



# Assessing Household Food Security Status and Nutritional Outcome among Underprivileged Children (10-19 Years) from East Senatorial District of Lagos State, Nigeria

Oluwole Steve Ijarotimi\* and Mojisola Lydia Erota

Department of Food Science and Technology, Federal University of Technology, Nigeria

## Abstract

**Background:** The purpose of this research work was to assess household food security and its nutritional implications on adolescents from selected Local Government Areas of Lagos, Nigeria.

**Methodology:** A cross-sectional study was conducted among school children (9- 20 years) in public and private secondary schools between March and June, 2017. The participants (2000) were selected from rural and urban communities using multistage sampling technique from three Local Government Areas of Lagos State. Information on bio-data and household Food insecurity access scale (HFIAS) were collected using pre-tested and semi- structured questionnaire. Height and weight of the participants were measured using standard methods. Data were analysed using statistical package, and results were presented descriptively. Chi-square test and odd ratio were calculated to compare means and relationship between parameters ( $P < 0.05$ ).

**Results:** The socio-economic status of respondents parents were as follows: for educational attainment, 19.1% completed primary school, 33.1% secondary school and 27.8% tertiary level; while the remaining (20.0%) had no formal education. The average monthly income of the family heads showed that 63.7% earned less than twenty-five thousand Naira per month (\$71.4), while the remaining earned above. Occupation of the family head were farming (44.1%), self-employed (31.1%) and civil servants (21.8%). The prevalence of household food insecurity were mildly (15.9%), moderately (8.0%) and severely (4.6%), while the remaining families were food secured (71.6%). The mean weight, height and BMI of the female and male respondents were  $47.6 \pm 1.4$  -  $48.4 \pm 1.7$  kg,  $1.57 \pm 0.01$  -  $1.61 \pm 0.00$  m and  $19.6 \pm 0.3$  -  $19.3 \pm 0.4$  kg/m<sup>2</sup> respectively. The prevalence of underweight was higher in male adolescents (47.1%) than female (38.0%) counterparts, whereas, the prevalence of overweight/obese in female (7.6%) was higher when compared to that of male (6.0%) counter parts. Statistically, there was significant ( $OR=1.03$ ,  $P=0.004$ ) relationship between the household food security status and nutritional status outcomes of the participants.

**Conclusion:** This study finding showed high prevalence of household food insecurity, underweight and emerging cases of overweight and/or obesity among adolescents. Hence, there is a need for nutrition and economic intervention programmes in order to improve optimal nutrition among the children.

**Keywords:** Household food security; Nutritional implications; Adolescents

## Introduction

Food insecurity is a common problem among the low-income households in developing countries of the world. Food insecurity is a condition whereby all people did not have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life [1]. The three basic components of food security policies, and programs in developing countries are availability (i.e., having sufficient quantities of appropriate food available), accessibility (having adequate income or other resources to access food), and utilization/consumption (having adequate dietary intake and the ability to absorb and use nutrients in the body) [1].

The utilization component of household food security is influenced by many factors such as nutrition knowledge and beliefs, access to healthcare, water, and sanitation services and practices relating to the management of childhood illness and hygiene [2]. Scientific study has reported that

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### \*Correspondence:

Oluwole Steve Ijarotimi, Department of Food Science and Technology, Federal University of Technology, Akure, Nigeria,  
E-mail: [soijarotimi@futa.edu.ng](mailto:soijarotimi@futa.edu.ng)

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**Table 1:** Socio-economic status of the head of the family in Lagos State.

Parameters	Percentage of respondents (%)
<b>Head of family educational attainment</b>	
NO formal education	20
Primary school	19.1
Secondary	33.1
Tertiary institution	27.8
<b>Head of family monthly income in Naira*</b>	
< 25,000	63.7
> 25,000	36.3
<b>Head of family occupation</b>	
Farming	44.1
Self-employed	31.1
Civil servants (< Grade Level08)	14.5
Civil servants (> Grade Level08)	7.3

\*Three hundred and fifty Naira (N350) = one Dollar (\$1)

household food insecurity can negatively affect food consumption in terms of reducing dietary variety, nutrient intake, and nutritional status of household members [3]. Epidemiological researches have established a positive association between household food insecurity and childhood growth indicators such as weight gain [4,5]. Whereas some other studies have also found no relationship with weight and height gain among children [6-8].

