



## **Nutrients Intake of Adults in Urban and Rural Households in Abia and Ebonyi States, Nigeria**

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Author HNEO designed the study and corrected the draft while author GID performed the statistical analysis, wrote the protocol, wrote the first draft of the manuscript, managed the analyses of the study and also managed the literature searches. Both authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/JSRR/2017/36265

#### Editor(s):

(1) Surapong Pinitglang, Department of Food Science and Technology, School of Science and Technology, University of the Thai Chamber of Commerce, Thailand.

#### Reviewers:

(1) Kelly Barnhill, USA.

(2) Miguel Guzman-Rivero, Universidad Mayor de San Simón, Bolivia

Complete Peer review History: <http://www.sciencedomain.org/review-history/21892>

**Original Research Article**

**Received 21<sup>st</sup> August 2017**  
**Accepted 12<sup>th</sup> September 2017**  
**Published 13<sup>th</sup> November 2017**

### **ABSTRACT**

**Aim:** This study assessed the energy and nutrient intakes of adults in Nigerian urban and rural households.

**Methods:** The study was conducted in forty (40) households comprising of 41 adult males and 58 adult females selected from two states (Abia and Ebonyi States) out of the five States that make up the south-eastern Nigeria. A multi-stage sampling technique was used in the selection of households. A three-day weighed food intake was conducted in all the selected households to estimate the quantity of foods consumed by the adult family members. Nutrient intakes of individual adult family member were calculated using food composition tables and compared with the recommended nutrient intake (RNI). Data were analysed using descriptive statistics. Student's t-test was used to compare means across locations (urban/rural) and significance accepted at  $p = 0.05$ .

**Results:** Energy intake was lower for Abia subjects (72.9-95.6% RNI) than for Ebonyi (96.3-104.7% of RNI). Protein intake ranged from 66.4-113.2% of RNI in Abia and 74.2-98.9% of RNI in

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Ebonyi. Irrespective of location, female subjects had very low intake of iron (37.8-49.8% of RNI) compared to their male (91.6-126% of RNI) counterparts. Zinc intake (92.1-123.3% of RNI) was much better than calcium intake (50.9-80.9% of RNI) in both states irrespective of gender. Vitamins A (190.0-698.8% of RNI) and C (262.4-463.3%) intakes were adequate for all subjects investigated. Thiamin, riboflavin and niacin intakes were generally low (46.6-88.2%) in Abia and (54.7-91.1%) in Ebonyi States. There were few exceptions: Adult males and females in urban Ebonyi met 117.7 and 91.3% of their RNI for thiamin respectively.

**Conclusion:** Rural and urban female subjects in both States did not meet their recommended iron requirement and the urban subjects had higher intake in most nutrients than their rural counterparts in Abia State while in Ebonyi State, the reverse was the case for calcium, vitamin A and vitamin C.

*Keywords: Energy; nutrients intake; percentage of RNI; urban-rural adult; household; Nigeria.*

## 1. INTRODUCTION

Good nutrition involves consuming a variety of foods in reasonable quantity. According to Merck [1], nutrients are substances in food that cannot be seen with the naked eyes but are needed for the proper functioning of the body and for good health. The most important aim of any government of any country is to achieve a reasonable level in the standard of living and general well-being of every individual through self-sufficiency in food production and consumption. Without sustainable food security, nutrition adequacy cannot be achieved [2]. Food security refers to the condition in which all people at all times have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs for an active and healthy life [3]. A household is food secured when it has regular access to adequate food and income capacity to purchase to food [4]. In the same vein, nutrition security is achieved for a household when secure access to food is coupled with a sanitary environment, adequate health services, and adequate care to ensure a healthy life for all household members. Inconsistent food security results in inadequate dietary intake, which leads to malnutrition. Malnutrition is the most serious consequence of food insecurity. Adult malnutrition results in a lower productivity on farms and in the labour market. In women, it also results in fetal malnutrition and low birth weights [4].

For farm households in rural areas, food availability means ensuring that sufficient food is available for them through their own production or purchase from markets. However, due to lack of adequate storage facilities and pressing needs, they mostly end up selling excess produce during the harvesting period, and sometimes rely on market purchases during the hungry season thereby creating a situation of

food insecurity for most rural farm producers and households.

