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Home Grown School Feeding Program in Nigeria: Its Nutritional Value and Anthropometry Assessment of School Age Children in Ilaro, Ogun State

Adepoju, A. B. ✉, Johnson, A. T.
Department of Nutrition and Dietetics, The Federal Polytechnic Ilaro, Nigeria
✉*adeyinka.adepoju@federalpolyilaro.edu.ng*

Abstract

Home grown school feeding (HGSF) program is the program aimed at improving nutrition and enhance better educational performance through the provision of locally produced foods by small scale farmers to tackle hunger, improve nutrition and enhance better educational performance. Though, the program has a very good intention but its effectiveness needs to be checked. Thus this study assessed the nutrient content of the meal and the nutritional status of the pupils. It was a cross-sectional and descriptive in design involving 250 students selected systematically from three Government primary school in Ilaro town. A semi-structured and interviewer guide questionnaire was used to obtained socio-demographic characteristics of the respondents. Anthropometry measurement was done and classified using World Health Organization (WHO) standards. The food served to the selected pupils was measured, recorded in gram and its nutrient content was determined using Total Dietary Assessment (TDA) software while other data were analyzed using SPSS v.20.0. The energy value of the meal ranged from 262.10 kcal/100g-602.95 kcal/100g, 205.56 kcal/100g-329.63 kcal/100g, 173.7 kcal/100g-297.29 kcal/100g in school 1, 2 and 3 respectively. Protein content falls between 4.45g/100g – 11.49g/100g, 3.36g/100g-11.24g/100g, 5.93g/100-15.63g/100g in school 1, 2 and 3 respectively. Fat content ranged between 0.16g/100g-6.24g/100g, 0.15g/100g-19.38g/100g, 0.08g/100g-10.14g/100g in school 1, 2 and 3 respectively. High prevalence of stunting, wasting and underweight was also discovered. In conclusion HGSFP was implemented in government primary school in Ilaro, but not all the meal served meet up with WHO standard in terms of nutrient composition.

Keywords*:* Nutritional status, School feeding, School age children.

INTRODUCTION

Adequate nutrition is the bed rock for optimal growth and development. It is a foundation for healthy living, helps in preventing and reducing the risk connected with both present and impending health problem in children (Ibianu, Okechuku and Eme-Okafor, 2017). In most developing countries, hunger and malnutrition have been found to continually affect general wellbeing, quality of life and survival of most children. As indicated by Food and Agricultural Organization (FAO, 2004), a child die at every six seconds from hunger interrelated causes. Also, UNICEF (2007) stated that one quarter of children from developing countries are underweight and school age children have been found to be vulnerable undernourished as indicated by Bundy, Burbano, Grosh, Jukes, and Drake (2009).

Adequate nutrition and health status can also influence academic performance and child learning ability. Access to a nutritious mid-day meal has been opined by Ibianu, Okechuku and Eme-Okafor (2017) to play a vital role in achieving good nutritional status, overall wellbeing, improve cognitive, mental development and enhance academic performance of school age children. In view of these, school feeding program was implemented in many nations across the globe to fight short-term hunger by providing at least one daily nutritious meal to compliment the household food so as to improve student attentiveness in class as well as enhancing good academic performance.

In 2005, School feeding program was launched in Nigeria with the assistance of the United Nation' Children Emergency Fund (UNICEF) and New Partnership for Africa's Development (NEPAD). This program was designed to provide one meal per school day to all primary school pupils in Nigeria with the specific objectives of improving the health of school children, increase their enrolment, retention and completion rate. Recently, this program was re-modified in Nigeria so as to address some economic issue and tagged Home Grown School Feeding Program (HGSFP) which was officially inaugurated on the 9th of June 2016.

According to Aliyar, Gelli and Hamdani (2015), home-grown school feeding is a conjoined word which is used to explain school feeding programs where goods

and services for meal preparation are procured from small-holder farmers and businesses within the school locality. Also, this program has the potential of improving the economic status of its target communities by providing a market in which farmers can sell their produce so as to create employment opportunities and increase their source of income. This program was also aimed at delivering, cost-effective program using food items that are locally grown by small-holder farmers so as to tackle hunger and improve nutrition, increase children access, participation and achievement in school and support local livelihoods. In addition, it can also be used as a means of incorporating varieties of nutritious foods that the students are accustomed to in to the school feeding menu.

So far, no empirical research has been conducted on the nutritional quality of the school meals served to the primary school pupils in Ilaro community Yewa south Local Government area of Ogun state as well as its contribution to recommended dietary allowance so as to ascertain if the meal served can achieve at least 30% of daily nutrient requirement target of the program. Thus, this study evaluates the nutrient content and its contribution to recommended dietary allowance of the meal served to the primary school pupils in Ilaro as well as their nutritional status.

