

ASSESSMENT OF NUTRITIONAL SECURITY OF PUBLIC SCHOOL PUPILS IN ONDO AND EKITI STATES, SOUTHWESTERN NIGERIA

¹Salau, S.A., ²Salami, O.S., ³Dickson, D.O. and ⁴Alao, B.I.

¹ *Department of Agricultural Economics and Farm Management, Faculty of Agriculture, Kwara State University Malete Kwara State PMB 1530, Ilorin.*

² *Department of Rural development and Gender Issues Agricultural and Rural Management Training Institute (ARMTI) Km 18, Ajasse-Ipo Highway, PMB 1343, Ilorin.*

^{3&4} *Department of Agricultural Development and Management Agricultural and Rural Management Training Institute (ARMTI) Km 18, Ajasse-Ipo Highway, PMB 1343, Ilorin.*

*Email of the corresponding author: alaobashir@gmail.com

ABSTRACT

The study assessed the nutritional security of public school pupils in Ondo and Ekiti states of south-western Nigeria. Specifically, the study estimated the child nutritional status and anthropometric scores and the factors responsible for anthropometric scores of school pupils in the states. Data were collected from school pupils for year 2022/2023 academic session using a semi-structured questionnaire. Descriptive statistics were used to get the bio-data of the pupils weight, height were measured and used to generate, stunting, wasting and underweight using WHO Anthroplus and STATA 12.1. Mutually-adjusted simple and multinomial logistic regressions were done to determine relationship between the explanatory and dependent variables. From the study, it was observed that pupils from 3 to 14years in Ondo and Ekiti states had average BMI of 18.75 Kg/ m² and 19.65kg/m² respectively being within the World Health Organization 2020 BMI standard of between 18.5–24.9Kg/ m². Regression result from the two states showed that age of the children which was significant at 1% and 5% respectively also parental education and access to remittance were significance at 5% and 10 % respectively. The study concluded that pupils in the two treatment states were better off in nutritional status.

Keywords: *Anthro-Plus, Assessment, Nutritional Security, Pupils*

INTRODUCTION

School feeding programs have been defined by the World Bank as targeted social safety nets that provide both educational and health benefits to the most vulnerable children, thereby increasing enrollment rates, reducing absenteeism, and improving food security at the household level. (World Bank 2022). UNDP (2019) reported that in Africa, there are 821 million people estimated to be chronically undernourished as at 2017, often as a direct consequence of environmental degradation, drought and biodiversity loss. Out of these, over 90 million children under five are dangerously overweight. Undernourishment and severe food insecurity among children appears to be increasing in almost all regions of Africa. SDGs aim to end all forms of hunger and malnutrition by 2030 making sure all people, especially children have sufficient and nutritious food all year.

SFP has been adopted in many countries, the programme which started in Lusaka Zambia in January 2003 was scaled to seventeen African countries; Bangladesh, Benin, Burundi, the Central African Republic, Ghana, Guinea, Guinea – Bissau, Haiti, Kenya, Liberia, Mozambique, Nicaragua, Pakistan, Senegal, Sierra Leone, Tajikistan and Palestinian. The aim to fight short-term hunger by ensuring at least one daily nutritious meal to support access to education. The high level of food insecurity, significant incidence of malnutrition and economic meltdown all combine to make school feeding relevant (WFP 2009). In the poorest countries of the world, this simple strategy can double school enrolment in one year, as it is happening in Nigeria (Lawson 2012).

METHODOLOGY

The study area is south western Nigeria also known as south west geopolitical zone of the country. Ondo and Ekiti states were selected for this study. The choice of the two states was purposive, they share the same demographic and economic characteristics.

The primary data was obtained using structured questionnaire that was administered to public school pupils that benefitted from the home grown NSFP. The pupils sampled are those in elementary school with primary (1-3). In Ondo state, the sample size obtained for the schools and pupils are 297 and 399 respectively. In Ekiti state, the sample size for the schools and pupils are 274 and 399 respectively.

