Assessment of Nutrient Intake among Rural Farming Households in Imo State, Nigeria

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ABSTRACT

***Background**: Adequate nutrient intake is one of the key promoters of good health. An inadequate diet, poor in both quantity and quality constitutes the major reason for high level of malnutrition among farming households.*

***Objective:** The study assessed nutrient intake among rural farming households in Imo State, Nigeria.*

***Methods:** A four-staged sampling technique was used to select a total of 122 farming households in Imo state. Purposively, caregivers in each of the selected households were interviewed. Analysis of nutrient intake was performed using Food Processor Software version 11.7.1, while all statistical analysis were performed using SPSS version 23.0. Usual nutrient intake of the farming households' caregivers were compared with the Dietary Reference Intake (DRI). Caregivers' anthropometric parameters were obtained using standard instruments.*

***Results:** Averagely, households' breadwinner's monthly income, years spent in education by households' caregivers, and household size were ₦45000±33500, 12.99±2.53, and 5±2 respectively. Almost half (51.6%) of the households' caregivers had normal weight. Average contribution of protein, fat and carbohydrate to the total energy intake were adequate for the households' caregivers. Compared to recommendations, all the caregivers aged 19-30 years had inadequate intakes of vitamins D and K. Over 83.0% of the households' caregivers aged 31-50 years had inadequate intake of calcium. However, more than 78.0% of the households' caregivers in each of the age group had excess intake of copper.*

***Conclusion:** The study therefore concludes that mean intake of potassium, calcium, vitamins D and K for the farming households in the study area were inadequate, while protein intake was adequate.*

Keywords: Farming households, nutrient intake, energy, caregivers.

INTRODUCTION

Agriculture remains the backbone of Nigeria's economy, providing employment for about 35% of the population [1, 2] and contributes about 30 percent to the overall Gross Domestic Product (GDP) [3]. According to Ngongi and Urassa [4], rural households in Nigeria are mostly engaged in agriculture either as a primary or secondary means of livelihood and are responsible for more than half of the nation's food production [5]. It is expected that food production by these rural farming households should provide a sustainable pathway out of poverty and contribute to household and national food security, but contrary to this expectation, the rural households

remained deprived, malnourished and marginalized thus resulting to high prevalence of malnutrition among them [6, 7, 8, 9].

Although malnutrition is widespread in Nigeria, studies have shown higher burden of malnutrition among rural households when compared to urban households [10, 11]. Despite the importance of the rural farming households in promoting food security and economy of the nation, there is no national report on the nutritional status of this sub-population. Pockets of studies across northern and southern regions of Nigeria have reported inadequate intakes of energy, carbohydrates, protein, fibre, potassium, iron, vitamins A and C, calcium, phosphorus, potassium and zinc among rural farming households [12, 13, 14]. Inadequate intake of energy among rural households constitute a red flag suggesting food insecurity and shortfall of several other multiple micronutrients among this group.

Though previous studies have identified some nutritional insights prevailing among the rural farming households [12, 13], yet, information provided is narrowed to average intakes of a limited number of nutrients. Also, previous studies did not compare energy intake to estimated energy requirement [12, 13, 14]. In addition, the distribution of the energy sources in relation to the acceptable macronutrient distribution range is not known. This is important particularly in Nigeria where staple foods are largely plant based starchy roots and tubers or cereals. Providing a detailed information on the nutrient intake of rural farming households in Nigeria, will form a basis for developing a tailored-nutrition education geared towards promoting dietary behavioral changes that would ensure adequate nutrition among this important group.

Based on the foregoing, this study was designed to assess nutrient intake among rural farming households.

Materials and methods

The study was descriptive, cross-sectional, and adopted a four-stage sampling technique in selecting the farming households.