In 1900, worldwide, there were 6.7 rural dwellers to each urban dweller; now the ratio is less than 1.0 and projections suggest close to three urban dwellers to two rural dwellers by 2025 [5]. Rapid urbanisation also signifies increased reliance on the market to supply food needs. There is a very large urban population worldwide with incomes so low that their health and nutritional status are at risk from any staple food price. This has become evident with the rising hunger among urban populations after the food price rises in 2007 and the first half of 2008 [6]. Even though reliable statistic on urban hunger and malnutrition are not currently available, there is no doubt that hunger and malnutrition are severe contributors to and consequences of the urban poverty syndrome [5]. As poverty in urban areas is mainly concentrated in the overcrowded shanty towns and slums, the brunt of nutritional deprivation is borne by their inhabitants and among them are adult men and women who may even sacrifice their foods to other younger family members at critical conditions.

Urban poverty in developing countries is receiving increasing attention as development issues. The World Bank has highlighted urban poverty as the major challenge facing the next decade [7]. Though malnutrition is a direct consequence of poverty, information on nutrition among urban and rural dwellers in the face of urbanization is very limited. It has been rightly observed that recent food consumption data from urban areas of developing countries are scarce and data comparing urban and rural household food consumption are even more scarce [5]. Such data are needed in a country like Nigeria for a current, adequate and critical analysis of food and nutrition security situation. This study is, therefore, aimed at providing current information

on the food and nutrition situation of urban and rural households in Nigeria.

## 2. METHODOLOGY

### 2.1 Study Area

Two out of the five states that make up the south-eastern Nigeria were selected for the study. Two Local Government Area were purposefully selected from each of the two states (Abia and Ebonyi) due to the differences in their food consumption pattern. In each of the selected Local Government Areas, two communities were also purposefully selected (one urban and rural community) making a total of four communities. Five willing families were used in each community for the study.

### 2.2 Informed Consent

In each community, the community based facilitator was connected through the community resource person. The researcher enlightened the community based facilitator on the aim and the expected results of the study and also solicited for support, co-operation and consent. The community based facilitator mobilized the willing families who were used for the study.

### 2.3 Weighed Food Intake

A 3 –day weighed food intake was carried out in five willing households in each community. The weighed food intake was done by weighing the raw ingredients used to prepare the food separately prior to cooking. The cooking pot (empty) with lid was weighed before cooking. After cooking, the cooked food was weighed with the pot and then the initial weight of the pot was subtracted to obtain the actual weight of the food. The portions of food consumed by adult male and female members in each household were weighed and subtracted from the weight of the whole food to get the left over. The subjects were also instructed to report any food consumed outside the home.

The nutrient content of all the foods eaten within the three days by the subjects was calculated using food composition tables. Foods not found in the food composition tables were chemically analysed. The adequacy of energy and nutrient intake was estimated as percentage of FAO/WHO requirement for each group using the formula:

$$\frac{\text{Nutrient intake}}{\text{Nutrient requirement}} \times \frac{100}{1}$$

### 2.4 Data Analysis

Data were analysed using Statistical Product for Service Solution (SPSS) version 21 for frequencies, percentages, means and standard deviation. Student's t- test was used to compare the nutrient intake of the subjects in rural and urban households in Ebonyi and Abia State. Statistical Significance was at p=0.05.

## 3. RESULTS AND DISCUSSION

In Table 1, it can be seen that the adult males in urban Abia State met their recommended intake for most of the nutrients examined except for niacin (61.9%). The adult females on the other hand did not meet their requirement for protein (66.4%), calcium (58.3%), iron (37.8%) and niacin (48.7%). Energy, protein, iron, zinc and thiamin intake were adequate (83.0, 69.7, 91.6, 92.1 and 86.7%). Calcium and riboflavin were moderate (56.4 and 51.5%) while niacin intake was low (46.6%). Iron intake by the adult females was low (41.1%) while their energy protein and thiamin intake (98.3, 77.6 and 88.2%) was adequate. Table 2 revealed that the energy (108.00%), protein (91.4%), iron (103.4%), zinc (98.1%), vitamin A (516.0%), thiamin (91.25%) and vitamin C (348.3%) intake of the adult males in urban Ebonyi State was adequate while their calcium, riboflavin and niacin intake (56.45, 62.7 and 54.7%) was moderate. The energy (116.7%), protein (98.9%), zinc (151.0%) vitamin A (501.4%), thiamin (117.7%), riboflavin (71.8%) and vitamin C (301.7%) intake of the adult females was adequate but iron intake was low (44.5%). The adult male in rural Ebonyi State met their energy (117.1%), protein (96.3%), calcium (76.1%), iron (123.3%), vitamin A (543.8%) thiamin (75.0%), niacin (73.6%) and vitamin C (402.6%) required intake. Their intake for riboflavin (65.8%) was below the recommended requirement. The adult females met their energy and nutrients requirement except for iron (49.8%), riboflavin (59.1%) and niacin (62.1). Statistically, higher intake of energy and most of the nutrients was observed among Urban Abia subjects when compared with their rural counterpart (Table 3), in Ebonyi State, the reverse was the case for some micronutrients such as calcium, vitamin A and vitamin C (Table 4).