Analytical techniques

The descriptive statistics was used to describe the demographic characteristics of school pupils, and the constraints hindering sustainable implementation of NSFP in the study areas objective. The World Health Organization software WHO Anthro Plus analytical tools was used to measure child nutritional status and anthropometric scores and multinomial logistic regression was employed to identify the factors influencing child nutritional status.

The WHO Anthropometric Z-scores

The Anthropometric Z-scores is a conditional probability of treatment given background variables, it is represented as:

$$Z_{ij} = \frac{X_{ij} - \mu_j}{\sigma_j} \dots\dots\dots (1)$$

Where:

- i = Refers to individual (children)
- j = 1,2,3....
- Z₁ = Z-score height for -age stunted index
- Z₂ = Z-score weight for -height wasted index
- Z₃ = Z-score weight for -age overweight index
- X_{ij} = observed value for the ith child
- μ = mean value of reference population
- σ = standard deviation of the reference population

Z-scores was then derived using WHO reference populations (de Onis, and M. Blossner, 2011).

A child was then classified as Stunting: height for age < -2 SD of the WHO Child Growth Standards median; Wasting: weight for height < -2 SD of the WHO Child Growth Standards median and Overweight: weight for height > +2 SD of the WHO Child Growth Standards median (de Onis, and M. Blossner, 2011).

Multinomial Regression

This analytical tool was used to measure the factors influencing child nutritional status against the three categories of anthropometric scores. The model is expressed implicitly according to Rahji et al (2009) as below.

$$\Pr(Y_1 = 1) = \frac{\exp^{\beta_1 x_1 \cdot D_1}}{1 + \sum_{k=0}^{k-1} e^{\beta_1 x_1}} \text{-----} (2)$$

$$\Pr(Y_1 = 2) = \frac{\exp^{\beta_2 x_1 \cdot D_1}}{1 + \sum_{k=0}^{k-1} e^{\beta_1 x_1}} \text{-----} (3)$$

$$\Pr(Y_1 = k - 1) = \frac{\exp^{\beta_{k-1} x_{k-1} \cdot D_{k-1}}}{1 + \sum_{k=0}^{k-1} e^{\beta_1 x_1}} \text{-----} (4)$$

Where: Pr (Y=1,2) = probability of being in each of the category 1

$\beta_1 - \beta_2$ = parameters to be estimated for category 1 and 2

X_i = Continuous independent variables for the category 1 and 2

D_i = dummy independent variables for the category 1 and 2

$\Pr(Y_1 = k - 1)$ = is the probability of being in the reference category

β_{k-1} = parameters to be estimated in the reference category

x_{k-1} = Continuous independent variable for reference category (stunted, wasted and overweight)

D_i = dummy independent variables for the reference category

The explanatory variables for the factors influencing child nutritional status and against the three categories of anthropometric scores (stunting, wasted and underweight) are given below:

X_1 = Age of child (years)

X_2 = Level of household head education (No formal education, primary education, secondary education, tertiary education and above)

X_3 = household head occupation (unemployed, government employed, private employed)

X_4 = gender of child (dummy: 1 for male and 0 if otherwise)

X_5 = Child Body Mass Index for age (Kg/m^2)

X_6 = Child's Height for Age Score (dummy: 1; Stunted if value = -2 SD and 0 if otherwise)

X_7 = child's weight for height score (dummy: 1; overweight if value >2 SD and 0 if otherwise)

X_8 = child's weight for Age score (dummy: 1; wasted if value <-2 SD and 0 if otherwise)

X_9 = household size (number)

e = random error term.

RESULTS AND DISCUSSION

Demographic Characteristics of the Public School Pupils

The demographic characteristics of public school pupils for Ondo and Ekiti states are as discussed in Table 1.