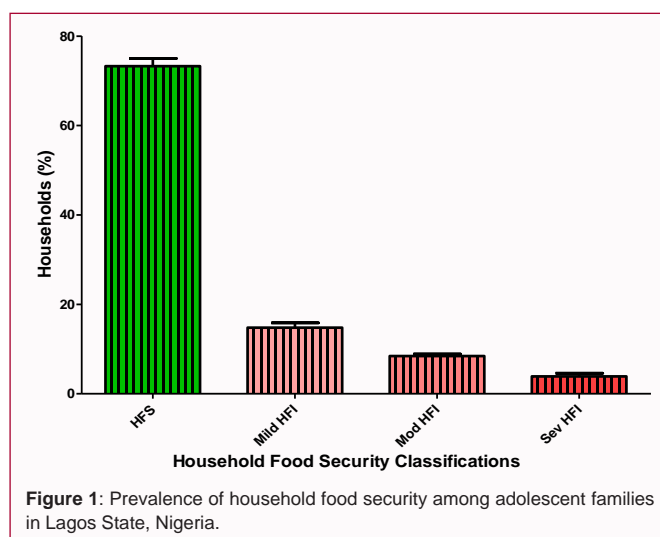
The relationship between poverty, household food security and children's nutrition and health has been widely reported by several studies [9-11]. Household food security level mainly relies on income and purchasing power of household members, and not just inadequate production of food commodities [12,13]. Studies have shown that growing up in conditions of poverty has negative effects on quality of dietary intakes, health, growth and cognitive development [14-16], and it increases the risk of mortality among children [17,18]. Nutritional studies have reported that efforts to improve the quality of dietary intakes of children in many parts of developing countries have been remarkably slow [19], due to several factors like rise in cost of food commodities [20] and poverty [21].

The nutritional consequences of food insecurity experience include poor dietary intake, nutritional status and physical well-being of the family members, particularly children [22]. Scientific study has reported that nutritional status of children is a key indicator to assess the nutritional and health status of a population experiencing food crisis as children are the most vulnerable to nutritional imbalances [23].

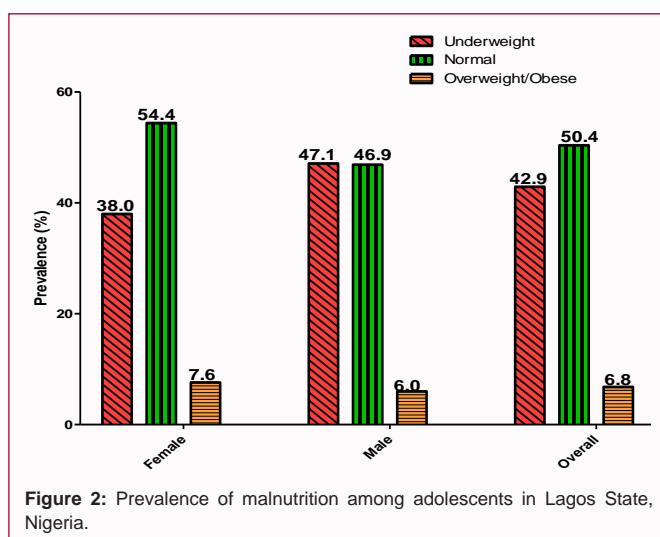
## Methodology

### Study location

The study was conducted in selected Local Government Areas of Lagos State, Nigeria. Three Local Government Areas (LGAs), (i.e., Imota LCDA, Ikosi Ejirin LCDA and Ikorodu North LCDA) out of six in Lagos East Senatorial district were randomly selected for this study. The selected Local Government Areas were predominantly Yoruba ethnic group, and were blessed with articulate populace who constitute a virile and productive workforce. The people in the communities were either civil servants, workers in the private industries or self-employed.



**Figure 1:** Prevalence of household food security among adolescent families in Lagos State, Nigeria.



**Figure 2:** Prevalence of malnutrition among adolescents in Lagos State, Nigeria.

### Study design, target population and sample size determination

A cross-sectional study was conducted among schoolchildren (10-20 years) in public and private secondary schools between March and June, 2017. The participants were selected from rural and urban communities using multistage sampling technique. To obtain a representative sample, the three LGAs were considered as clusters. Two public and one private secondary schools were randomly selected from each cluster, and within the schools, each level from junior secondary school (JSS 1) to senior secondary school (SSS 3) was treated as a stratum. Using the class register as the sampling frame, proportionate number of males and females were selected using simple random techniques from each stratum.

