Food Habits and Mini Nutrition Assessment Status of Older Adults (60 Years and Above) in Umuahia South Local Government Area of Abia State.

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ABSTRACT

Introduction: *Malnutrition is one of the most serious problems of the older adults, with degenerative changes resulting in unintended weight loss. These have negative impact on the anthropometric/health status, psychological well-being and the quality of live among the older persons.*

Objective: *The study assessed the food habits and mini nutrition assessment (MNA) status of the older adults in Umuahia South Local Government Area of Abia State.*

Methods: *A multi stage random sampling was used to select the subjects; Two hundred and forty-five (245) subjects (60.8% Female and 39.2% Male) in four clans. A structured and validated questionnaire was used to obtain information on the socio-economic characteristics, food habits and food frequency of the respondents. Mini nutritional assessment (MNA) and anthropometric measurements were carried out. Descriptive statistics was used to analyze data on socio-economic characteristics, food habits and food frequency questionnaire (FFQ) while the mini nutrition assessment was analysed using scores and percentages. Body Mass Index (BMI) and Mid Upper Arm Circumference (MUAC) were computed using standard values, while chi-square was used to identify relationship between food habits and MNA status.*

Results: *The MNA result showed that 65.6% male older adults were at risk of malnutrition compared to 77.2% of their female counterparts. There was significant difference ($P < 0.05$) between skipping of meals, availability of cooked food and MNA status of the older adults.* ***Conclusion:*** *It is important to pay attention to risk factors that could compromise the ability of the older persons to manage their diet.*

Keywords: Food habit, Mini Nutrition Assessment, Older adults.

INTRODUCTION

The nutritional status is a result of nutritional intake, nutrient requirements and influencing factors from the medical, functional, cognitive and social domains (1). In older persons, multi-morbidity is thought to be the most important cause of malnutrition. Imbalance can occur in situations where there is not enough food available (e.g., poverty, self-neglect, problems with shopping or cooking), or when the quality or presentation of food is insufficient. Malnutrition in older persons is almost always a combination of a poor intake on the one hand, and multiple other problems (either in the somatic, functional, cognitive, or social domain) on the other hand. Ojofeitimi, Ijandonola and Jegede (2) reported that the three vulnerable groups (pregnant women, infants and older persons) that face nutritional and public health threats, the older persons are the most neglected. Nutritional interventions could play a role in delaying the degenerative changes and improving quality of life of the older persons. Food habit is indispensable for population-level health promotion and for chronic disease management. However, as adults age, they tend to eat nutritionally suboptimal diets in terms of reduced

variety and fewer vegetables, and thus are unable to meet healthy dietary recommendations (3). As there is a worldwide increase in the number of older adults, so does the need to identify the factors which influence eating habits and consequently how eating habits affect quality of life and survival (3). According to Saka et al. (1) older adults may be more susceptible to arising complications in dietary habits, as a result of adverse social and psychological factors (poverty, isolation, difficulty in purchasing and preparing meals, cognitive decline, and depression). A study carried in Umuahia North Local Government Area Abia State by Nzeagwu and Uwaegbute (4) reported 75% of the older adults studied were vulnerable to malnutrition. Another similar study reported 50% of the subjects were moderately vulnerable to malnutrition (5). Adebusoye, Ajayi, Dairo and Ogunniyi (6) reported that poor nutritional status is a silent, potentially serious and frequently under diagnosed problem of older persons, causing increased morbidity and mortality. It is recognised that those who develop healthy food habits early in life are likely to maintain them into adulthood, and have a reduced risk of chronic diseases such as cardiovascular disease, certain cancers, diabetes and osteoporosis (7). A study carried out in Umuahia South Local Government Area of Abia State reported that 17.63% of older persons in the study area were malnourished (8) but did not take cognizance of their food habits. This study was therefore undertaken to assess the food habits and the mini nutrition assessment status of the older adults (60 years and above) in Umuahia South Local Government Area of Abia State.

Materials and methods

Study design

A cross-sectional study design was used to assess food habits and mini-nutritional assessment status of the older adults (60 years and above) in Umuahia South Local Government Area of Abia State. Prior to the study, the Traditional Rulers (TR) and the Village Heads (VHs) of the various selected clans were paid a visit in order to gain permission to carry out the study. The details of the study were explained to the participants, and those who accepted to participate in the study gave their consent orally.