MATERIALS AND METHOD

The study was conducted in Ilaro town; the capital of Yewa South Local Government, Ogun state, Nigeria. Ilaro town is about 50 km from Abeokuta, the Ogun State capital and about 100 km from Ikeja, the capital city of Lagos State. Ilaro is situated on the rich cocoa belt of South Western region of Nigeria and endowed naturally with an expanse of land measuring about 168,750 hectares and a population of 168,850 according to the 2006 provisional census. The inhabitants of Yewa south are mainly Yoruba speaking with various dialects like Yewa, Anago, and Egun, while the three main religions are Christianity, Islam and Traditional.

The study was cross-sectional and descriptive in nature and involves pupils from the selected primary schools in Ilaro metropolis. All participants were systematically selected from primary 1 to 3 using a regular interval from all the selected primary schools in Ilaro metropolis Ogun state Nigeria. The sample size for the study was calculated using Gibson 2004 formula.

$$N = \frac{z^2(pq)}{d^2} \qquad \text{eq.(1)}$$

Where N is the sample size;
Z = the standard normal variable for a 95% confidence level (CI) = 1.96
p = the prevalence of the attribute (prevalence of under nutrition in Ogun state is 17.4 % (Senbanjo, Oshikoya, Odusanya & Njokanma 2011).
q = 1-p, d is precision = (0.05).
The sample size for the present study was calculated to be;

$$N = \frac{1.96 \times 1.96 \times 0.174 \times 0.826}{0.05 \times 0.05} = 221$$

An additional 15% was added to account for non-responses, (Askia, 2001) yielding a sample size of 254 participants, which was rounded up to 250.

Multi-stage sampling procedure was used in selecting the subject, which involved purposive selection of Ilaro town, followed by selection of four Government-owned primary schools using proportionate stratified sampling method. Pupils were then systematically selected proportionately from each school using a regular interval. A semi-structure and interviewer administered questionnaire was used in assessing the socio-economic and demographic characteristics of the pupils.

The nutritional status was assessed using anthropometric measurement method (height and weight). The weight was measured while standing using a bath room scale and recorded to the nearest kilogram while the height was measured using a height meter and the measurement was taken while standing in meter. The mid upper arm circumference (MUAC) was measured with the aid of non-stretchable tape placed firmly on the left mid upper arm, at the mid-point between the acromion process of the scapular and the olecranon process of the ulna bone as indicated by (23). The measurement was taken in centimetres with the non-elastic tape measure.
The food served to the selected pupils was gotten at the point of serving, measured and recorded in gram. The nutrient content was determined using adapted Total Dietary Assessment (TDA) software.

Data obtained were subjected to descriptive and inferential analysis using Statistical package for social sciences (SPSS version 20.0). Continuous and categorical variables were analyzed using descriptive statistics (frequency, percentage, mean and standard). Analysis of variance (ANOVA) was used to determine the differences between the means and significant differences between the mean values were evaluated at 5% probability level using Duncan's Multiple Range Test.

RESULTS

Socio-demographic and economic characteristics of the pupils as presented on Table 1 show that more than half of them (55.6%) were male and nearly all (96.8%) fall between ages six(6) and ten (10) years. Christianity was found to be a major religion among majority (64.4%) of the pupils and most of them (72.0%) were from Ogun state. More than half of the pupils were from low socio-economic background and majority of their parent engaged in petty trading.

Table 1: socio-demographic and economic characteristics of the pupils

Variable	Frequency	Percentage
Sex		
Male	139	55.6
Female	111	44.4
Age(year)		
1-5	8	3.2
6-10	242	96.8
Religion		
Christianity	161	64.4
Islam	89	35.6
State of Origin		
Ogun	180	72.0
Oyo	26	10.4
Lagos	7	2.8
Osun	5	2.0
Kano	5	2.0
Ondo	9	3.6
Ekiti	12	4.8
Niger	2	0.8
Edo	1	0.4
Ebonyi	2	0.8
Kogi	1	0.4
Ethnic group		
Yoruba	238	95.2
Igbo	5	
Hausa	7	2.8
Father Occupation		
Civil servant	50	20.0
Trader	128	51.2
Farmer	36	14.4
Auto Mechanic	6	2.4
Tailoring	9	3.6
Security	3	1.2
Driver	3	1.2
vulcanizer	1	0.4
Motorcycle rider	3	1.2
Barbing	1	0.4
Retried	2	0.8
Plumber	1	0.4
Bricklayers	3	1.2
Welder	1	0.4
Carpentry	1	0.4
Mothers occupation		
Civil servant	27	10.8
Trader	198	79.2
Farmer	10	4.0
Nurse	2	0.8

Tailoring	5	2.0
Hairdresser	1	0.4
House wife	7	2.8

Table 2 shows the anthropometry measurement of the sampled subject. The mean weight of female subject (23.41±4.82) was found to be significantly higher ($p< 0.05$) than that of male subject (21.85±2.10). Also, significant difference ($p<0.05$) was observed between the height of both male (120.23±9.69) and female (123.59±13.27) subjects with female having the higher mean value. No significant difference was observed between the mid-upper arm circumference of both the male and female subject, however female subjects were found to have higher mean value.

