Nutritional Status of Urban Households: The Case of Adolescents in South Eastern Nigeria

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ABSTRACT

***Background:** Adolescence is a unique, critical period of growth and development, therefore they require adequate nutrients.*

***Objective:** This investigated the nutritional status of adolescents in urban households of South Eastern Nigeria.*

***Methods:** The study adopted a cross-sectional design. Multi-staged sampling techniques were used to select 3 persons in 422 households (1266 participants) in 3 selected states in the South Eastern in a larger study of which and 244 adolescents participated from the households. A semi-structured questionnaire containing demographic, socio-economics characteristics and anthropometric measurements was used to elicit information. A total of ten per cent (10%) of the sample size was used to assess 3–day weighed food. Data was analyzed using descriptive statistics.*

***Result:** Findings showed that there was a high prevalence of stunting, 12.3% and 27.9% were severely stunted and stunted respectively. 14.3% and 11.9% of the adolescents were wasted and overweight respectively. The majority of the adolescents did not meet the recommended nutrient intake. Vitamin A deficiency was seen in 76.5% of adolescents, 64.7%, 88.2%, 82.4% and 58.8% were calcium, iodine, Iron and zinc deficiency respectively. It also revealed that more than twenty in ten (25.4%) of the adolescents consume their meal twice per day and lunch was the most skipped meal (17.6%). Reasons for meal skipping was that food was not affordable by 66%.*

***Conclusion:** There is a high prevalence of stunting and wasting among adolescents. The majority of them did not meet the recommended nutrients.*

Keywords: Households, adolescents, nutritional status, consumption pattern, stunting

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INTRODUCTION

Adolescence is a unique, critical period of growth and development and they undergo the second growth spurt. They are the key to breaking the intergenerational cycle of malnutrition, poverty food insecurity and undernutrition affecting the economic development of the society (1). Damie et al. (2) indicated that adolescence is the second most critical period of physical growth in the life cycle after the first year of infancy. Studies on adolescent malnutrition are limited much attention has not been given to their nutrient deficiencies like the under-five children despite their increased nutritional vulnerability (3,23,43). Adolescents in developing countries have encountered many nutritional problems such as undernutrition, which affects their growth spurt as well as their health (4). They are going through the second growth spurt this period and is crucial that they receive the required nutrients, very little attention has been paid to adolescents and their nutrition has received inadequate attention. During adolescence, the attainment of the most favorable growth is essential

to maintain good health (5).

Suboptimal dietary practices result in either limited access to the food supply or inadequate knowledge of a good quantity and quality diet to consume (6). The effect of food insecurity on the dietary intake is very common. When food supplies are constrained, household members including adolescents are exposed to the use of coping strategies that compel them to reduce the quality and quantity of food consumed (7) and this situation affects nutritional status. Every adolescent needs food to have appropriate nutritional status and to sustain life (8). For growing adolescents protein is important for growth, maintenance and protection of the body and adequacy of protein quantity and protein quality in the diet are important to guarantee obtaining all the essential amino acids (9). Deficiency of these nutrients can lead to impaired growth and development.

Adolescent nutrition is given less attention in nutrition policies and programs of low-income countries, which might explain the high prevalence of both acute and chronic malnutrition among adolescents in developing countries (10). In a study conducted by Kumar et al, the prevalence rate of thinness was 13.0% (11). According to Gezawalet et al. (12), they pointed out that the overall underweight prevalence of 60.6% with a higher prevalence among boys (63.0%) than girls 56.7%. Underweight is more prevalent among boys because they engage in more physically demanding activities (11). Ene-Obong et al. in their study indicated that obesity is higher among adolescents 10-18 years (13%) than among children 5- 9 years of age (9.4%) and is highest (23.1%) at 15 years of age (13). In addition, the study done by Neha et al. (14) reported that almost all the adolescents in the study area had poor dietary intakes, over one quarter (30%) reported that they do not consume vegetables and 70% of children reported eating three or more servings of energy-dense snacks. Therefore, there is a need to assess the nutrition status among adolescents in selected households and determine their dietary intake using weighed food intake.

MATERIAL AND METHODS

Study Area

The study area was South Eastern Nigeria, one of the country's six geopolitical zones. The zone has a population of over 16 million people (NPC, 2006). It is made up of Abia, Anambra, Ebonyi, Enugu and Imo state. These states made up of the southeast of Nigeria have common boundaries with each other.

Study Design

This study was a cross-sectional descriptive study and was carried out in randomly selected urban areas of South Eastern Nigeria.