Table 1: Demographic Characteristics of the Pupils

Characteristics	ONDO		EKITI	
	Frequency	Percentages	Frequency	Percentages
Age (years)				
3-5	97	24.31	83	20.80
6-8	184	46.11	102	25.56
9-11	86	21.55	168	42.11
12-14	32	8.1	46	11.53
Sex				
Male (boy)	295	73.93	236	59.14
Female (girl)	104	26.06	163	40.85
Weight (kg)				
10-15	23	5.76	53	13.28
16-20	89	22.30	96	24.06
21-25	229	57.39	187	46.86
26-30	58	14.54	63	15.78
Height (cm)				
<60	4	1.00	5	1.24
61-80	112	28.07	163	40.85
81-100	187	46.87	149	37.34
101-120	96	24.06	82	20.55
BMI (kg/m²)		18.75		19.65
Number of people in child household				
2-4	73	18.30	65	16.29
5-7	239	59.90	149	37.34
8-10	66	16.54	98	24.56
≥ 11	21	5.26	87	21.80
Mothers education				
No schooling	61	15.28	44	11.02
Secondary education	236	59.15	139	34.83
Tertiary education	102	25.56	216	54.14

Source: Field survey (2022/2023).

The age of the pupils ranged from 3 to 14years, it was observed that out of the 399 pupils that were sampled. Most of the pupils (46.1%) were in the range of 6-8years, while 8.1% fell between the age range of 12-14years. The mean age of the pupils sampled was 9 years and 3 months. Likewise, the age of the sampled pupils in Ekiti state it was found that out of the 399 pupils that were sampled, 42.1% of them were within the age bracket of 9-11 years and the least fell within 11.5% the age bracket 12-14years with the average age being 8years. This agrees with Kwabla and Charlotte (2018) on nutritional status of in-school children in Ghana where the mean age of the children was found to be 9 years.

In Ondo state, it was revealed that about 73.9% of the pupils were male while 26.1% were Female. Also in Ekiti state, 59.1% of the pupils are male children whereas 40.9% of them are female children. It could be inferred that girl child education is still a major challenge in the study areas when compared to male counterparts where a lot are more enrolled in school. This aligns with the study by Karimah et al (2023) on effect of SFP on nutritional balance in primary school pupils in Kano Metropolis where 63% of male children in the SFP out numbered 37% their female counterparts.

The average BMI value for pupils in Ondo and Ekiti states revealed that the weight and height of the respondents conforms with BMI values of 18.75 Kg/m² and 19.65 Kg/m² respectively. This value agrees with WHO BMI standard value of 18.5 – 24.9Kg/m².

About 59.9% and 37.3% of pupils in Ondo and Ekiti respectively have a household size of 5-7 members. As the size of household increases, there is a tendency for the pupil to consume little at home which may have effects on the pupils' nutritional status. This agrees with Awojobi (2019) in a study on impact of Ghana's school feeding programme on educational and nutritional outcomes. For pupils in Ondo state, 59.2% of the pupils' mothers acquired secondary school education while about 15.3% have no formal education. In Ekiti state, 54.1% of them have mothers that acquired tertiary education, 34.8% of the mothers have secondary education. An educated parent will have the propensity to send their wards to schools to benefit from the SFP. This agrees with (Gelli and Aulo, 2015), that there is a great impact of maternal education on children's enrolment in early childhood.

Factors Influencing the Nutritional Status of Public School Pupils

The estimate of the logit regression on factors influencing stunting among public school pupils in Ondo and Ekiti States is presented in Table 2