Table 2: Anthropometry measurement of the pupils

Sex	Weight(kg)	Height(cm)	MUAC(cm)
Male	21.85±2.10	120.23±9.69	16.34±1.53
Female	23.41±4.82	123.59±13.27	18.58±14.80
F	9.808	5.359	3.069
p-value	0.002*	0.021*	0.081

**** Statistical significant at p ≤ 0.05***

The anthropometric indices; weight for age (WAZ), height for age (HAZ) and BMI for age (BAZ) Z score of the subject was computed electronically using WHO anthroplus computer software and presented on the figures 1, 2 and 3 respectively. Figure 1 shows that larger percentage (47%) of the subject was mildly underweight, 36% have normal weight for their age, 13% were moderately underweight and few (4%) of the subject were severely underweight.

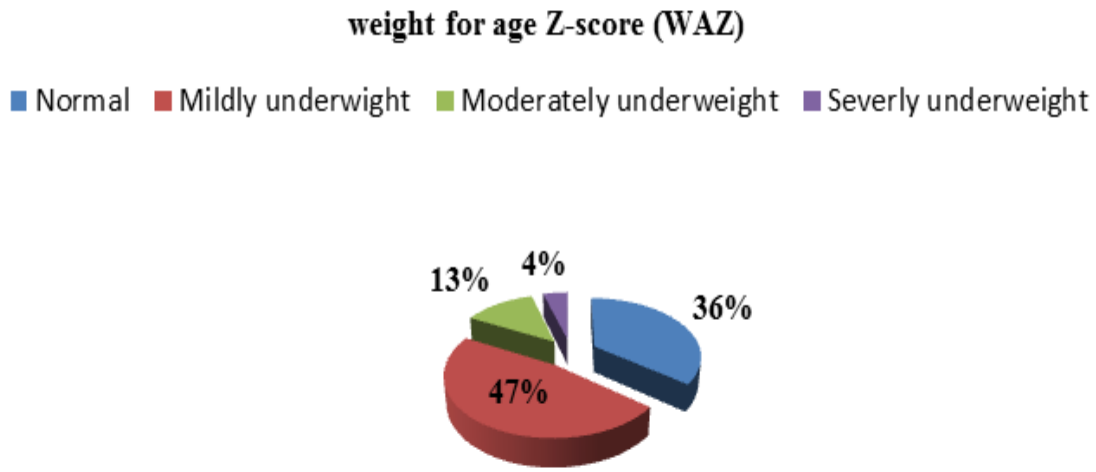

Figure 1: Weight for age Z-score of the pupils

As presented on the figure 2, larger percentage (41%) of the subjects had normal weight, 27% were mildly stunted, 22% were moderately stunted while the remaining (10%) of subjects were severely stunted.

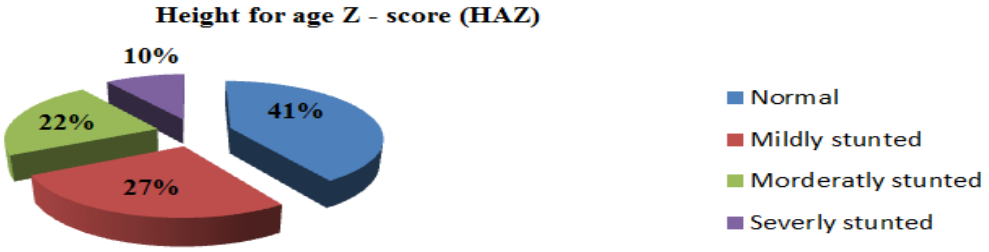

Figure 2: Height for age Z-score of the pupils

Figure 3 shows that larger percentage (40%) of the subjects had normal BMI for their age, 37% had mildly low BMI, 18% of the subjects had moderately low BMI for their age and few (5%) of the subjects had severely low BMI for their age.