The sample size was determined on the basis of an estimate of 50% of prevalence of malnourished (underweight) children, a 5% level of precision and a confidence level of 95%, using the formula for calculating sample size as described by Gahlinger and Abramson. This generated a sample size of 317 from each local, and with total population size of 2000 adolescents.

### Data collection

Data were collected by trained health researchers using structured self-administered questionnaires designed in English language and

**Table 2:** Anthropometric measurements and body mass index of adolescents.

Age	Weight			Height			BMI		
	Female	Male	overall	Female	Male	overall	Female	Male	overall
10	33.4 ± 0.3	45.2 ± 0.4	39.3 ± 0.4	1.47 ± 0.02	1.61 ± 0.02	1.54 ± 0.00	15.9 ± 0.2	18.0 ± 0.2	16.9 ± 0.1
11	42.6 ± 0.4	31.1 ± 0.3	36.9 ± 0.4	1.51 ± 0.01	1.55 ± 0.02	1.53 ± 0.00	18.9 ± 0.2	14.1 ± 0.1	16.5 ± 0.3
12	41.1 ± 0.4	41.8 ± 0.4	41.4 ± 0.4	1.53 ± 0.02	1.51 ± 0.01	1.52 ± 0.02	18.1 ± 0.1	18.8 ± 0.1	18.4 ± 0.2
13	46.3 ± 0.5	42.3 ± 0.6	44.3 ± 0.4	1.56 ± 0.02	1.55 ± 0.02	1.55 ± 0.01	19.7 ± 1.2	18.2 ± 1.5	18.9 ± 0.2
14	46.9 ± 0.4	44.9 ± 0.5	45.9 ± 0.5	1.57 ± 0.02	1.62 ± 0.01	1.59 ± 0.02	19.5 ± 1.3	18.3 ± 0.7	18.9 ± 0.4
15	50.5 ± 3.5	49.3 ± 3.3	49.9 ± 2.5	1.60 ± 0.01	1.61 ± 0.01	1.60 ± 0.00	20.4 ± 2.2	19.6 ± 2.3	20.0 ± 2.0
16	52.0 ± 1.5	52.2 ± 3.5	52.1 ± 2.3	1.61 ± 0.02	1.62 ± 0.00	1.61 ± 0.02	20.6 ± 1.6	20.5 ± 2.1	20.5 ± 2.0
17	53.7 ± 3.3	55.5 ± 2.4	54.6 ± 4.1	1.61 ± 0.00	1.65 ± 0.01	1.63 ± 0.02	21.3 ± 0.1	20.7 ± 2.2	20.9 ± 1.5
18	54.4 ± 3.3	58.2 ± 3.6	56.25 ± 3.5	1.61 ± 0.00	1.65 ± 0.02	1.63 ± 0.01	21.7 ± 2.7	22.2 ± 2.2	21.9 ± 0.3
19	55.1 ± 2.5	60.1 ± 3.6	57.6 ± 1.5	1.66 ± 0.02	1.66 ± 0.00	1.66 ± 0.01	20.8 ± 1.2	22.7 ± 1.5	21.8 ± 2.0
20	47.5 ± 1.4	51.5 ± 2.5	49.5 ± 1.5	1.62 ± 0.01	1.75 ± 0.02	1.69 ± 0.02	18.6 ± 0.2	19.5 ± 0.2	19.1 ± 0.1
Total	47.6 ± 1.4	48.4 ± 1.7	47.9 ± 1.4	1.57 ± 0.01	1.61 ± 0.00	1.59 ± 0.01	19.6 ± 0.3	19.3 ± 0.4	19.4 ± 1.3

**Table 3:** Relationship between Nutritional Status and Household Food Security.

Parameters	Underweight	Normal	Row total	Statistics
Household Food Security	520(26%)	836(42%)	1,356	OR = 1.03
				X = 0.062
Household Food Insecurity	243(12.2%)	401(20.1%)	644	df = 1
Column Total	763	1,237	2,000	P = 0.004

local language. The questionnaires were given to the students to take home for their parents to fill after adequate demonstration on how to fill the questionnaire had been explained. The students were informed to return the questionnaire in the following school day; and those students whose their questionnaires were adequately filled were finally recruited for the study. The questionnaire was designed to collect information on the following.