**Table 1. Energy and nutrient intake of adult males and females in Abia State expressed as percentage FAO requirements**

Subjects	Adequacy of intake	Energy (Kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Zinc (mg)	Vitamin A RE(ug)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)
Adult male(rural) [12]	Mean Intake	2041.8 ±103.3	34.2 ±4.3	564.0 ±42.32	10.1 ±3.2	6.5 ±0.1	715.6 ±43.6	1.04 ±0.00	0.7 ±0.3	7.5 ±2.1	208.5 ±4.5
	Requirement for age\sex Intake as percentage requirement	2800	49.0	1000.0	11.0	7.0	600.0	1.2	1.3	16.0	45.0
Adult female (rural) [19]	Mean Intake	2104.2 ±5.3	34.9 ±5.2	509.0 ±75.3	9.9 ±0.8	5.9 ±1.0	949.9 ±10.2	1.0 ±0.1	0.7 ±0.9	8.0 ±1.0	118.1 ±73.3
	Requirement for age\sex Intake as percentage requirement	2,200	45.0	1000.0	24.0	4.9	500.0	1.1	1.1	14.0	45.0
Adult male (urban) [7]	Mean Intake	2496.3 ±93.3	55.5 ±2.3	816.1 ±27.3	13.9 ±1.2	8.6 ±0.1	2044.8 ±43.7	1.4 ±0.0	1.0 ±0.2	9.9 ±1.1	191.3 ±5.5
	Requirement for age\sex Intake as percentage requirement	2800.0	49.0	1000.0	11.0	7.0	600.0	1.2	1.3	16.0	45.0
Adult female (urban) [14]	Mean Intake	1831.9 ±31.3	29.9 ±5.1	583.3 ±55.3	9.1 ±0.6	5.6 ±0.8	1536.2 ±8.2	0.9 ±0.1	1.8 ±0.2	6.8 ±0.6	160.3 ±53.3
	Requirement for age\sex intake as percentage Requirement	2200.0	45.0	1000.0	24.0	4.9	500.0	1.1	1.1	14.0	45.0
		83.3	66.4	58.3	37.8	114.7	307.2	82.7	161.8	48.7	356.1

*Figures in parenthesis show the number of subjects in each group*

**Table 2. Energy and nutrient intake of adult males and females in Ebonyi State expressed as percentage FAO requirements**

Subjects	Adequacy of intake	Energy (Kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Zinc (mg)	Vitamin A RE(ug)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)
Adult male (rural) [13]	Mean Intake	2870.5 ±83.3	47.2 ±1.1	761.2 ±42.3	13.6 ±3.2	8.6 ±0.0	4,192.6 ±53.7	0.9 ±0.0	0.9 ±0.3	11.8 ±2.1	206.5 ±4.5
	Requirement for age\sex Intake as percentage requirement	2800	49.0	1000.0	11.0	7.0	600.0	1.2	1.3	16.0	45.0
Adult female (rural) [13]	Mean Intake	2266.2 ±15.3	33.4 ±5.1	809.1 ±75.3	11.9 ±0.8	7.3 ±1.0	2718.8 ±10.2	0.8 ±0.1	0.7 ±0.1	8.7 ±1.0	181.2 ±43.3
	Requirement for age\sex Intake as percentage requirement	2200.0	45.0	1000.0	24.0	4.9	500.0	1.1	1.1	14.0	45.0
Adult male (urban) [9]	Mean Intake	2697.0 ±53.2	44.8 ±1.0	564.5 ±62.3	11.4 ±3.2	6.9 ±0.0	3096.1 ±53.7	1.1 ±0.0	0.8 ±0.3	8.8 ±2.1	156.8 ±4.5
	Requirement for age\sex Intake as percentage requirement	2800	49.0	1000.0	11.0	7.0	600.0	1.2	1.3	16.0	45.0
Adult female (urban) [12]	Mean Intake	2302.0 ±16.3	44.5 ±5.2	511.5 ±75.3	10.7 ±0.8	7.4 ±1.0	2506.9 ±10.2	1.3 ±0.1	0.8 ±0.8	8.5 ±1.0	135.8 ±43.7
	Requirement for age\sex intake as percentage Requirement	2200	45.0	1000.0	24.0	4.9	500.0	1.1	1.10	14.0	45.0
		104.7	98.9	51.2	44.5	151.0	501.4	117.7	71.8	60.5	301.7