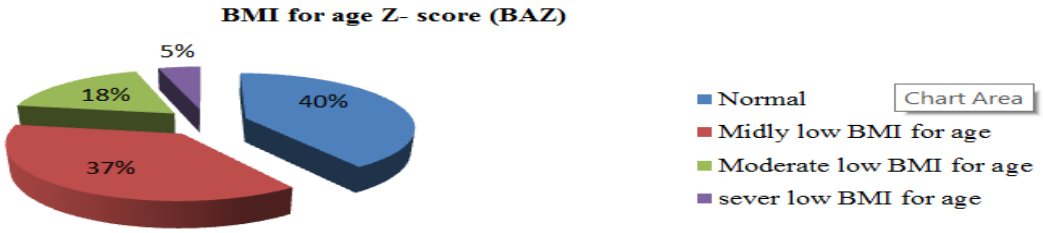

Figure 3: BMI for age Z-score of the pupils

Furthermore, Tables 3 to 5 show the mean nutrient and energy values of the meal served in the three selected public primary schools in Ilaro. Table 3 presents the mean values of energy and nutrients of the meal served in the first school across the week. Significant difference was observed between the mean value of the energy and nutrients of the meal. The meal served on the first day of the week (Monday) was found to have the highest calorie value (602.95±227.31) and no significant difference was observed between the meal served in the other days (Tuesday, Wednesday, Thursday and Friday). Moreover, the meal served on the first day of the week gives 35.7% of the recommended dietary allowance of the pupils while that of other days gives 19.4%, 15.5%, 16.0% and 11.9% of the recommended dietary allowance of the respondents. Also protein value of the meal served on the second (Tuesday) was significantly higher than that of Monday, Thursday and Friday and gives 60.0% of the RDA of the pupils. However, no significant difference was observed between the mean value of that of Tuesday and Wednesday though the mean value of protein in the meal served on Tuesday was higher than that of Wednesday but the difference is not significant. Also, the meal served on Monday had the highest value of carbohydrate, and calcium. No significant difference was observed between the mean values of vitamin B3 and folic acid across the week. The mean values of Vitamins B1, B2, B3 and folic of the meal served on Tuesday were found to be significantly ($p<0.05$) higher than the meal served on other days and contribute in varying percentage to the RDA of the pupils.

Table 4 show the mean energy and nutrients values of the meal served in the second school. Significant difference was observed between the mean energy and nutrient values of the meals. Meal served on Monday was found to have a significant higher mean value of calorie and carbohydrate and contribute 35.7% and 43.9% to their RDA. Also the meal served on Wednesday was found to have a significant higher value of vitamin B1 (0.27 ± 0.005), B2 (0.03 ± 0.015), B3 (2.63 ± 0.042), B6 (0.17 ± 0.005), folic acid (96.17 ± 0.113) and vitamin B12 (0.16 ± 0.038). On the contrary, the meal served on Tuesday and Friday has the lowest value of vitamin B1, B2, B3, B6, folic acid and vitamin B12. Protein content of the meal served on Friday was found to be significantly higher than that of any other days. Calcium and iron were also found to be significantly higher in the meal served on Thursday.

Table 5 shows the mean energy and nutrient value of the meal served in the third school across the week. The calorie content of the meal served on Monday to Thursday was not significantly ($p< 0.05$) different from each other while that of Friday was significantly lower than others. Also, the meal served on Wednesday had a significant ($p< 0.05$) higher value of protein, fat and vitamin B12. The meal served on Tuesday had the higher values of carbohydrate, Vitamin B3, Vitamin B6 and folic acid. Calorie value of the meal served on Thursday was found to be significantly higher than

others and all contribute to the Recommended Dietary Allowance of the respondent in varying percentage.

Also as presented on table 3, 4 and 5, the energy value of the meal served in all the three schools ranged from 262.10 - 602.95 kcal/100g, 205.56 g - 329.63 kcal/100g, 173.7 - 297.29 kcal/100g in schools 1, 2 and 3 respectively. The meal served in school 3(5.93-15.63g/100g) has the highest protein content compare to school 1 and 2 with the values that range between 4.45 – 11.49g/100g, 3.36-11.24g/100g in school 1 and 2 respectively across the week. Fat content ranged between 0.16g/100g-6.24g/100g, 0.15g/100g-19.38g/100g, 0.08g/100g-10.14g/100g in school 1, 2 and 3 respectively as presented on table 3, 4 and 5. Carbohydrate content of the meal served in the three selected schools ranges between 31.12 - 57.05g, 23.68 - 50.14g and 22.58 -54.0g in school 1, 2 and 3 respectively. Similarly vitamin B1 and B2 content of the meal served in school 1, 2 and 3 were between 0.01- 0.23mg and 0.01 – 0.04mg (school 1), 0.01-0.24mg and 0.01 – 0.03mg (school 2), 0.01 – 0.30mg and 0.03-0.10mg (school 3) respectively. while vitamin B3 and B6 content of the meal served in school 1, 2 and 3 ranged between 0.48-2.27mg and 0.04-0.15mg (school 1) 0.19-2.63mg and 0.02 – 0.17(school 2) and 0.48-3.1mg and 0.04-0.2mg (school 3) respectively. Lastly, calcium and iron content of the meal served in school 1 (12.88 -78.04 mg and 1.52 - 3.4mg) was higher than school 2 (5.14 - 22.42 mg and 1.32 - 2.75mg), and 3 (5.4 - 26.42mg and 1.35 - 3.37mg).