The first stage involved selection of two agricultural zones (Owerri and Orlu zones) out of three agricultural zones in Imo state. The second stage involved selection of two agricultural blocks (Owerri west and Oguta blocks) from Owerri zone and three blocks (Ideato south, Orlu, and Ideato north blocks) from Orlu zone. The third stage involved selection of agricultural cells from the selected blocks as follows: Obinze, Eziobodo, Umuagwo, and Ihiagwa (Owerri West block); Umuokwu, Ugbele, Amakofia, and Orsu (Oguta block); Ogboko, Umuma Isiaku, Umuchima, and Ugbelle (Ideato South block); Osina, Akokwa, and Urualla (Ideato North block); Umuna, Amaifeke, Ihioma, Umutanze, and Okporo (Orlu block). In the final stage, farming households from the chosen agricultural cells were selected as follows: Obinze (5), Eziobodo(7), Umuagwo(6), and Ihiagwa(5) (Owerri West block); Umuokwu (3), Ugbele (9), Amakofia (6), and Orsu (4) (Oguta block); Ogboko (6), Umuma Isiaku (5), Umuchima (3), and Ugbelle (11) (Ideato South block); Osina (8), Akokwa (11), and Urualla (6) (Ideato North block); Umuna (8), Amaifeke (8), Ihioma (4), Umutanze (3), and Okporo (4) (Orlu block). The agricultural zones, blocks, cells and farming households were selected by simple random sampling. A total of one hundred and twenty two farming households were selected for the study.

In all the sampled farming households, caregivers who did not give their consent to participate as well as those with pregnant woman as the caregiver were excluded from the study, while non-pregnant caregivers who gave their consent were chosen to represent the household. Their anthropometric indices were measured and they were asked to recall all the foods, drinks, and beverages eaten in the immediate past 24 hours of the survey. The age of the households' caregivers in the study area was categorized into two groups based on age categorization for Dietary Reference Intakes (DRI) recommendations [16]. These two groups are 19 – 30 years and 31 – 50 years.

Indigenous enumerators familiar with the foods in each study area were used for proper collection and recording of the data. Data on farming households' socioeconomic attributes such as household size, monthly income of households' breadwinners, years spent in education by the households' caregivers, etc were obtained using structured questionnaire. Anthropometric parameters (body weight and height) of the households' caregivers were collected. A 24-hour dietary recall was used to record what the farming households consumed on the immediate past 24 hours of the survey. Foods, beverages, and water consumed and the quantity consumed (either in standard units or monetary values) were recorded. Analysis of nutrient intake was performed using ESHA's Food Processor ®

Nutrition Analysis software version 11.7.1.

Estimated Energy Requirement (EER) was calculated for each household's caregiver using [15] equation based on their age, body weight, height, sex and Physical Activity Level (PAL). The PAL of the farming households' caregivers was adjudged as 'very active' due to the strenuous activities (such as land preparation, weeding, planting, harvesting, processing, etc) involved in farming. Estimated Energy Requirement calculated as described by Institute of Medicine [15] was adopted. Usual nutrients' intake was compared with the Dietary Reference Intake. Macronutrients' intakes were evaluated as percentage of total energy intake. Inadequate or excessive intake of macronutrients was classified as percentages less than the lower limit or higher than the upper limit of the acceptable macronutrient distribution ranges (AMDR), while intake within the AMDR were adjudged adequate. Vitamins and minerals' intake were compared with either Estimated Average Requirement (EAR) or Adequate Intake (AI) or Tolerable Upper Intake Levels (UL). Usual intake of vitamins or minerals below EAR/AI was adjudicate as inadequate, intake within EAR/AI and UL was adjudged adequate, while intake above UL was arbitrated as excess. For nutrients that do not have established UL, intake below EAR/AI indicate inadequate while intake equal to EAR/AI and above denote adequate. When a nutrient does not have any known issue if taken in excessive doses, it is not assigned a UL.

Body Mass Index (BMI) that is weight/height^2 (kg/m^2) was calculated for each household caregiver. Estimates of weight/height^2 was categorized into four using [9] standards as follows: 'BMI below 18.5 kg/m^2 = underweight', 'BMI between 18.5 kg/m^2 – 24.9 kg/m^2 = normal weight', 'BMI between 25.0 kg/m^2 - 29.9 kg/m^2 = overweight', and 'BMI of 30.0 kg/m^2 and above = obese'.

All statistical analysis was performed using Statistical Package for the Social Sciences (SPSS), version 23.0.

Results

Socioeconomic attributes of the rural farming households in Imo state

Table 1 shows the distribution of the socioeconomic attributes of the rural farming households in the study area. The findings showed that the average monthly income of the farming households' breadwinners was ₦45000±33500, average number of years spent in education by the caregivers was 12.99±2.53 years and the size of the farming households ranged between 2 to 16 persons per household with an average of 5±2. Household size between 5 and 16 persons constituted a higher percentage (62.3%), while household size between 2 and 4 persons constituted a lower percentage (37.7%). Farming households in Imo state cultivated between 0.06 and 20 hectares with average cultivated farm size of 1.16±1.74 hectares. Majority (98.4%) of the farming households cultivated between 0.06 and 9.9 hectares (small scale farmers) while 1.6% cultivated between 10 and 20 hectares. The finding on the type of farming enterprise of the farming households in the study area indicated that 68.0% engaged in crop cultivation, 31.2% engaged in both crop and livestock farming, while 0.8% engaged in poultry. Table 1 also showed that, 32.0% of the farming households' caregivers were between the age of 19 and 30 years, while 68.0% were between 31 and 50 years.