### Socio-economic status

The socioeconomic status was determined using the parameters like students parental/caregiver's occupations, educational attainments and monthly incomes. Using these parameters for assessing socio-economic status of children has earlier been reported by Boey [24].

### Household food insecurity assessment scale

Household food insecurity access was measured using items from the validated Household Food Insecurity Access Scale (HFIAS) that was specifically developed for use in developing countries [25-28]. The HFIAS consists of 9 items specific to an experience of food insecurity occurring within the last month. Each respondent indicated whether they had encountered the following at household level due to lack of food or money to buy food in the last one month: (1) worried about running out of food, (2) lack of preferred food, (3) the respondent or another adult had limited access to a variety of foods due to a lack of resources (4) forced to eat un preferred food due to lack of resources, (5) eating smaller portions, (6) skipping meals, (7) the household ran out of food, (8) going to sleep hungry, and (9) going 24 h without food. To determine the status of food insecurity the average HFIAS score was computed and then household food insecurity access prevalence (HFIAP) categories (food secure, mild, moderately and severely food insecure) was generated [29]. The percentage of households that fall in each food insecurity access scale category, that

is, mildly, moderately and severely, was calculated relatively to the population size of the study.

### Anthropometric measurements

Anthropometric measurements (height and weight) of the children were measured using the standard techniques described by Gibson [30]. All measurement was carried out in the morning between 9 am and 12 pm noon. Weight was measured using a digital weighing scale (Model 880, Seca, Hamburg, Germany) calibrated to the nearest 0.1 kg. Height was measured using a portable measuring unit (Seca Body meter Model 208, Seca, Hamburg, Germany) calibrated to the nearest 0.1 cm. When measuring height, the subject stands straight looking ahead, with Frankfurt plane horizontal, with shoulders blades, buttocks, and heels almost together touching measurement board, arms at sides, legs straight, knees together and feet flat. The instruments were validated daily to ensure consistence in measurements. The body mass index was calculated, with the children categorized as overweight/obese, normal and underweight according to age [31].

### Ethical approval/ informed consent

The study protocol was approved by the ethics committee of Federal University of Technology, Akure, Nigeria (FUTA/2017/019). Informed consent was obtained from parents and guardians of the school children, while the participants were informed that the study would not cause them any harm, and also there was no penalty for those who declined.

### Statistical analysis

Data was processed using the Statistical Package Software for Social Sciences (SPSS) - 16 computer software. The means of anthropometric measurements (i.e., height and weight) were expressed in mean (± SE). The descriptive values were also expressed

as percentages of the study population. For nutritional index, that is, Body Mass Index (BMI-for-age) was calculated and the distributions were expressed in percentage of the proportion. Chi-square was used to determine level of significance ( $p < 0.005$ ) between the categories of nutritional classifications and gender (male and female adolescents).

## Results and Discussion

The study population was adolescents (10-20 years) in secondary schools. The population size was 2000 participants, and out of which 52.3% were males; while the remaining were females (47.7%). The socio-economic status of respondents' parents is presented in (Table 1). The educational attainment of the family head of respondents showed that 19.1% completed primary school, 33.1% secondary school and 27.8% tertiary education; while the remaining parents (20.0%) did not have any formal education. The average monthly income of the family heads showed that 63.7% earned less than twenty-five thousand Naira per month (\$71.4), while the remaining head of families earned above twenty-five thousand Naira per month (\$71.4). The occupation of respondents' family head showed that large proportion engaged in farming (44.1%), while others were self-employed (31.1%) and civil servants (21.8%). From the present study, it could be deduced that large proportion of the study population earned less than one dollar (\$1) per day, and this indicates level of poverty [32]. It is well established that low-income can lead to household food insecurity, which in turns causes continuously insufficient nutrient intakes of household members, hence, poor growth and health status [33,34].

The prevalence of household food insecurity of the adolescents' families in Lagos state is presented in (Figure 1). The prevalence of households were 15.9%, 8.0% and 4.6% for mildly, moderately and severely food insecure respectively, while the remaining families were food secured (71.6%). The proportion of households who were food insecure in this present study could be attributed to low-income that common among the respondents, due to economic recession in the country. However, the prevalence of food insecurity observed in this present study was comparatively lower when compared to the findings from other developing countries [35-37].

