	-	-	-
10	1		-	-	2	0.8	-	-	-	-
Total (%)	120	48	3	1.2	16	6.4	108	43.2	3	1.2

Note: Classifications are based on NCHS, IAP, WHO

Table 10: Dietary and Deworming Frequency Distribution of the study Population

Regular intake	Diet	%	R. Deworm	%	No. R Deworm	%
Carbohydrate	142	56.8	54	21.6	196	78.4
Carb/protein	80	32				
Protein	20	8				
Veg/vit	8	3.2				
Total	250	100				

Note: R = regular, No. R =not deworming regularly

The results from this study shows the age frequency distribution for age 5yrs as the highest (67.2%) among the study population in the different communities while children within age 6yrs make up 25.2%,age 7yrs 4.4%, 9yrs (0.8%) and 10yrs 1.2% respectively. This study observe a significant difference of 0.03/ 0.02 between the mean weight, height and BMI of boys in Ogbia- Oloibiri and Otuabagi/ otuakemecommunities but there was no significant p-value in the muac between the study population. The percentile weight for age boys extremely underweight that falls below the 3rd and 1st percentile zone among age 5:11 and 6:11 (yrs:month) was 30.88% and 20.58% while 1.47% among 8yrs is in the 3rd zone.

However only 4.41%, 3.68% and 2.94% are within the median green zone as normal weight. Thus those within the 85th percentile yellow among age 5 -7yrs were 8.82%, 7.35%, and 0.74% with 14.71% in the 97th red zone among age 5yrs only from Ogbia,Oloibiri/Otuogidi compared with Otuabagi-otakeme of 26.32% (5yrs), 1.75% (6yrs) ,1.75% (7yrs) and 1.75% (10yrs) below the 1st percentile level. Furthermore 8.78% (5yrs) and 7.06% (6yrs) are within the normal green zone weight. The combined weight for age of the study children shows 41.6% falling below the 1st percentile level with only 13.2% having normal weight. However 22.8%, 15.2% and 1.6% are in the 85th, 97th and above 97th level in both communities. Regarding height for age, 34% are within the normal height level with 66% falling below the normal standard height. The prevalence of underweight among children within 5yrs is higher in Africa (20%) compare with age 6-10yrs and below 9yrs (WHO, 2015).

The PEM classification of weight for age adopted IAP, WHO (2014,20124) method used in this study reveal 0.74% of male children suffering from very severe malnutrition, 55.89% as severe,10.30% moderate, and 0.74 mild respectively compared with 32.37% PEM free in Ogbia-oloibiri / Otuogidi. Malnutrition is a global problem due to insufficient consumption of dietary nutrients resulting in impaired cognitive development affecting children in later life (Solomon *et al.*, 2015; Kalu, 2018).

Comment [SAS6]: PEM ?

However the percentage of children with PEM free in otuabagi- otuakeme was higher than that of Ogbia/Oloibiri though the study reveal severe malnutrition of 28.07% and 1.75% as very severe in these communities. More so the prevalence of malnutrition among boys in the entire study communities shows 1.2% as very severe, 43.2% severe cases, 6.4% moderate, 1.2% mild and 48% normal.

Prevalence of malnutrition in Nigeria has been pegged at 33% with two in every ten being affected (UNICEF, 2022). Decrease in dietary intake and micro/macronutrients absorption associated with increased energy expenditure/losses are among the leading factors of malnutrition. This study reveal carbohydrate (56.8%) as the most regular dietary food intake by the children. However 32% consume the combination of carbohydrate/protein while only 8% regularly include protein in their diet and 3.2% vegetables and vitamins. The study further shows 78.4% of the children not being regularly or even deworm compare with 21.6% being deworm in every three month intervals. Adherence to WHO guidelines regarding regular deworming can be donated at schools by health professionals since the drugs are donated to an extent with records keeping. Previous study conducted by lorina (2013) shows 46% of ascaris lumbricoid, 23% hook worm, and 9% trichuris T with significant value among children in Enugu state.

Malnutrition caused by helminthes infections increases the risk of weight deficit and illness among age 5-19yrs (Bundy *et al.*, 2009; Sawyer *et al.*, 2012; WBG, 2017).Malnutrition inflict damages that increase the risk of ill-health, short stature, decrease productivity and cognitive impairment in relation to learning at school in later life (Hoddinott*et al.*, 2013; Kawakita*et al* ., 2015).The difficulty to reverse stunting during early life due to inadequate dietary intake in association with infection may be link to changes in genetic expression during early life. However some studies have shown that may be reverse after 2yrs (Lundeen *etal*., 2014; Watkins *et al*., 2017).

CONCLUSION

This study identify high percentage of underweight and prevalence of malnutrition among school boys as a result of insufficient protein dietary food intake and lack of regular deworming amongst others.

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Comment [SAS7]: Reference need setting and numbering

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