Sampling Techniques

Multi-stage sampling techniques were employed to select the Local Government Areas (LGAs) that were used in the study. In the first stage, three states were selected out of five states in South Eastern Nigeria by simple random sampling (SRS) technique, three states namely Abia, Ebonyi and Imo state were picked. From the three states that were picked, a list of Local Government Areas (LGAs) was obtained from the National Population Commission (2006) where the LGAs were stratified into rural and urban LGAs.

Sample size Calculation

Sample size was determined using Fisher's formula

$$n = Z2\ P(100-p)/X2\ ,$$

n= number of household,
P= prevalence of households assumed to be food insecure = 40% (41),
Z= 955 confidence interval for 1.96.

The total number of households calculated was 384 adding 10% attrition= 422 households. A simple random sampling technique without replacement was used to select the 422 households was used in a larger household study and 3 persons were selected in each household making a total of 1266 of which 244 adolescents were randomly selected from 422 selected households. The sample size for this study was 244 adolescents who were randomly selected. The sub-sample for nutrient intake was conducted on 10% of the sample size

Ethical Consideration

Ethical approvals were obtained from Federal Medical Centre, Umuahia (FMC/QEH/G.596/Vol.10/220), Federal Medical Centre, Owerri (FMC/OW/HREC/94) and Afikpo North LGA (AFLG/AD/22179/6). Permission was sought from the chairmen of the selected LGAs that were visited.

Data Collection

A semi-structured pre-tested interviewer-administered questionnaire designed to elicit information on household demographic and socio-economic characteristics, anthropometry (height and weight) and weighed food intake study.

Dietary intake

Three days weighed food intake were assessed 2-week day and 1 weekend, excluding the festive days. All foodstuff used for the preparation of the meal, cooked food, quantities consumed at meal, leftover foods, plate – waste, discarded food and snack were weighed and calculated. Food consumed were also weighed, samples collected and put in a clean container, each container were coded, stored in a small cooler with ice-block to prevent spoilage.

Anthropometric Measurement

The adolescent's height was measured to the nearest 0.1 centimetre (cm) using a portable stadiometer. The respondents were asked to stand on the base parallel to each other, arms hanging at their sides, shoulders relaxed and heads healed comfortably erect. A flat board attached to the rod was used to make contact with a subject´s head. Weight was measured using the Hana Mechanical Bathroom Scale (BR model) of 120kg capacity. Each respondent was weighed barefoot with minimal clothing. The respondents were asked to stand erect on the Centre of the scale with arms hanging at the sides naturally. The measurement was taken to the nearest 0.1kg. The weight, height and age of respondents were used to compute z-scores for the respondents using the WHO Anthro Plus package. Body mass index-for-age of respondents and Height-for-Age (HAZ) less than -2 standard deviation (SD) and BMI-for-age were used to determine the prevalence of stunting and thinness. This was compared with WHO (2007) (16) growth reference standard.

Proximate analysis and vitamin/mineral determination

Nutrient intake of energy, Protein, vitamin A, vitamin C, iron, iodine and zinc both for adolescents was analysed using standard method described by AOAC (2010) and compared with the reports of Joint WHO/FAO Expert Consultation (2004) (17), the protein was compared with WHO (2007) (16) carbohydrate were compared with FAO/WHO (1998) (18) fat FAO/WHO (1994) (19) and calcium FAO/WHO (2002) (20).

Statistical Analysis

Data collected from the questionnaire on socio-economic and demographic characteristics of households, food security, coping strategies and nutrient intake was coded using an Excel Microsoft worksheet and analyzed using the Statistical Software, Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive statistics such as frequencies, percentages, mean and standard deviation were calculated.

RESULTS

Demographic and Socio-economic Characteristics of the adolescent´s household.

Table 1 shows the Socio-demographic and Socio-economic Characteristics of the respondents. Of a total number of 244 adolescents, 36.9% and 63.1% of the respondents were male and female respectively. The mean age of the respondents was 15.1±2.06 years. The adolescent household size showed that the majority (73.0%) of the households had 1-6 persons. The majority 87.7% were in the monogamous family. The table also depicted that the highest educational level of 32.8% and 26.2% of the adolescent households obtained First School Leaving Certificate (FSLC) and Senior School Certificate Examination (SSCE) respectively. Almost five in ten (48.8%) of the adolescents' households were traders while 11.9% and 18.9% of them were farmers and civil servants respectively. Also, the estimated monthly income of the adolescents' household was presented in the table. It depicted that 36.1% of the respondents earn less than N10,000, 24.2% earn between N11,000 - N20,000 monthly, 13.9% earn between N21,000-N30,000 monthly, 7.4% earn N31,000-N40,000 monthly while 12.7% of the respondents earn N51,000 and above monthly.