Table 3: Mean energy and nutrient value of the meal served in school 1

Nutrients	RDA	Mean intake					% of RDA				
		M	T	W	TH	F	M	T	W	TH	F
Cal(kcal)	1690	602.95 ±227.31^{a}	328.26 ±66.11^{b}	262.10±105.43^{b}	271.07 ±22.15^{b}	201.87 ±6.36^{b}	35.7	19.4	15.5	16.0	11.9
Protein(g)	19	4.45 ±0.86^{b}	11.49 ±5.00^{a}	10.45±0.93^{a}	7.77 ±2.61^{ab}	8.51 ±0.25^{ab}	23.4	60.5	55	40.9	44.8
CHO(g)	130	57.05 ±3.51^{a}	54.99 ±2.07^{a}	41.45±31.95^{ab}	50.26 ±0.04^{a}	31.12 ±1.07^{b}	43.9	42.3	31.9	38.7	0.6
FAT(g)	25	6.06 ±2.37^{a}	6.24 ±4.66^{a}	5.64±2.73^{a}	4.43 ±1.19^{a}	0.16 ±0.01^{b}	24.2	25.0	22.6	17.7	0.0
VIT. B1(mg)	0.6	0.07 ±0.15^{b}	0.23 ±0.16^{a}	0.01 ± 0.25^{ab}	0.02 ±0.01^{b}	0^{b}	11.6	38.3	1.7	3.3	0.0
VIT. B2(mg)	1	0.01 ± 0.01^{b}	0.04 ±0.03^{a}	0.03 ± 0.01^{ab}	0.04 ±0.03^{a}	0^{a}	1.0	4.0	3.0	4.0	0.0
VIT. B3(mg)	13	0.66 ± 1.32^{a}	2.27 ±1.52^{a}	1.18 ± 2.3^{a}	0.48 ±0.32^{a}	0^{a}	5.1	17.5	9.0	3.7	0.0
VIT. B6(mg)	0.6	0.04 ±0.09^{ab}	0.15 ±0.1^{a}	0.1 ± 0.13^{ab}	0.05 ±0.03^{ab}	0^{b}	6.7	25	16.7	8.3	0.0
Folic Acid(mcg)	120	25.96 ±51.91^{a}	81 ±54.00^{a}	46.06 ± 90.71^{a}	1.18 ±0.79^{a}	0^{a}	21.6	67.5	38.4	0.9	0.0
VIT. B12(mcg)	12	0^{b}	0.19 ±0.13^{ab}	0.19 ± 0.13^{ab}	0.4 ±0.265^{a}	0^{b}	0	1.6	1.5	3.3	0.0
CALCIUM(mg)	700	78.04 ±39.92^{a}	17.91 ±3.38^{b}	12.88 ±12.37^{b}	25.81 ±1.06^{b}	5.75 ±0.17^{b}	11.1	2.5	1.8	3.7	0.8
IRON(mg)	7	1.58 ±0.45^{c}	2.69 ± 0.27^{ab}	2.18 ±1.065^{ab}	3.4 ±0.32^{a}	1.52 ±0.05	22.6	38.5	31.1	48.5	21.7

Values are expressed as mean ± standard deviation
Mean values with different superscript on the same row are significantly different at p < 0.05.
M, T, W, TH, F, Indicate Monday, Tuesday, Wednesday, Thursday and Friday respectively.

Table 4: Mean energy and nutrient value of the meal served in school

	RDA	Mean intake					% RDA				
		M	T	W	TH	F	M	T	W	TH	F
Cal (kcal)	1690	308.89 ± 11.99^{a}	329.63 ± 40.98^{a}	246.71 ± 3.338^{b}	207.56 ± 3.54^{c}	246.82 ± 19.45^{b}	18.3	19.5	14.6	12.3	14.6
Protein (g)	19	5.42 ± 0.57^{d}	8.82 ± 0^{b}	7.23 ± 0.443^{c}	3.36 ± 0.47^{e}	11.24 ± 1.292^{a}	28.5	46.4	38.05	17.7	59.2