Study area

Umuahia South is located in Abia Central Senatorial Zone. Its headquarters is at Apumiri in Ubakala. It has an area of 140 km2 and a population of 138,570 at the 2006 census. It is made up of six notable clans namely; Olokoro, Old Umuahia, Omaegwu, Umuokpara, Ubakala and Nkwoachara. The area is situated between 200m and 600m above the sea level in the central part of Abia State. It lies approximately at latitude 150 23N and longitude 70 19E of the equator. The average temperature is 270C.

Study population

The study population was older adults (60 years and above) in Umuahia South Local Government Area of Abia State, Nigeria.

Sample size

The sample size was calculated from the formula: the extended proportion for the determination of the sample size (9).

$$\text{Sample size (n)} = \frac{Z^2 P(100-P)}{X^2}$$

Z = z- value (confidence interval) is 1.96
P= Percentage of malnourished elderly (60 years and above) in Umuahia South Local Government Area of Abia State using the Mini Nutritional Assessment tool = 17.67% (8).
100 – P = percentage of the elderly that are not malnourished
X = width of confidence interval or required precision level taken to be 5% of probability.
Therefore:

$$n = \frac{1.96^2 X 17.6(100-17.6)}{5^2}$$

$$n = \frac{3.84\ X\ 17.6(82.4)}{25}$$

n = 222.75 which is 223 by approximation to nearest whole number.
To make up for the attrition, 10% was added to the estimated sample size.

$$\text{Percentage drop out} = \frac{10}{100} \times \frac{223}{1} = 22.$$

Total number of sample = 22 + 223
= 245.

Sampling procedure

Multi stage random sampling was used in selecting the older adults for the study. Simple random sampling by balloting was used to select four clans from the study area. Seven communities were chosen from the clans. Furthermore, stratified sampling was used to get households with older adults and those without. A sampling frame (list) was drawn showing the list

of households with the older adults. From this list, simple random sampling by balloting was used to select the households with the older adults to be used. Hence, a total of thirty-five (35) older adults were randomly selected from each of the seven (7) communities totalling, two hundred and forty-five (245) respondents.

Data collection methods

A structured questionnaire which was validated by some nutrition researchers, was used. The questionnaire was divided into section A to capture socioeconomic characteristics of the subjects. Section B captured food habits while section C captured the Mini Nutritional Assessment (MNA) short form. The MNA short form was used to identify older adults who were normal, at risk of malnutrition, or malnourished. Section D captured food frequency questionnaire (FFQ), to determine the frequency of consumption of starchy roots and tubers, cereals, legumes, fruits, vegetables, meat and its product, dairy, oil, amongst the older adults.

Anthropometric Measurements

The weights of the subjects were measured using the portable Hanson model bathroom scale. The subjects were made to stand without shoes and wearing light clothes. They were made to stand upright facing forward and looking straight ahead until the reading was taken to the nearest 0.1kg. The weighing scale was zeroed before each reading. Those whose weights could not be measured standing up were excluded from the study. For those without kyphosis, their heights were obtained by using a constructed vertical wooden rod with the tailor's measuring tape (butterfly superior measuring tape in centimeter) attached to the wooden rod. The measurement was taken with the subjects standing erect without foot wears and feet and heels put together, buttocks, heels and back of head touching the upright rod.

The body mass index was calculated from the subjects' height and weight measurements using the formula:

$$\text{BMI} = \frac{Weight(Kg)}{Height\ (m^2)}$$ (10).

The mid upper arm circumference (MUAC) was measured at the level marked as the mid-point for the measurement of the triceps skin fold thickness, located after bending the left elbow at a 90^0 angle (11). The measurement was done by placing the forearm palm across the trunk with the upper arm hanging approximately parallel to the trunk using a fiber flexible tape that was snug around the arm without compressing the tissues. The circumference was recorded to the nearest 0.1cm. Three measurements were taken and the mean calculated (11).

Data and statistical analysis

The body mass index, the mid-upper arm circumference, the height, weight measurements and scores from the mini nutritional assessment (MNA) was calculated and graded using reference classifications.

Mid-upper arm circumference (MUAC):

Males: MUAC of <23 cm =malnourished, MUAC of ≥ 23cm = normal,

Females: MUAC of < 22cm =malnourished, MUAC of ≥ 22cm = normal (11).