*Figures in parenthesis show the number of subjects in each group*

Energy and protein intake of adult males in rural Abia State were 72.9% and 69.7% of their recommended requirement. Among the rural and urban adult females, protein intakes were 77.6 and 66.4% respectively. Inadequate energy and protein intake observed in Abia State could be due to the fact that several million Nigerians live in extreme Poverty. These values were higher than those reported by International Conference on Nutrition (ICN) [8] which showed that low-income rural and semi-urban adult dwellers in Nigeria consume less than 60% and 40% of their energy and protein needs. The finding of this study revealed that there is food insecurity in both urban and rural households of Abia State since they could not meet their daily energy and protein required intakes. The fact that households that are food insecure face both energy and protein deficiencies has well been established. Kirkpatrick and Tarasuk [9] found a negative association between household food insecurity with protein and energy intake. Studies have also shown that malnutrition in Nigeria is rampant and often severe. According to Christopher and Alabi [10], a quarter of all under nourished West Africans reside in Nigeria. This confirmed the high prevalence of food insecurity (70%) found in some selected local government areas in Ibadan and Lagos State, Nigeria [11]. This supported the assertion by Folaranmi [12] that despite the general worldwide reduction in food insecurity, Africa's food security and nutrition situation is growing worse. Africa has been experiencing several episodes of acute food insecurity causing an immense loss of life and livelihoods over the past decades [13]. Hungry and malnourish adults are unable to be fully reproductive workers and are more likely to be ill, increasing the burden on health system [14]. The aggregate cost of food and nutrition insecurity in Africa imposes a heavy burden on efforts to foster sustained economic growth and improve general welfare.

There were general low micronutrients (calcium, riboflavin and niacin) intake among all the population groups in both states. This finding is in line with existing literatures. A study of rural farming women in south-eastern Nigeria showed low riboflavin, iron and niacin intake [15]. According to Steyn and Nel [16], niacin, thiamin and riboflavin intake were low in both South African and Kenyan women. The reason for inadequate micro nutrient intake could be because a high percentage of the population in south eastern Nigeria depended almost solely on starchy staples like cassava, yam and rice which

are poor sources of so many micronutrients. It has also been observed that people living in developing countries have less access to a good and regular supply of food due to poverty levels and other environmental factors such as seasonal availability of food materials, cultural belief, drought and famine [17]. Though micronutrients are needed only in small amounts, the consequences of their absence in the human body can be very severe. An inadequate diet can have disastrous impacts on health ranging from minor effects such as tiredness and less alertness to more severe effects such as diabetes. In addition to the adverse health effects posed by micronutrient deficiencies, it also has severe implications on economic development and productivity [17]. Dairo and Ige [18] found out that micronutrient deficiencies are becoming widespread especially in those countries in the developing part of the globe. According to Hale [19], it is no longer a question of treating severe deficiency in individuals. It is a question of reaching out to whole populations to protect them against the devastating consequences of even moderate forms of vitamin and mineral deficiencies.

Calcium's major role is in the development of strong bones and healthy teeth. Calcium deficiency however, does not only result in the deterioration of bone metabolism and cardiovascular system [20] but has been implicated with the development of high blood pressure [21]. When it comes to neurological concerns, thiamin (vitamin B<sub>1</sub>), riboflavin (vitamin B<sub>2</sub>), niacin (vitamin B<sub>3</sub>) and other B group of vitamins are especially important. These B group of vitamins have specific effects on the brain cell functions and their deficiencies lead to different neurological and psychological problems [22]. According to Peking, [23] riboflavin and niacin decreases the incidence of esophageal cancer by 14%. In the absence of nutrition interventions, deficiencies of these micronutrients among Nigerians may have far-reaching nutritional and health implications in the near future.