CHO(g)	130	50.14 ± 0.42[a]	23.68 ± 0[e]	47.86 ± 0.00[b]	43.78 ± 0.00[c]	34.62 ± 1.055[d]	38.7	18.2	36.8	33.7	26.6
FAT(g)	25	8.67 ± 1.33[b]	19.38 ± 1.00[a]	2.13 ± 0.16[c]	2.08 ± 0.17[c]	0.15 ± 0.009[d]	34.7	77.5	8.52	8.32	0.6
VIT. B1(mg)	0.6	0.24 ± 0.08[a]	0.01± 0.005[b]	0.27 ± 0.005[a]	0 ± 0.005[b]	0·01± 0.005[b]	40.0	0.0	45	0.0	0.0
VIT. B2 (mg)	1	0.02 ± 0[ab]	0[c]	0.03 ± 0.015[a]	0.01 ± 0.005[b]	0[c]	2.0	0.0	3.0	1.0	0.0
VIT. B3(mg)	13	2.49 ± 0.04[b]	0[c]	2.63 ± 0.042[a]	0.19 ± 0.05[c]	0[d]	19.2	0.0	20.2	1.5	0.0
VIT. B6(mg)	0.6	0.17 ± 0.03[a]	0[b]	0.17 ± 0.005[a]	0.02 ± 0[b]	0[b]	28.3	0.0	28.3	3.3	0.0
Folic Acid(mcg)	120	95.74 ± 6.39[a]	0[b]	96.17 ± 0.113[a]	0.45 ± 0.12[b]	0[b]	79.8	0.0	80.1	0.4	0.0
VIT. B12(mcg	12	0[b]	0[b]	0.16 ± 0.038[a]	0.15 ± 0.04[a]	0[b]	0.0	0.0	1.3	1.25	0.0
CALCIUM(mg)	700	17.1 ± 0.94[b]	5.14 ± 0[d]	17.15 ± 0.146[b]	22.42 ± 0.155[a]	7.4 ± 0.765[c]	2.4	0.73	2.5	3.2	1.2
IRON(mg)	7	2.15 ± 0.09[b]	1.32 ± 0[d]	2.21 ± 0.047[b]	2.75 ± 0.055[a]	1.89 ± 0.17[b]	30.7	18.9	31.6	39.3	27.0

Values are expressed as mean ± standard deviation
Mean values with different superscript on the same row are significantly different at p < 0.05.
M, T, W, TH, F, Indicate Monday, Tuesday, Wednesday, Thursday and Friday respectively.

Table 5: Mean energy and nutrient value of the meal served in school 3

Nutrients	**RDA**	**MEAN INTAKE**					**% OF RDA**				
		M	**T**	**W**	**TH**	**F**	**M**	**T**	**W**	**T**	**F**
Cal (kcal)	1690	280.5 ±30.8[a]	259.8 ±5.2[a]	297.29 ±77.66[a]	258.48 ±7.50[a]	173.7 ±2.8[b]	16.6	15.4	17.6	15.3	10.3
Protein(g)	19	6.8 ±0.6[c]	8.3 ±0.4[b]	15.63 ±2.146[a]	5.93 ±0.23[c]	8.34 ±0.15[b]	35.4	43.7	82.3	31.2	43.9
CHO(g)	130	54.0 ±6.6[a]	50.7 ±0.2[a]	35.59 ±11.79[b]	49.72 ±0.301[a]	22.58 ±0.3[c]	41.6	39.0	27.4	38.2	17.4
FAT(g)	25	3.4 ±0.1[b]	1.8 ±0.4[c]	10.14 ±2.5[a]	3.88 ±0.986 [b]	0.08 ±0[d]	13.4	7.0	40.6	15.5	0.3
VIT. B1(mg)	0.6	0.3 ±0.1[a]	0.3 ±0[a]	0.01 ±0.005[b]	0.01 ±0[b]	0[b]	41.7	48.3	1.7	1.7	-
VIT. B2(mg)	1	0.1 ±0.0[a]	0.04 ±0.0[b]	0.03 ±0.014[b]	0.04 ±0.004[b]	0[c]	8.0	4.0	3.0	4.0	-
VIT. B3(mg)	13	2.3 ±0.6[b]	3.1 ±0.1[a]	0.48 ±0.28[c]	0.49 ±0.121[c]	0[d]	17.7	23.5	3.7	3.8	-
VIT. B6(mg)	0.6	0.1 ±0.1[b]	0.2 ±0.0[a]	0.04 ±0.018[b]	0.04 ±0.005[b]	0[c]	11.7	33.3	6.7	6.7	-
Folic Acid(mcg)	120	97.4 ±16.4[a]	102.5 ±0.1[a]	1.11 ±0.592[b]	1.15 ±0.211[b]	0[b]	81.2	85.4	0.9	1.0	-
VIT. B12(mcg)	12	0 [c]	0.3 ±0[a]	0.35 ±0.142[a]	0.38 ±0.014[a]	0[c]	-	21.7	29.2	31.7	-
CALCIUM(g)	700	21.8 ±8.0[b]	18.6 ±0.04[b]	9.28 ±2.119[c]	26.42 ±0.037[a]	5.4 ±0.098[d]	3.1	2.7	1.3	3.8	0.8
IRON(g)	7	2.0 ±0.6[c]	2.41 ±0.05[b]	2.33 ±0.462[c]	3.37 ±0.042[a]	1.35 ±0.03[d]	29.0	34.4	33.3	48.1	19.3

Values are expressed as mean ± standard deviation
Mean values with different superscript on the same row are significantly different at p < 0.05.
M, T, W, TH, F, Indicate Monday, Tuesday, Wednesday, Thursday and Friday respectively.