The mean anthropometric measurements and body mass index (BMI) of adolescents is presented in (Table 2). The mean weight, height and BMI of the female and male respondents were  $47.6 \pm 1.4$  -  $48.4 \pm 1.7$ ,  $1.57 \pm 0.01$  -  $1.61 \pm 0.00$  and  $19.6 \pm 0.3$  -  $19.3 \pm 0.4$  respectively, and these values were higher when compared to the values obtained by Ahmad et al. [38], who reported weight of  $46.4 \pm 11.5$  and  $47.1 \pm 9.2$  kg, height of  $158.2 \pm 11.2$  and  $155.7 \pm 6.5$  cm and BMI of  $18.3 \pm 2.7$  and  $19.3 \pm 3.1$  kg/m<sup>2</sup> for male and female adolescents respectively in Sokoto State of North-Western Nigeria. In this presents study, the mean weight, height and BMI of respondents were increasing with age, and were higher in male than female, except for BMI, where female had the higher values compared to male counterparts. This observation could be attributed to the variation in genetic and hormonal factors [39].

The prevalence of underweight and overweight/obesity among the adolescents is presented in (Figure 2). Prevalence of underweight was higher in male adolescents (47.1%) than female (38.0%) counterparts, whereas, the prevalence of overweight/obese in female (7.6%) was higher when compared to that of male (6.0%) counterparts. The disparity between prevalence of underweight and overweight/obesity among male and female adolescents in this present study could be attributed to factors like gender, genetic and degree of physical

**Table 4:** Correlations between age, weight, height and body mass index (BMI) of Adolescents.

		Age	Weight	height	BMI
Age	Pearson Correlation	1	0.541**	0.233**	0.310**
	Sig. (2-tailed)		0	0	0
	N	2000	2000	2000	2000
Weight	Pearson Correlation	0.541**	1	0.353**	0.746**
	Sig. (2-tailed)	0		0	0
	N	2000	2000	2000	2000
Height	Pearson Correlation	0.233**	0.353**	1	-0.073**
	Sig. (2-tailed)	0	0		0.001
	N	2000	2000	2000	2000
BMI	Pearson Correlation	0.310**	0.746**	-0.073**	1
	Sig. (2-tailed)	0	0	0.001	
	N	2000	2000	2000	2000

\*\* : Correlation is significant at the 0.01 level (2-tailed)

activities [40,41]. Besides, it is evident that female adolescents are usually engage in consumption of high calorie drinks and sedentary activities like watching television and indoor games when compare to male counterparts, and these may have all contributed to increase in overweight/obesity [42,43]. The high prevalence of underweight and overweight/obesity that was observed among adolescents in this present study agreed with other report [44-46]. The overall prevalence rate (6.8%) of obesity in this present study was lower than those obtained in developed countries like USA (15%), UK (20%), France (14%), Russia (6.7%), and China (3.6%) [47]; and this variation could be due to differences in economic standards.

The association between the respondents' household food security status and nutritional outcome is shown in (Table 3). The nutritional status, that is, body mass index, of the respondents was significantly and positively associated with household food security (OR=1.03,  $p=0.004$ ). This finding agreed with other scientific studies [48-51]. Epidemiological studies have established that household food insecurity influence nutritional outcome of children by compromising the quantity and quality of their dietary intakes [52,53]. (Table 4) shows that there was positive and negative correlation between BMI and weight and height of adolescents respectively. The relationship between growth patterns (i.e., weight and height gained) in children are the main indicators that commonly used to assess the nutritional and health outcome of a population as children are the most vulnerable to nutritional imbalances [54].

## Conclusion

The present study evaluated household food security status and nutritional status of adolescents from selected local government areas of Lagos state, Nigeria. The findings showed high prevalence of household food insecurity among the respondents' families, which varied between mildly, moderately and severely, while nutritional outcome of the respondents equally showed high prevalence of underweight and emerging prevalence of overweight and/or obesity among adolescents. In view of this, there is a need for nutrition and economic intervention programmes to ensure optimal nutrition among the children. This would go a long way in promoting good nutrition and health status of the children, and also economic development of the country.



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