Anthropometric status of adolescents

Table 2 describes the anthropometric status of adolescents. The result depicted that a prevalence of 12.3% of the total adolescents were stunted of which 10.0% and 13.6% of the adolescent male and females were severely stunted respectively. However, 27.9% of all adolescents were moderately stunted, and 24.4% and 27.3% of males and females were moderately stunted males respectively. The BMI-for-age of the adolescents revealed that the severity of thinness among adolescents was 14.3% of which 11.1% and 16.2% of the adolescent males and females were thin.

Table 1: Demographic and Socio-economic Characteristics of the adolescent´s household (n=244)

Variables		Frequency	Percentage
Sex of Adolescents			
	Male	90	36.9
	Female	154	63.1
Household (HH) size	1 – 6	178	73.0
	7 – 12	56	23.0
	13 – 18	10	4.0
Marriage Type	Monogamy	213	87.3
	Polygamous	10	4.1
	Single parents	21	8.6
Educational qualification of HH	FSLC	80	32.8
	SSCE	64	26.2
	NCE/OND	52	21.3
	B.Sc./HND	34	13.9
	Post Graduate	13	5.3
	No School Attainment	1	0.4
Primary Occupation of HH	Trading	119	48.8
	Farming	29	11.9
	Civil Servant	46	18.9
	Pensioner	7	2.9
	Skilled Worker	43	17.6
Monthly Income Earned	Less than ₦10000	88	36.1
	₦11000 – ₦20000	59	24.2
	₦21000 – ₦30000	34	13.9
	₦31000 – ₦40000	18	7.4
	₦41000 –₦ 50000	14	5.7
	₦51000 and above	31	12.7

Table 2: Anthropometric indices (height-foe-age and BMI-for-age) of the adolescents according to sex (n=244)

Variables		Male F (%)	Female F (%)	Total F (%)
Height-for-Age/stunting				
	Severe (-3SD)	9 (10.0)	21(13.6)	30 (12.3)
	Moderate(-2SD)	22 (24.4)	46 (27.3)	68 (27.9)
	Normal	59 (65.6)	91 (59.1)	146 (29.8)
BMI- for age	Severe wasting (-3SD)	3(3.3)	9 (5.8)	12 (4.9)
	Moderate wasting(-2SD)	7 (7.8)	16 (10.4)	23 (9.4)
	Normal	69 (76.7)	111 (72.4)	180 (73.8)
	Overweight (+2SD)	10 (11.1)	16 (10.4)	26 (10.7)
	Obese (+3SD)	1 (1.1)	2 (1.3)	3 (1.2)

Nutrient Intake Adequacy of the Food Consumed by the Adolescents.

Table 3 revealed the result on the nutrient intake adequacy of the food consumed by the adolescents. The majority 75.0%, 70.8%, 66.7%, 75.0% and 70.8% of the adolescents had inadequate intake of energy, carbohydrate, vitamin A, iodine and iron respectively with mean of 1685.64±381.57, 245.78±58.50, 492.16±177.85, 17.44±9.34 and 13.69±6.57 respectively. More so, 58.3% of the adolescents had calcium and zinc below the recommended nutrient intake respectively. The table also showed that 62.5% of the respondents had fat and 70.8% had protein and vitamin A above the recommended nutrient intake.

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Food Consumption Pattern of Adolescents

Table 4 shows the food consumption pattern of adolescents. It revealed that more than twenty in ten (25.4%) of the respondent reported consuming their meal twice per day. However, lunch was the most skipped meal by 17.6% of the adolescents. The reason for skipping meals by 66.1% of the adolescents was that food is not affordable and 27.4% indicated that food not available was their reason.