DISCUSSION

The present study assessed the anthropometry measurement of the pupils in public primary schools as well as the contribution of home grown school feeding programme to the Recommended Dietary allowance (RDA) of pupils in selected Government primary schools in Ilaro Ogun state. The socio-demographic characteristics of the respondents

show that more than half of the respondents were male, between the age brackets of 6-10 years, practice Christianity religion and from Ogun state. The socio-demographic characteristics of the subject in the present study is in variance with that of Olusanya, (2010) in a study conducted on food habit and school feeding program of pupils in rural communities in Odogbolu local Government area of Ogun state and that of Ajuzie, Sanusi and Makinde (2018) in a study conducted on the nutritional status and school performance of primary school children in Ogun state. Olusanya (2010) and Ajuzie et al., 2018 discovered higher percentage of female students in all the selected schools but Olusanya 2010 did not provide information on their religion.

In the same vain, more than half of the pupils' father were petty traders, less than one fifth of them were civil servants while others engaged themselves in various occupations like auto mechanic, tailoring, commercial motor cycling, security, carpentry among others in varying percentage. Though the respondents were unable to give detail and reliable information on the estimated monthly income of their parents but the occupation of the majority of the respondents' parents (fathers) indicates that majority of the pupils were from families with low socio-economic status. Low socio-economic status of the subject parents observed in the present study has also been discovered by various researchers in similar study - Olusanya, (2010); Ajuzie et al., (2018); Runsewe-Abiodun et al., (2018). Senbanjo *et al.,* (2011) - conducted in Ogun state and this implies that the pupils will be deprived of some essential needs like access to adequate diet due to their low socio-economic status. However, this low socio-economic situation will not only affect the nutritional status of the children but that of other members of the household and the effect may be more noticeable and significant on the children due to their vulnerability.

In assessing the nutritional status of the respondents, anthropometry measurements {weight, height, and mid-upper arm circumference (MUAC)} of the respondents were taken and their nutritional indices was computed using standard procedure. In the present study, the mean weight and height of the female respondent was found to be significantly higher than that of the male respondents. Also, the mean MUAC of the female respondents was also found to be higher than of the female respondents but the difference was not significant. This discovery corroborates that of Senbanjo *et al.,* 2011 in a similar study conducted on prevalence of and risk factors for stunting among school children and adolescents in Abeokuta, Southwest Nigeria in which mean weight and height of female respondents was found to be significantly higher than that of their male counterparts.

Stunting is an indicator for past or long term under-nutrition, it occurs mostly in the first three years of life, reflecting long term under-nutrition and poor health. In the present study, larger percentage of the respondents has normal weight for their height while about one third (27.0%) were mildly stunted and others were either moderately or severely stunted. The prevalence of stunting observed in this study is higher than that of Olusanya (2010) in a similar study in Odogbolu local government area of Ogun state. This higher prevalence of stunting observed in this study can be linked or due to the low socioeconomic status of the respondents and this will have a detrimental effect on the wellbeing and academic performance of the pupils as indicated by Ajuzie et al**.,** **(**2018).

Under weight is a convenient mixture of both present and past under-nutrition. In the present study, high prevalence of underweight was observed. About half (47.0%) of the respondents were mildly underweight, few (13.0%) were moderately underweight, very few (4.0%) were fund to be severely underweight and others has normal weight for their age. Specifically, the prevalence of underweight discovered in this study is higher than the value recorded by Rufina, Ayogu, Afiaenyi and Elizabeth, (2018) in a similar study conducted on prevalence and predictors of under nutrition among school children in a rural South-eastern Nigerian community. Rufina et al., (2018) found a significant association between the prevalence of underweight and various socio-economic and demographic characteristics of the respondents like gender of the household head, household income, and weekly food expenditure. This implies that high prevalence of underweight in the present study may also be due to the low socio- economic status of the respondents as indicated by Rufina *et al.,* 2018. Moreover, it may also be due to inadequate energy and nutrient intake as indicated by Mwaniki and Makokha (2013).

Furthermore, this study also aimed at assessing the energy and nutrient composition of school meals served in three randomly selected schools in Ilaro town Ogun State of Nigeria and their contributions to energy and nutrient intakes of school children. In evaluating the nutrient composition of the meal served in Home Grown School Feeding Program (HGSFP) in Ilaro town, three government own primary schools was randomly selected and tagged school 1,2 and 3.