VARIABLES	Ondo state n=399			Ekiti state n=399		
	Coefficients	Std. Error	t-value	Coefficients	Std. Error	t-value
Sex	-0.8037147	.4963074	-1.62	-0.34537143	0.304574	-1.13395
Age of the children	7.288451***	1.956129	3.73	6.456654**	1.629876	3.96
Height of children	4.864672***	1.220665	3.98	3.887687***	1.736822	-2.24
Weight of children	3.002218***	0.8524132	3.515	1.471492***	0.46369	3.17
Children’s Location	1.294103*	0.7595985	1.70	0.4554215	0.5549366	0.82
Children H/hold size	-0.6102718	0.8817093	-0.69	0.9682406	0.7730528	1.25
Parents’ occupation	-0.5960812	0.5319345	-1.12	1.076711	1.397024	0.77
Parents’ education	-1.522125**	0.6267543	-2.43	-3.391874**	1.686226	2.01
Parents access to remittance	-0.461811*	0.25136	-1.84	-1.824328*	1.056887	-1.73
Constant	-18.946337***	4.250822	-4.45	-19.876543***	3.653456	-5.44048
Number of Obs	399			399		
Prob > chi²	0.0000			0.0000		
Pseudo R²	0.6552			0.4398		

Table 2: Factors Influencing Stunting among pupils in Ondo and Ekiti

Source: Data Analysis 2023

* Significant at (10%) ** Significant at (5%) *** Significant at (1%)

In Ondo state, age of the children and weight and height of the children were statistically significant at 1% whereas in Ekiti state, the age of children was significant at 5% and weight and height were significant at 10%. This implies that as the children age increases, with proportionate positive increase value in weight and height, the less would be the tendency of becoming stunted this agrees with Osita and Tanvir (2021) on the trends of stunting prevalence and its associated factors among children of 5years residing in Northern Nigeria between 2008- 2018.

VARIABLES	Ondo state n=399			Ekiti state n=399		
	Coefficients	Std. Error	t-value	Coefficients	Std. Error	t-value
Sex	-0.4165923	.3725448	-1.12	-0.1660727	0.3685644	-0.45
Age of the children	-4.787177*	2.519942	-1.90	-2.316592**	1.066392	-2.17
Height of the children	3.391874**	1.686226	2.01	4.039128**	1.698547	2.38
Weight of the children	-1.471492***	0.46369	-3.17	-1.5597754***	0.4431932	-3.51
Children's Location	0.8829484	0.7856471	1.12	0.4554215	0.5549366	0.82
Children's H/hold size	-0.0049463	0.2439553	-0.02	0.1005382	0.2457736	0.41
Parent's occupation	-1.466774***	0.5952591	-2.46	0.4680334	0.7731693	0.61
Parent's education	0.8829484	0.7856471	1.12	-1.425446**	0.5922344	2.41
Parent access to remittance	-1.824328*	1.056887	-1.73	2.747945**	1.332108	2.06
Constant	-11.2571***	4.0261182	-2.80	-13.01982*	6.916175	-1.88
Number of Obs	399			399		
Prob > chi²	0.0000			0.0000		
Pseudo R²	0.5938			0.5431		

Table 3: Factors Influencing Wasting among Pupils in Ondo and Ekiti States Source@ Data Analysis, 2023

* Significant at (10%) ** Significant at (5%) *** Significant at (1%).

In Ondo state, the coefficient of the value of the parental education and parental access to remittance were statistically significant at 5% whereas in Ekiti state, the negative coefficient of -3.39 and -1.82 was recorded for parental education and parental access to remittance implies that parents with low education background have the higher tendency to raise stunted children.

In Ondo state, the age of the children was negative but statistically significant at 10% whereas in Ekiti state was significant at 5%. This implies that the pupils at their earlier age have higher tendency of becoming wasted. This agrees with Tamiru et al (2022) in their study conducted on factors driving underweight, wasting and stunting among 422 school age children in Northern Ethiopia where it was revealed that age of children have significant effect on the wasting status of children. In both states, the height and weight of the children was positive and significant at 5% level and 1% respectively. This can be interpreted to mean that the higher the height and weight of the children, the greater the tendency of becoming wasted, (Tamiru and Mohammed 2022). This finding was in consistent with a study conducted by Olasinde et al, (2020) on the nutritional status of 408 primary school children between 3-9 years from food secured and food in secured households in rural communities Kwara state where it was found that only 11% of the school children from food secured household were wasted.