The result of this study also indicated that low iron intake (37.8-49.9%) was observed particularly among the females in both States and locations. This finding agrees with previous studies carried out in Nigeria. For instance, in Zaria, Calabar and Port-harcourt, the prevalence of iron deficiency among non-pregnant women of reproductive age were 46% [24], 39.5% [25] and 24.4% [26] respectively. According to Agabi [27], statistics have shown that one out of two women

of reproductive age in Nigeria is anaemic. Iron deficiency, including its most severe form- iron deficiency anemia (IDA), has been found to be the most common and widespread micronutrient deficiency worldwide [28,29]. Studies have also shown that iron deficiency is more prevalent in population groups that have high iron requirement because of rapid growth or blood loss. The population groups most vulnerable to developing iron deficiency are infants, children and women of reproductive age [29]. Iron is essential to all cells. Functions of iron includes involvement in energy metabolism, gene regulation, cell growth and differentiation, oxygen binding and transport, muscle oxygen use and storage, enzyme reactions, neurotransmitter synthesis and protein synthesis [30,31,32]. Iron deficiency has a massive and almost totally unrecognized economic cost. It adds to the burden on health system, affects learning and school performance and reduces adult productivity [33]. The world Bank, World health Organization (WHO) and Harvard university list iron deficiency anemia as having a higher overall cost than any other disease except tuberculosis [34].

The study revealed that vitamin A and C intake among the subjects in both States and across location were quite high. This was expected because red palm oil is a major cooking oil in Nigeria and it is an excellent source of  $\beta$ -carotene which is a precursor of vitamin A. Cassava and yam might have contributed to the high vitamin C intake because they were usually consumed in large quantities by the subject. This finding is in line with that of Okeke et al. [35] who found out that intake of vitamin A (332.12%) and ascorbic acid (363%) in South-eastern Nigeria were higher than the FAO/WHO recommended intake.

The result of the study showed that nutrient intake of the adult males in urban Abia State was higher than that of their female counterpart. For instance, protein, iron and thiamin intake for adult males and females were 113.2 and 66.4 g; 126.0 and 37.8 mg; 113.0 and 82.7 mg respectively. This finding could be attributed to sex disparities in intra household food distribution which have been indicated in many studies [36]. In a study carried out in Bangladesh by Roy et al. [37] women agreed that they had been observing gender discrimination favouring males in food distribution from their very youth. They reported having seen the very same practice among their mothers, mothers-in-law, and sisters-in-law. They also agreed that it is likely that they will

transfer the same practices to their own daughters. Based on another study in Nepal, Gittelsohn [38] observed that males accepted preferential food allocation. In the study carried out in south eastern Nigeria, women unanimously agreed that "the best portion of food goes to husbands" while the men also were of the opinion that 'a good woman (wife) must serve her husband first and give him the best portion of the meal because he is the head of the family [15].

The study also revealed that energy intake was adequate among adult males and females in both urban and rural communities of Ebonyi State. In Nigeria, Ebonyi State is known for food crop farming, particularly rice. It could be that the subjects might have been economically empowered (through rice farming) to purchase other starchy staples such as cassava and yam which are energy dense. Though these staple are poor protein sources, high protein intake (74.17-98.9%) was surprisingly observed among these subjects. It could be that dry crayfish contributed to the high protein intake of the subject since it was a major component of commonly consumed dishes in Southern Nigeria. According to Ene-Obong et al. [39] dry crayfish is a cheap protein source with about 70% protein.

Energy and nutrient intake in Abia state were significantly higher in the urban than rural areas (Table 3). This is in line with the report by Viteri [40], who stated that protein and energy deficiency is less prevalent in urban than rural. This finding however disagrees with the report of Jansen et al. [41] who found that urban dietary intakes are of poorer quality than that of the rural. In Ebonyi State however, energy and nutrient intake were generally higher in the rural than urban (Table 4). This finding was attributed to the fact that majority of the adults in rural Ebonyi State were farmers and produced their own foods. According to Kakona- Apte [42], many rural families especially in Africa own small pieces of land on which they grow part of their food or from which harvest surpluses are available. This finding agreed with that of Jansen et al. [41]. Though Ferroni [43] found no clear-cut variation in the incidence of protein-energy deficiency along rural/urban lines. Atkinson [44] however concluded that intake is more affected by low income than by urban or rural residence. Hani and Ashraf [45] reported that some of the urban poor may be more vulnerable to food insecurity than the rural poor who may be engaged in subsistent agriculture.