DISCUSSION

Adolescents are key to breaking the intergenerational cycle of malnutrition, poverty and food insecurity and their under-nutrition affects the economic development of the society (1). Damie et al. indicated that adolescence is the second most critical period of physical growth in the life cycle after the first year of infancy (2). Shriven et al. (21) revealed that they are the future generation of any country and meeting their nutritional needs is critical for the well-being of a society (21). The rapid growth involved in the adolescence period requires and demands increased dietary requirements for healthy living and quality health of life among adolescents. The respondents for this study were adolescents between the age range of 11-18 years and the mean age was 15 ± 2.06 years, this is similar to research conducted by Omobuwa et al. (22) where the mean age of the respondents was 15.67± 1.2 years and another researcher reported that the mean age of adolescents used in their study was 14.2 ±1.2 years, this is a bit lower than the mean age used in this study (23). From the table, 36.9% and 63.1% of the adolescents were male and female respectively. This could be the fact that female adolescents are more available in the household. The majority (73.0%) of the adolescents' households are within the range of 1-6 persons and mostly live in monogamous families (87.3%). More than half (50%) of the adolescent parents (32.8%) and (26.2%) had attended primary (FSLC) and secondary (SSCE), although, (5.3%) had a postgraduate certificate. This is similar to the study carried out by Omobuwa et al. where the majority (90%) of the adolescent parents had attended at least secondary education. (22). The high number of traders found in this study could be a reflection of a low level of education. The household average monthly income distribution revealed that (36.1%) of the respondents earned below 10,000 and (24.2%) earned 11,000- 20,000, 5.7% earned 41,000- 50,000 per month, though only (12.7%) of the respondents earned 51,000 and above. High income improves the standard of living hence the quality of life. Averett maintained that households with less income experience hunger more than those that have higher incomes and also spend less on food (24). This affects the nutritional status of the individuals especially the vulnerable. The study showed that lunch was the most skipped meal (17.6%) and (6.6%) of the adolescents skipped breakfast. This result is higher than the study by Otuneye et al. who reported that (9.5%) of their adolescents skipped breakfast, lunch and dinner (25). The main reason for skipping meals by (66.1%) of adolescents was that food is not affordable.

The study also depicted that stunting and thinness were the problems affecting adolescents, the prevalence of stunting was (40.2%), and previous studies reported a lower prevalence (26, 23, 27). The prevalence of stunting was higher in females (39.6%) than in males (34.4%) in this study and this was in disagreement with the study by Akhimienho and Uwaibi who reported that 60.8% of males and 39.5% of female of adolescents in their study area in

Table 3: Nutrient intake adequacy of the food consumed by sex of the respondents (n=24)

Nutrients	MALE Inadequate F (%)	Adequate F (%)	FEMALE Inadequacy F (%)	Adequacy F (%)	Mean ± SD
Energy(kcal/day)	7 (77.8)	2(22.2)	11 (73.3)	4(26.7)	1685.64±381.57
Protein(g/day)	3(33.3)	6 (66.7)	4(26.7)	11(73.3)	54.42±11.02
Fat(g/day)	4(44.4)	5 (55.6)	5 (33.3)	10 (66.7)	58.81±14.51
Carbohydrate(g/day)	6(66.7)	3(33.3)	11 (73.3)	4(26.7)	245.78±58.50
Vitamin A (mcg)	6 (66.7)	3(33.3)	10 (66.7)	5 (33.3)	492.16±177.85
Vitamin C(mg)	3(33.3)	6 (66.7)	4 (26.7)	11 (73.3)	104.50±149.85
Calcium (mg)	3 (33.3)	6 (66.7)	12 (80.0)	3 (20.0)	1122.48±600.45
Iodine	7(77.8)	2 (22.2)	11 (73.3)	4 (26.7)	17.44±9.34
Iron (mg)	5(55.6)	4 (44.4)	12(80.0)	3 (20.0)	13.69±6.57
Zinc (mg)	4 (44.4)	5 (55.6)	10 (66.7)	5 (33.3)	4.46±2.29

Table 4: Food Consumption Pattern of Adolescents (n=244)

Variables		Frequency(F)	Percentage (%)
Number of Meals Consumed per Day			
	Once	-	-
	Twice	62	25.4
	Thrice	169	69.3
	Four times and above	13	5.3
Meal Usually Skipped	Breakfast	16	6.6
	Lunch	43	17.6
	Dinner	3	1.2
	No Skipping	182	74.6
Reasons for Skipping Meal	Not Affordable	41	66.1
	Not Available	17	27.4
	Usually not Hungry	4	6.5
Factors that affect the choice of food	Food cost	107	43.9
	Likes/dislikes	94	38.5
	Availability	38	15.6
	Choice of breadwinner	5	2.0
Living conditions that affect the choice of food	Poor storage facilities	68	27.8
	Poor cooking facilities	113	46.3
	Both poor storage/cooking facilities	46	18.9
	Lack of preparatory facilities	17	7.0

Uyo Urban communities in Akwa-Ibom state were stunted (28).

The prevalence of thinness in this study was 14.3% similar to the study of Uwakwe et al. (23) where they reported 14.4%, a lower prevalence (12.4%) was reported from other studies (25, 29). A higher prevalence (53.8%) was observed by several studies by Deshmukh et al. (30) and Gadanya et al also reported 55.4% in Kano (31). However, in India, the prevalence of thinness is 28-40%. The prevalence of thinness was 43.5% and 34.4% for males and females in this study and this result was consistent with Omobuwa et al. (22) who revealed that the prevalence was higher in males than females' counterparts at 41.4% and 23.4% respectively. In the study by Singh et al.(32) on the assessment of nutritional status among adolescents, a hospital-based cross-sectional disagreed and revealed that the prevalence was higher in females than males, 27.5% and 25.9% respectively (32).