Furthermore, in Ondo state, parental occupation was negatively significant at 1% but at 5% in Ekiti state, which means that the unemployed parents have a higher tendency to raise children that will have low weight for height (wasted). In Ondo and Ekiti state, parental access to remittance was also negatively significant at 10% and 5% respectively. This connotes that a parent that has a poor remittance is at the higher risk of raising a wasted child even if the children are benefiting from SFP intervention. However, this disagrees with a study conducted by Kaumi et al. (2022) in their study conducted on the impact of remittances on nutritional status and enrollment of school children aged 3-8years in Borno state Nigeria. The study found out that there was positive and significant effect of household remittance income on the children nutritional status in the short run.

From Table 4, children household size was both positive and significant at 10% for both States. This implies that there is a relationship between the children's household size and their underweight status. The larger the household size, the higher the tendency for the children to manifest underweight status. This agrees with Ajao (2010) on the influence of family size on the nutritional status of under-five children in Nigeria, where it was found that there was high prevalence of underweight children from large household sizes. In the two states, occupation of the parent was negative and significant at 10%. This suggests that children whose parents have no job were easily predisposed to being underweight. In ondo state, Parent's access to remittance was also positively and significant at 5% but at 10% in Ekiti state. The more the parent earns from remittance, the lesser the tendency for the child to be underweighted.

Table 4: Factors influencing Underweight among pupils in Ondo and Ekiti

Variables	Ondo state n=399			Ekiti state n=399		
	Coeff.	Std. Error	t-value	Coeff.	Std. Error	t-value
Sex	-0.166077	0.3685644	-0.45	-0.4165923	.3725448	-1.12
Age of the children	1.343067	0.9264447	1.44	-0.0049463	0.2439553	-0.02
Height of the children	0.1005382	0.2457736	0.41	2.278865	1.532108	1.49
Weight of the children	0.4680334	0.7731693	0.61	0.8829484	0.7856471	1.12
Children's Location	0.4554215	0.5549366	0.82	0.8829484	0.7856471	1.12
Children's H/hold size	2.380275*	1.310316	1.82	2.8565458*	1.556471	-1.83
Parent's occupation	-4.78717*	2.519942	-1.90	-2.562567*	1.459565	-1.76
Parent's education	-1.82438*	1.056887	-1.73	1.466774**	0.5952591	-2.46
Parent access to remittance	3.39184**	1.686226	2.01	-4.787177*	2.519942	-1.90
Constant	-9.10088*	4.083649	-2.23	-	4.920687	-3.43
Number of Obs =399				16.8734***		
Prob > chi ²	0.0000			0.0000		
Pseudo R ²	0.5387			0.4987		

Source@ Data Analysis, 2023

* Significant at (10%) ** Significant at (5%) *** Significant at (1%).

Conclusion

From the findings, intervention of the SFP has a positive effect on the nutritional status of the pupils under the treatment states. The average values of the BMI for school pupils in Ondo and Ekiti States were 18.75kg/m² and 19.65 Kg/m² respectively. These values fell within the range of WHO 2020 BMI standard of 18.5–24.9Kg/ m². Also conclusion could be drawn from all the three anthropometric scores stunting, wasting and underweight; that were tested against all the school pupil's parameters. There was statistically significant difference in the nutritional status of the two states. The SFP have better impact on the nutritional status of the pupils in the study areas.

Recommendations

There is a need for school managers to ensure that balanced meals with reasonable portions of all nutrient components are offered in schools. There should also be frequent change of the diets to avoid monotony. This will improve the nutritional status of children. The study also recommends that the Federal ministry of education should review the SFP continuously and extend to states that are not currently participating. This will improve the BMI of children to meet global standard. Moreover, Parents of the pupils especially those in rural areas should be sensitised to take frontline in supporting the SFP. They should be made to know that they are partners in successful implementation of the programme not spectators. The parents should be well sensitised about their role to ensure sustainability of the programme. Lastly, a special fund school be allotted in the education national budget that will ensure continuity of the SFP.