Energy is the product of cellular respiration required for the functioning of the human body. In high-income countries, the focus is on ensuring that school children do not consume too much in proportion to their energy expenditure, which will lead to obesity (Ruzky *et al.,* 2015) and vice versa for developing country. In the present study, significant differences were observed in the energy content of the different meal served in all the selected schools and contribute in varying percentages to the RDA of the school age children; 11.9% -35.7% in

school 1, 12.3%-19.5% in school 2 and 10.3% -17.6% in school 3. This implies that the energy content of the meal served in Ilaro community was below the standard set by WHO (WHO, 1998) and less than the value recorded by Falade, Otemuyiwa, Oluwasola, Israel, Oluwemimo … & Adewusi, (2012) in a similar study conducted in Ile-Ife.

Protein is essential in the human diet for growth and the repair of worn-out tissue (Baah et al., 2009). It is an important component of food essential for growth and maintenance. In school 1, significant difference was observed between the protein content of the food served with the value ranged from 4.5g to 11.49g across the week. The meal served on Tuesday (Beans and stew with fish) and Wednesday (rice and stew with fish) has the highest protein content followed by that of Thursday (Fufu and vegetable) and Friday (Eko with moinmoin) while the meal served on Monday (Rice and Beans with fish) was found with the lowest protein content and the differences was significant. Moreover, the meal served in school 1 contribute to the recommended dietary allowance in vary percentage. The meal served on Tuesday was found with the highest percentage 60.5% while that of Monday has the lowest contribution to the Recommended Dietary Allowance (RDA). This finding is in line with that of Falade et al., 2012 in a similar study conducted in Osun state on school feeding program in Nigeria.

In the same vain, significant differences was observed between the protein content of the meal served in school 2 which ranged between 3.36g to 11.24g. In contrary to what was discovered in school 1, the meal served on Friday has the highest protein content and gives 59.2% of the RDA of the school age children while the meal served on Thursday has the least protein content and give 17.7% of their RDA. Conversely, the protein content of the meal served in school 3 was found to be higher than other schools and ranged from 5.93g to 15.63g which contributes to the protein requirement of the school age children in varying percentages within the week.

The world Health organization recommends that school feeding programs should contribute 30% to 45% of the RDA of energy and nutrient for half-day schools and 60%to 75% for full-day school (WHO 1998). Though the meal served in each of the selected schools contributed more than the stipulated percentage to the RDA of the school age children but the protein intake of the pupils in the present study through the meal may be regarded as sub-optimal considering the fact that not all protein ingested in the food would be utilized as indicated by Falade et. al., (2012)

Carbohydrates (sugars and starches) provide energy to cells in the body particularly the brain which is a glucose-dependent organ (HMD, 2002). In the present study, carbohydrate content of all the meal served in the selected schools contributed to the RDA in varying percentage. 0.6% - 43.9% in school 1, 18.2% - 38.7% in school 2 and 17.4% - 41.6% in school 3. This implies that not all the meal serve in the selected schools contributes to the RDA of the children the stipulated percentage indicated by WHO of the carbohydrate. The finding of this study is in line with that of Owusu et al., 2016 in a similar study conducted in Ghana in which meals provided by Non-Governmental School Feeding Programme (NSFP) had larger portion sizes and contributed 28% to energy intakes of the children, respectively. Other researchers (Stevens & Nelson, 2011, Rees *et al.*, 2008) have reported similar findings. Similarly, the inadequate contribution made by the foods to carbohydrate requirements of the school children in the 3 schools was in agreement with the report of Nelson *et al.,* 2007 who reported that school meals failed to make good the shortfalls in daily intakes of carbohydrate. The present finding can be attributed to the portion sizes given the pupils which were not nutrient dense enough to provide the required one third of the energy requirement.

Vitamins are a group of organic nutrients required in small quantities for a variety of biochemical functions and which, generally, cannot be synthesized by the body and must therefore be supplied in the diet. In the present study, water soluble vitamin like vitamin B1, B2, B3 and B6 was very low and less than one third of the RDA as indicated by WHO. Also, iron content of the meal served meets the recommended standard of WHO, while calcium content was below the recommended standard. This finding corroborates that of Rufina *et al.*, 2018 in a similar study conducted in Enugu and Nelson, Lowes and Hwang 2007. Basically, the shortfalls in this nutrient content may be attributed to the portion sizes given the pupils.

CONCLUSION

In conclusion HGSFP was implemented in government primary school in Ilaro, but not all the meal served provided a third of the recommended daily intakes of macro and micro nutrient as well as vitamins as recommended by WHO. Also, socio demographic/economic characteristics of the respondent's parents show that majority of the primary school pupils from the study area were from low socioeconomic group. High prevalence of stunting, wasting and underweight was also discovered. Effective monitoring and evaluation of this programme (HGSFP) at all level is recommended so as to achieve its target goals and objectives

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