Table 3. Comparison of the energy and nutrient intake of adult males and females in rural and urban Abia State

Subjects	Mean intake	Energy (Kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Zinc (mg)	Vitamin A RE(ug)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)
Adult males (rural)	Mean Intake	2041.8 ±103.3	34.2 ±4.3	564.0 ±42.3	10.1 ±3.2	6.5 ±0.1	715.6 ±43.6	1.0 ±0.0	0.7 ±0.3	7.5 ±2.1	208.5 ±4.5
Adult males (urban)	Mean Intake	2496.3 ±93.3	55.5 ±2.3	816.1 ±27.3	13.9 ±1.2	8.6 ±0.1	2045.0 ±43.7	1.4 ±0.0	1.0 ±0.2	9.9 ±1.1	191.3 ±5.5
	<b>P-value</b>	<b>0.045</b>	<b>0.032</b>	<b>0.032</b>	<b>0.031</b>	<b>0.021</b>	<b>0.080</b>	<b>0.041</b>	<b>0.012</b>	<b>0.012</b>	<b>0.045</b>
Adult females (rural)	Mean Intake	2104.2 ±5.3	34.9 ±5.1	509.0 ±75.3	9.9 ±0.8	5.9 ±1.0	949.8 ±10.2	1.0 ±0.1	0.7 ±0.1	8.0 ±1.0	118.1 ±73.3
Adult females (urban)	Mean Intake	1831.9 ±31.3	29.9 ±5.1	583.3 ±55.3	9.1 ±0.6	5.6 ±0.8	1536.2 ±8.2	0.9 ±0.1	1.8 ±0.2	6.8 ±0.6	160.3 ±53.3
	<b>P-value</b>	<b>0.021</b>	<b>0.031</b>	<b>0.089</b>	<b>0.910</b>	<b>0.956</b>	<b>0.043</b>	<b>0.976</b>	<b>0.014</b>	<b>0.065</b>	<b>0.015</b>

Table 4. Comparison of the energy and nutrient intake of adult males and females in rural and urban Ebonyi State

Subjects	Mean intake	Energy (Kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Zinc (mg)	Vitamin A RE(ug)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)
Adult male (rural)	Mean Intake	2870.5 ±83.3	47.2 ±1.1	761.2 ±42.3	13.6 ±3.2	8.6 ±0.0	4,192.6 ±53.7	0.9 ±0.0	0.9 ±0.3	11.8 ±2.1	206.5 ±4.5
Adult male (urban)	Mean Intake	2697.0 ±53.2	44.8 ±1.0	564.5 ±62.3	11.4 ±3.2	6.9 ±0.0	3096.1 ±53.7	1.1 ±0.0	0.8 ±0.3	8.8 ±2.1	156.8 ±4.5
	<b>P-value</b>	<b>0.051</b>	<b>0.068</b>	<b>0.031</b>	<b>0.079</b>	<b>0.053</b>	<b>0.031</b>	<b>0.086</b>	<b>0.089</b>	<b>0.046</b>	<b>0.045</b>
Adult female (rural)	Mean Intake	2266.2 ±15.3	33.4 ±5.1	809.1 ±75.3	11.9 ±0.8	7.3 ±1.0	2718.8 ±10.2	0.8 ±0.1	0.7 ±0.1	8.7 ±1.0	181.2 ±43.3
Adult female (urban)	Mean Intake	2302.0 ±16.3	44.5 ±5.2	511.5 ±75.3	10.7 ±0.8	7.4 ±1.0	2506.9 ±10.2	1.3 ±0.1	0.8 ±0.1	8.5 ±1.0	135.8 ±43.7
	<b>P-value</b>	<b>0.800</b>	<b>0.060</b>	<b>0.042</b>	<b>0.650</b>	<b>0.078</b>	<b>0.034</b>	<b>0.090</b>	<b>0.080</b>	<b>0.087</b>	<b>0.045</b>



They also stipulated that within the next 20 years, more poor and undernourished people in developing countries will live in cities than in the countryside.

#### 4. CONCLUSION

Rural and urban female subjects in both States did not meet their iron requirement and the urban subjects (both male and female) had higher intake in most nutrients than their rural counterparts in Abia State while the reverse was the case for calcium, vitamin A and vitamin C in Ebonyi State. Vitamin A and vitamin C intake in both States were higher than the FAO/WHO recommended requirement. Macro and micro nutrient deficiencies are still major nutritional challenges facing both rural and urban Nigerian population.

#### 5. RECOMENDATION

Based on the findings of this study, nutrition intervention in the form of micro nutrient (calcium, iron, vitamin B<sub>1</sub>, vitamin B<sub>2</sub> and vitamin B<sub>3</sub>) fortification of the starchy staples consumed in these two state as well as nutrition education for better food choices need urgent attention. Economic empowerment that will lead to a more purchasing power is also urgently needed particularly in the two States and entire South-eastern Nigeria.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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