One in ten (11.9%) of the adolescents in this study were overweight/obese. The prevalence of 25.0% overweight and 6.1% obesity was reported by Calista et al (2) who assessed; Dietary Practices, Nutrient Adequacy, and Nutrition Status among Adolescents in boarding schools in Ethiopia. This result was higher than the prevalence observed in this study (2). The overall prevalence found by Worku et al.(33) determined the prevalence and associated factors of overweight and obesity among high school adolescents in Bahir Dar City, Northwest, Ethiopia revealed that (12.5%) of the adolescents in the area were overweight/obese (33). Moreso, the prevalence was higher in males (13.3%) than females (11.5%) and this was consistent with the result found in this study where the prevalence of overweight/obesity was higher in males than females, 12.2% and 11.7% respectively.

Adolescent nutrition is very essential not only to improve health and reduce the risk of malnutrition but also to prevent malnutrition-related diseases/conditions later in life. The quality and quantity of food consumed are crucial as they affect the amount of nutrients consumed. Energy intake of adolescents showed that 75% did not meet the recommended nutrient intake, 70.8%, 66.7%, 75%, and 58.3% of respondents were deficient in carbohydrates, vitamin A, iodine, iron and zinc respectively. The nutrient intake of carbohydrates and energy was below the recommended nutrient intake, 70.8% and 75%respectively. This was consistent with the findings of a study done in India, which reported low energy intake among adolescents (34). However, adolescents tend to underreport/misreport food intake might contribute to the underestimation of energy intake (35).

Results of fat intake showed that 62.5% of the adolescents met the recommended nutrient intake adequate intake of fat. Fat acts as a source of energy enhances the absorption of fat-soluble vitamins and is an essential component of the membrane and certain hormones (36). WHO recommended that less than 30% of the daily energy be from fat. Fat improves the palatability of foods and also high intake of fat increases the risk of overweight/obesity hence increasing the risk of nutrition-related diseases later in life (37).

Micronutrient adequacy during adolescence is essential not only to support adolescents' health status but also for their future health in adulthood (38). The increased demand for micronutrients during adolescence is contributed by growth spurt and hormonal changes. Micronutrient deficiencies during adolescence can cause impaired growth, delayed sexual maturation, and poor reproductive outcomes later in life, particularly among girls (39). Findings in this study indicated that micronutrient intake such as calcium, zinc, iron, and vitamin C was below the RDA for both sexes, adequate calcium intake is important for bone development during adolescence and for the prevention of osteoporosis in adulthood (40). About 45% of adult bone mass development occurred during adolescence (39).

The food consumption pattern depicted that 25.4% of adolescents skipped meals, 6.6% of them skipped breakfast, 17.6% lunch and 1.2% skipped dinner per day. This skipping of meals could affect the amount of nutrients consumed per day and invariably have a detrimental effect on their health. The reason for skipping meals as revealed by the adolescents was that foods not affordable were indicated by 66.1%, 27.4 availability and 6.5% adolescents usually not hungry. Money must be available to enable adolescents to afford the foods needed for healthy living. That is the reason Lokosang et al (41) indicated that individuals and households must have sufficient income to purchase food and adequate access to food depends on the household's purchasing power. Households with the lowest income may not be able to diversify their diet as it depends on the purchasing power and access to a variety of food for the household members which may affect the adolescent positively or negatively. Moreover, four in ten (43.9%) and (38.5%) revealed that food cost and likes/dislikes respectively affect their food Consumption. The living conditions that affected the choice of food for the adolescents were poor cooking facilities (46.3%) and (27.8%) poor

storage facilities.

CONCLUSION

Adolescents are vulnerable and deserve special attention in nutrition because adult health can be affected by nutrition during adolescence. A high prevalence of stunting and thinning among adolescents was observed in this study. The majority of them do not meet the recommended nutrient intake of most micronutrients. The poor nutritional status of adolescents could be attributed to nutritional inadequacy during the early stage of life. Moreover, insufficient availability of food in the household also can lead to under-nutrition. Undernutrition is an indicator of poor nutrition and has major consequences on their health. Nutrition education is needed to inform adolescents and even parents of the importance of adequate nutrition to reduce/prevent the double/triple burden of malnutrition, which mostly co-existed.

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