Rural farming households' caregivers' Body Mass Index

The result of the rural farming households' caregivers' Body Mass Index as presented in Table 2 showed that 51.6% had normal weight (BMI between 18.5 kg/m^2 and 24.9 kg/m^2), 21.3% were underweight (BMI less than 18.5 kg/m^2), 18.9% were overweight (BMI between 25 kg/m^2 and 29.9 kg/m^2), while 8.2% were obese (BMI of 30.0 kg/m^2 and above).

Energy and nutrients intake of rural farming households' caregivers aged 19- 30 years

The result on energy and nutrients intake of rural farming households' caregivers aged 19 and 30 years is presented in Table 3. The result showed that the mean calorie intake of the caregivers was 2900.20±915.62 kcal/day which exceeded their average Estimated Energy Requirement (2786.32±727.01 kcal/day). Dietary fat contributed 25.89% of the energy and about 34.6% of the caregivers had energy intake from fats below the lower limit of acceptable macronutrient distribution range (AMDR). The mean energy intake from protein was 11.93% and about 25.0% of the caregivers had energy intake from protein below the lower limit of AMDR. Average energy intake from carbohydrate was about 62.18% and about 41.9% of the caregivers had energy intake from carbohydrate above the upper limit of AMDR.

With reference to total dietary fibre, the average intake was 15.48±10.74g/day which is below the Adequate Intake of 25/38g/day.

Table 1: Socioeconomic attributes of the rural farming households in Imo state, n = 122

Variables	Frequency	Percent (%)	Mean	SD
Household's breadwinner's monthly income (₦)				
5000 – 44000	64	52.5	45000	33500
45500 – 100000	58	47.5		
Years spent in education by household caregivers				
1 – 6	7	5.7	12.99	2.53
7 – 12	68	55.7		
13 – 24	47	38.5		
Household size				
2 – 4	46	37.7	5	2
5 – 16	76	62.3		
Households' farm size (hectare)				
0.06 – 9.9	120	98.4	1.16	1.74
10 – 20	2	1.6		
Type of households' farming enterprise				
Crop	83	68.0		
Both crop and livestock	38	31.2		
Poultry	1	0.8		
Households' caregivers' age				
19 – 30 years	39	32.0		
31 – 50 years	83	68.0		

Source: Field Survey, 2022

Table 2: Farming households' caregivers' Body Mass Index, n = 122

Caregivers' Body Mass Index (BMI)	Frequency	Percent (%)
Under-weight (0 - 18.49 kg/m^2)	26	21.3
Normal weight (18.5 - 24.99 kg/m^2)	63	51.6
Overweight (25 - 29.9 kg/m^2)	23	18.9
Obese (30 - 46.6 kg/m^2)	10	8.2

Source: Field Survey, 2022

With respect to vitamins intake, households' caregivers' average intake per day of thiamin, riboflavin, niacin, vitamin C, vitamin A, vitamin B_6, vitamin B_{12}, vitamin D, vitamin E, vitamin K, and folate were 9.70±53.77mg/day, 1.39±0.99mg/day, 15.48±15.30mg/day, 89.70±159.04mg/day, 529.38±1155.93mcg/day, 1.64±3.69mg/day, 11.87±45.47mcg/day, 1.35±2.09mcg/day, 3.94±5.16mg/day, 8.85±14.07mcg/day, and 245.66±189.65mcg/day respectively. On the basis of adequacy of vitamins intake, 46.1%, 33.3%, 46.1%, 61.5%, 56.4%, 69.2%, 100.0%, 94.9%, 100.0%, and 76.4% of the caregivers had intakes below their corresponding Estimated Average Requirements (EAR) in thiamin, riboflavin, niacin, vitamin C, vitamin B_6, vitamin B_{12}, vitamin D, vitamin E, vitamin K, and folate respectively. Low intake of vitamin D from diet may not present a health challenge as the skin has been noted as key means of producing the vitamin and not diet [17].