REFERENCES

- Ajao K.O (2010). Influence of family size, household food security status and child care practices on the nutritional status of under-five children in Ile Ife , Africa. *Journal of Reproductive Health* December 2010
- Awojobi O.N. (2019). A Systematic Review of the Impact Of Ghana's School Feeding Programme On Educational And Nutritional Outcomes Department of Research and Policy National Youth Council of Nigeria. *Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension* 18 (2) pp. 42-50
- de Onis, M. Blossner, M. Borghi, E.(2011). Prevalence and trends of stunting among preschool children, 1990-2010. *Public Health Nutrition*, [online] Available at: <http://www.who.int/nutgrowthdb/publications/Stunting1990_2011.pdf> [Accessed 5 November 2012].

- Gelli and Aulo (2015). "School Feeding and Girls Enrollment: The Effects of Alternative Implementation Modalities in Low-Income Settings in Sub-Saharan Africa". *Frontiers in Public Health*. 3: 76. doi:10.3389/fpubh.2015.00076. ISSN 2296-2565. PMC 4440399. PMID 26052509.
- Kaumi U, Babagana A.M and Zainab H.I (2022). The enrollment of children in primary schools in Borno. *International journal of Educational policy and administration* 8(1) pp 23
- Karimah Muhammed Rabiu, Siddiq Ali Idoko and Aderounmu Ibrahim Ganiyu (2023). effect of schoolfeeding programme on nutritional balance in primary school pupils in Kano metropolis *FUDMA Journal of Sciences (FJS)* 7(2) pp 256-264
- Kwabla M.P and Charlotte G (2018). Nutritional status of in school children and its associated factors in Denkyembour District, eastern region, Ghana: comparing schools with feeding and non-feeding policies; *nutrition journal* 17(8)
- Lawson Ty M (2012). Impact of school feeding programme on Educational, Nutritional and Agricultural Development Goals: A Systematic Review of Literature journal of economics DOI 10.22004/AG.ECON.142466 Corpus ID73016557
- Olasinde Y.T, Adesiyun O.O, Olaosebikan R.R, Ibraheem R.M, Popoola G, Olayoonu (2020). Nutritional Status of primary school children in Ilorin-west LGA., Kwara state, Nigeria. *Journal of community medicine and Primary health care*, 32(1) 2020
- Osita and Tanvir (2021). Trends of stunting prevalence and its associated factors among children of 5years residing in Northern Nigeria between 2008-2018. *Journal of National library of nutrition* Nov 29; 13(12): 4312 doi: 10.3390/nu13124312
- Rahji, M. A. Y; and S. A. Fakayode (2009). A Multinomial Logit analysis of Agricultural Credit Rationing by Commercial Banks in Nigeria. *International Research Journal of Finance and Economics* 24, 91
- Tamiru Y and Mohammed S Razzaque (2022). Risk factors of stunting and Wasting among children aged 6-59months un Household Food Insecurity of Jima Geneti District, western Oromia, Ethiopia: An observational study. *Journal of Food and Nutritional Sciences* Volume 2022 Article ID 3981417 doi 10.1155/2022/3981417
- UNDP (2019). IACC/SCN 4th Report on the worlds nutrition situation. Washington DC (In collaboration with international food policy Research
- WFP (2009). State of School Feeding Worldwide. World Food Programme. Retrieved from https://documents.wfp.org/stellent/groups/public/documents/communications/wfp257481.pdf?_ga=2.213196752.57135622.1539805500
- World Bank (2022). ["Scaling Up School Feeding"](#). The World Bank and World Food Programme. 2012. Retrieved 31 March 2013.