The average intake of the caregivers for calcium, phosphorus, iron, sodium, zinc, magnesium, potassium, selenium, and copper were 590.77±249.94mg/day, 894.08±421.59mg/day, 22.85±7.39mg/day, 1908.38±1485.90mg/day, 10.35±4.75mg/day, 420.61±189.34mg/day, 2032.16±1255.44mg/day, 54.69±56.53mcg/day, and 68.26±209.51mg/day respectively. On adequacy of minerals intake per day, 83.8%, 22.3%, 79.4%, 36.7%, 48.7%, 20.5%, 97.8%, 54.1% and 87.1% of the caregivers had intake below their individual Estimated Average Requirement (EAR) in calcium, phosphorus, iron, sodium, zinc, magnesium, potassium, selenium, and copper respectively.

Table 3: Energy and nutrients intake of farming households' caregivers aged 19- 30 years

Age groups	EAR/AMDR	AI	UL/AMDR	Mean ±SD	Percentile					% above/below EAR/AMDR/AI
	M/F	M/F	M/F		10th	25th	50th	75th	90th	
Calorie(k/cal)				2900.20±915.62	1948.51	2199.22	2603.20	3290.15	3729.38	
Total fat (%)	20*	-	35*	25.89±10.86	14.92	17.80	24.53	31.28	38.91	34.6%<AMDR
Fat (g/d)	-	-	-							
Protein (%)	10*	-	35*	11.93±3.50	6.43	9.99	12.77	13.91	15.18	25.0%<AMDR
Protein (g/kg/day)	-	-	-	72.48±41.20	25.95	38.97	65.96	97.43	123.91	
CHO (%)	45*	-	65*	62.18±10.89	50.68	55.56	63.37	71.07	74.08	41.9%>AMDR
CHO (g/d)	100	-	-	456.22±141.09	244.36	352.00	477.84	559.95	638.07	
Total fibre (g/day)	-	38/25	-	15.48±10.74	1.44	7.74	15.99	22.53	28.211	
Vitamins										
Thiamin (mg/day)	1.0/0.9	-	-	9.70±53.77	0.37	0.51	0.97	1.53	2.06	46.1%<EAR
Riboflavin (mg/day)	1.1/0.9	-	-	1.39±0.99	0.62	0.77	1.08	1.58	2.20	33.3%<EAR
Niacin (mg/day)	12/11	-	35	15.48±15.30	1.93	5.77	12.82	19.72	32.19	46.1%<EAR
Vitamin C (mg/day)	75/56	-	2000	89.70±159.04	0.00	13.76	43.02	83.05	189.26	61.5%<EAR
Vitamin A (mcg/day)	625/500	-	3000	529.38±1155.93	0.00	7.79	54.18	319.56	2811.92	
Vitamin B_6(mg/day)	1.1/1.1	-	100	1.64±3.69	0.11	0.28	0.99	1.54	2.19	56.4%<EAR
Vitamin B_{12} (mcg/day)	2.0/2.0	-	-	11.87±45.47	0.00	0.00	1.04	2.35	4.46	69.2%<EAR
Vitamin D (mcg/day)	10/10	-	100	1.35±2.09	0.00	0.00	0.05	1.73	4.61	100.0%<EAR
Vitamin E (mg/day)	12/12	-	1000	3.94±5.16	0.20	0.60	2.05	4.77	10.90	94.9%<EAR
Vitamin K(mcg/day)	-	120/90	90	8.85±14.07	0.00	0.75	3.09	10.52	21.73	100.0%<EAR
Folate (mcg/day)	320/320	-	-	245.66±189.65	27.25	103.26	217.10	318.20	437.11	76.4%<EAR
Minerals										
Calcium (mg/day)	800/800	-	2500	590.77±249.94	350.59	436.28	599.85	685.92	863.96	83.8%<EAR
Phosphorus (mg/day)	580/580	-	-	894.08±421.59	389.25	650.59	882.44	1128.41	1405.10	22.3%<EAR
Iron (mg/day)	13.7/29.4	-	-	22.85±7.39	12.74	16.67	22.93	26.50	34.40	79.4%<EAR
Sodium (mg/day)	-	1500/1500	2300	1908.38±1485.90	498.07	836.62	1813.32	2235.78	3054.83	36.7%<EAR
Zinc (mg/day)**	14.0/9.8	-		10.35±4.75	4.35	6.91	10.80	12.78	16.65	48.7%<EAR
Magnesium (mg/day)	330/255	-	350	420.61±189.34	196.99	292.11	384.76	556.13	733.91	20.5%<EAR
Potassium (mg/day)	-	4700/4700	5100	2032.16±1255.44	412.71	1070.96	2142.35	2588.80	3517.57	97.8%<AI
Selenium (mcg/day)	45/45	-	400	54.69±56.53	0.64	6.74	42.35	87.78	154.70	54.1%<EAR
Copper (mg/day)	0.7/0.7	-	10	68.26±209.51	8.40	11.59	19.69	39.78	49.67	87.1%>EAR
EER				2786.32±727.01	2061.51	2125.92	2263.20	2408.67	2567.47	

Source: Field Survey, 2022; The following [15] equations were used to calculate Estimated Energy Requirements (EER):
Adult male = 662 - (9.53 x age [years]) + PA x {(15.91 x weight [kg]) + (539.6 x height [m])};
Adult females = 354 - (6.91 x age [years]) + PA x {(9.36 x weight [kg]) + (726 x height [m]

Energy and nutrients intake of farming households' caregivers aged 31 - 50 years

The result on energy and nutrients intake of the caregivers in the rural farming households aged 31 and 50 years is presented in Table 4. The mean calorie intake of these caregivers (2694.38±785.48kcal/day) surpassed their Estimated Energy Requirement (2185.74±218.66kcal). Dietary fat contributed about 22.24% of their energy intake and 19.9% of the caregivers had energy intake from fat below the lower limit of AMDR. The mean contribution of protein to energy intake was 13.11%, with 2.4% of the caregivers having energy intake from protein below the lower limit of AMDR. Contribution of carbohydrate to energy intake was about 64.65% and 48.7% of the caregivers had intake of energy from carbohydrate below the lower limit of AMDR.

Average fibre intake among the farming households' caregivers was 14.56±10.49g/day.

As regards households' caregivers' intake of vitamins, Table 4 reports that the average intake for thiamin, riboflavin, niacin, vitamin C, vitamin A, vitamin B_6, vitamin B_{12}, vitamin D, vitamin E, vitamin K, and folate were 12.14±55.01mg/day, 1.55±0.78mg/day, 17.32±11.42mg/day, 44.55±126.46mg/day, 213.90±518.22mcg/day, 2.23±5.63mg/day, 25.68±68.14mcg/day, 2.57±2.63mcg/day, 3.09±3.00mg/day, 14.22±14.77mcg/day, and 313.33±208.67mcg/day discretely. On vitamin intake adequacy, 30.8%, 25.6%, 25.6%, 82.1%, 94.8%, 51.7%, 56.5%, 98.7%, 98.7%, 100%, and 56.4% of the caregivers had values below their corresponding Estimated Average Requirement (EAR) in thiamin, riboflavin, niacin, vitamin C, vitamin A, vitamin B_6, vitamin B_{12}, vitamin D, vitamin E, vitamin K, and folate. Also, low intake of vitamin D among this group further buttressed the fact that diet is not the major source of this vitamin.

Mean intake of the caregivers in calcium, phosphorus, iron, sodium, zinc, magnesium, potassium, selenium, and copper were 658.89±459.61mg/day, 942.99±444.28mg/day, 21.39±7.42mg/day, 1574.40±1446.95mg/day, 12.09±7.09mg/day, 331.79±146.96mg/day, 1671.17±963.47mg/day, 68.25±53.08mcg/day, and 110.90±575.57mg/day respectively. On mineral intake adequacy, Table 4 showed that 83.8%, 15.1%, 76.9%, 59.9%, 51.3%, 33.3%, and 33.8% of the caregivers had intake values below their individual EAR in calcium, phosphorus, iron, sodium, zinc, magnesium, and selenium respectively. More so, 2.6% of the caregivers had potassium intake values above Adequate Intake, while 78.7% had copper intake values above Upper Tolerable Intake Level.

Discussion

Following the findings on the socioeconomic attributes of the farming households in the study area, it could be inferred that the households were low-income earners and the possibility of these farming households consuming most of their cultivated agricultural produce is almost indispensable if they were to have proper nutrients for optimal health. Low income is likely to affect nutrient intake negatively. Result on average number of years spent in education implied that majority of the farming households' caregivers who bought, prepared and apportioned foods to every member within the farming households were literate. This is expected to translate to better dietary knowledge towards making good nutritional choices for the household members. Educated caregivers are better aware of the nutritional requirements of their household members. This result corroborated previous study in Benue State [18] where majority of the caregivers in rural farming households spent average of 12 years in education. The size of majority of the farming households were large and were mostly small scale farmers as judged by international standards for classification of farmers [19] whose major farming activities were on crop and livestock.

Nearly half of the farming households' caregivers had double burden of malnutrition expressed as either under-nutrition (manifested as underweight) or over-nutrition (manifested as overweight or obesity). This could be attributed to the large size of their households. While a large household size could imply a sufficient supply of labour for farming activities as submitted by [20], a large farming household size might also delineated over-dependency on household resources to cater for their dietary needs.

From the findings on energy and nutrients intake of the farming households' caregivers in the study area, it could be deduced that the average energy intake per day among the two age groups of households' caregivers exceeded their respective mean Estimated Energy Requirement. It is possible therefore, that the high calorie intake recorded could have accounted for the overweight status of 27.1% of the households' caregivers documented in Table 2 which is similar

Table 4: Mean usual intake of respondent between aged 31-50yrs

Age groups	EAR/AMDR M/F	AI M/F	UL M/F	Intake Mean±SD	Percentile 10th	25th	50th	75th	90th	EAR/AMDR/AI
Calorie(Kcal)				2694.38±785.48	1910.60	2212.79	2570.16	3058.94	3600.45	
Total fat (%)	20*	-	35*	22.24±7.71	13.88	17.79	22.09	26.22	27.74	19.9% <AMDR
Fat(g/day)	-	-	-							
Protein (%)	10*	-	35*	13.11±2.79	10.42	11.14	12.54	14.66	16.67	2.4%<AMDR
Protein (g/kg/day)	-	-	-	87.01±30.46	52.29	65.30	80.96	109.65	126.95	
CHO (%)	45*	-	65*	64.65±8.54	57.06	60.01	64.69	70.60	73.97	48.7%<AMDR
CHO (g/d)	100	-	-	424.42±117.58	275.06	367.02	402.99	472.32	585.68	
Total fibre (g/day)	-	38/25	-	14.56±10.49	3.23	7.68	14.06	20.56	25.80	
Vitamins										
Thiamin (mg/day)	1.0/0.9	-	-	12.14±55.01	0.37	0.78	1.23	1.85	3.01	30.8%<EAR
Riboflavin (mg/day)	1.1/0.9	-	-	1.55±0.78	0.50	1.05	1.57	2.15	2.52	25.6%<EAR
Niacin (mg/day)	12/11	-	35	17.32±11.42	4.97	8.41	15.02	23.89	31.79	25.6%<EAR
Vitamin C (mg/day)	75/56	-	2000	44.55±126.46	0.00	1.42	15.00	41.04	70.67	82.1%<EAR
Vitamin A (mcg/day)	625/500	-	3000	213.90±518.22	1.36	20.92	100.82	198.47	403.09	94.8%<EAR
Vitamin B_6(mg/day)	1.1/1.1	-	100	2.23±5.63	0.28	0.52	1.02	1.45	3.22	51.7%<EAR
Vitamin B_{12} (mcg/day)	2.0/2.0	-	-	25.68±68.14	0.322	1.35	1.68	4.21	105.16	56.5%<EAR
Vitamin D (mcg/day)	10/10	-	100	2.57±2.63	0.03	0.47	1.55	3.84	5.67	98.7%<EAR
Vitamin E (mg/day)	12/12	-	1000	3.09±3.00	0.30	0.80	1.98	4.75	7.48	98.7%<EAR
Vitamin K(mcg/day)	-	120/90	90	14.22±14.77	0.61	3.17	11.39	19.57	30.82	100%<EAR
Folate (mcg/day)	320/320	-	-	313.33±208.67	24.51	196.31	281.54	430.15	613.95	56.4%<EAR
Minerals										
Calcium (mg/day)	800/800	-	2500	658.89±459.61	215.50	338.19	521.80	878.30	1329.09	83.8%<EAR
Phosphorus (mg/day)	580/580	-	-	942.99±444.28	526.22	685.41	867.76	1235.72	1361.12	15.1%<EAR
Iron (mg/day)**	13.7/29.4	-	-	21.39±7.42	12.64	14.75	19.94	27.02	31.70	76.9%<EAR
Sodium (mg/day)	-	1500/1500	2300	1574.40±1446.95	307.79	586.56	1203.63	2412.42	2903.91	59.9%<EAR
Zinc (mg/day)**	14.0/9.8	-	-	12.09±7.09	5.27	8.69	11.09	13.24	19.11	51.3%<EAR
Magnesium (mg/day)	350/265	-	350	331.79±146.96	173.69	249.61	300.54	380.21	514.64	33.3%<EAR
Potassium (mg/day)	-	4700/4700	5100	1671.17±963.47	491.68	1060.01	1506.05	2146.46	3185.04	2.6%>AI
Selenium (mcg/day)	45/45	-	400	68.25±53.08	10.63	28.39	54.73	105.66	137.13	33.8%<EAR
Copper (mg/day)	0.7/0.7	-	10	110.90±575.57	6.55	10.52	14.52	24.62	42.76	78.7%>UL
EER				2185.74±218.66	1914.76	2037.30	2152.61	2321.17	2495.81	

Source: Field Survey, 2022; The following [15] equations were used to calculate Estimated Energy Requirements (EER):
Adult male = 662 - (9.53 x age [years]) + PA x {(15.91 x weight [kg]) + (539.6 x height [m])};
Adult females = 354 - (6.91 x age [years]) + PA x {(9.36 x weight [kg]) + (726 x height [m]

to that reported for farming households in Northwest Nigeria [12]. Cultivation of crops such as cassava, yam, leave yam, etc, as well as low monthly income by majority of the farming households could have made them to depend majorly on their farm produce which is mainly carbohydrate, thus resulting to the high calorie intakes observed among the two groups of the households' caregivers.

The average contribution of protein, fat and carbohydrate to the total energy intake were adequate for the two age groups as their individual mean intake per day was within the acceptable macronutrient distribution range of 10% to 35% for protein, 20% to 35% for fat and 45% to 65% for carbohydrate. However, a critical examination of the caregivers' average energy intake from protein among the two different age groups showed that the older age group (mean = 13.11%) had higher calorie intake from protein than the younger age group (mean = 11.93%). Also the average energy intake from fat showed that the younger caregivers (19 – 30 years) had higher energy intake from fat than the older age caregivers (30 – 50 years). This shows that the older age group eat more protein than the younger group and this may be attributed to Igbo culture which gives more preference to elders over meat and fish.

However, contribution of fat to energy intake slightly exceeded the upper limit of acceptable macronutrient distribution range for younger caregivers at 90th percentile, while contribution of fat to energy intake did not reach the upper limit of acceptable macronutrient distribution range for the older households' caregivers at 90th percentile. With this, it could be said that farming households in the study area consumed foods that were moderate in oil and fat.

The apriori expectation with respect to contribution of carbohydrate foods to total dietary fibre was that high consumption of carbohydrate foods would translate to high total fibre intake and vice versa, but despite high consumption of carbohydrate foods among the farming households in the study area, total dietary fibre appeared low. A critical look into each foods consumed by the farming households indicated that the dietary fibre of some of the carbohydrate based foods (*agidi, moi moi uka, abacha, una, etc*) were removed during processing.

This study observed that the average intake per day of thiamin, riboflavin, niacin, and vitamin B_{12} among the younger group exceeded their individual Estimated Average Requirement while that of the older group, only thiamin, riboflavin, niacin, and vitamin B_{12} intake exceeded their individual Estimated Average Requirement. Mean intake of vitamins D, E, K, and folate were below their respective Estimated Average Requirement for the two age groups.

With respect to minerals, only phosphorus, iron, sodium, zinc, and selenium average intake were adequate for the younger age group; calcium and potassium mean intake were inadequate; while magnesium and copper average intake were excess (exceeded the Tolerable Upper Intake Levels). For the older age group, phosphorus, iron, sodium, zinc, magnesium, and selenium mean intake were adequate; calcium and potassium average intake were inadequate; while copper's intake was excess. Sodium intake for the two age groups were adequate even though average intake for the younger group (1908.38 mg/day) was higher than the older group's mean intake (1574.40 mg/day). It is possible that farming households in Imo State understood the health implications of excessive sodium intake and its attendant effect on cardiovascular health according to [21] as [22] reported that in 2017, three million deaths were attributed to high salt intake globally.

Conclusion

The study concludes that mean intake of potassium, calcium, vitamins D and K for the farming households in the study area were inadequate, while protein, fat, and carbohydrate intakes were adequate.

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