Body mass index (BMI):

BMI<18.49kg/m^2 = underweight, BMI between 18.50-24.99kg/m^2 = normal
BMI between 25.00-29.99kg/m^2 = overweight
BMI between 30.00-39.99kg/m^2 = obesity
BMI above 40.00 kg/m^2 = morbid obesity (10).

Mini nutritional assessment (MNA) short form:

Scores of 12 - 14 = normal nutritional status
Scores of 8 - 11 = at risk of malnutrition
Scores of 0 -7 = malnutrition (12).

The data obtained was analyzed using the IBM for windows version 20. Descriptive statistics such as frequency, percentage, scores and cross tabulation was used where applicable. Chi square test was used to determine the relationship between food habits and MNA status.

Results

Table 1a below showed the background information of the older adults studied. Most (60.8%) of the respondents were females while 39.2% were males. Some (32.7%) of the respondents were aged between 60 and 64 years while only 5.7% were aged above 80years.

Table 1a: Background information of the respondents

Variables	Frequency	Percentage
Sex		
Male	96	39.2
Female	149	60.8
Total	**245**	**100.0**
Age in years		
60-64	80	32.7
65-69	60	24.5
70-74	51	20.8
75-79	40	16.3
80 and above	14	5.7
Total	**245**	**100.0**
Religion		
Christian	238	97.1
Tradition	7	2.9
Total	**245**	**100.0**
Marital status		
Single	2	.8
Married	202	82.4
Divorced	11	4.5
Widow	18	7.3
Widower	12	4.9
Total	**245**	**100.0**
Residence		
Urban	7	2.9
Rural	238	97.1
Total	**245**	**100.0**

Table 1b also revealed that more than half of the respondents (59.2%) had no formal education while 28.2%, 9.8% and 2.9% respectively, had primary, secondary and tertiary education. Occupation status of the respondents studied showed that 55.1% of both male and female were found to be farmers, 26.5%, 15.1%, and 0.4%, were traders, pensioners, and civil servant, respectively, while few (2.9%) had no occupation. The average monthly income of the respondents revealed that 40.8% had less than N10,000 monthly incomes, 32.7% were at the average of between N10,100 - N20,000. Very few (14.7% and 9.8%, respectively) of the respondents had their average monthly income within N20,100 - N30,000 and N30,100 - N40,000. Only 2.0% of the respondents had a monthly income of between N40,100 - N50,000. Food expenditure revealed that 42.0% spend less than N2,000 on food weekly. There was an unexpected increase in the percentage (15.1%) of respondents that spend over N5,000 a week on food.

Table 2a below revealed that 12.2% of the respondents who were males had their food prepared by their wives, 22.9% of the respondents had their food prepared by their children. More than half (53.1%) prepared their food themselves while few (11.8%) had their food prepared by others which include house-helps, relatives and friends. Data on the distribution of food supply revealed that (2.9%, 96.3% and 0.8%, respectively) of the respondents got their food from market, farm, and donations. Information gotten from the respondents on who does their shopping for food showed that, 49.8% shop for themselves, few (26.9%) had their food shopped by their children, 0.8% had their house helps shop for them while 22.5% of their spouses shopped for them.

Table 1b: Socio-economic characteristics of the respondents

Variables	Frequency	Percentage
Educational status		
Primary	69	28.2
Secondary	24	9.8
No formal education	145	59.2
Tertiary	7	2.9
Total	**245**	**100.0**
Occupation		
Farmer	135	55.1
Trader	65	26.5
Pensioner	37	15.1
Civil servant	1	0.4
No occupation	7	2.9
Total	**245**	**100.0**
Average monthly income		
Less than N10,000	100	40.8
N10,000- 20,000	80	32.7
N20,100-30000	36	14.7
N30,100-40,000	24	9.8
N40,000- 50,000	5	2.0
Above 50,000	0	0
Total	**245**	**100.0**
Amount spent on food in week		
Less than N2,000	103	42.0
N2,000- 3,000	43	19.2
N3,100-4,000	57	23.3
N4,100-5,000	1	.4
Above N5,000	37	15.1
Total	**245**	**100.0**
Sources of income		
Selling of fire wood	31	12.7
Bricklayer	14	5.7
Petty trading	85	34.7
Assistance of children	89	36.3
Possession of some form of investment	12	4.9
Working on some one's farm	14	5.7
Total	**245**	**100.0**

Table 2b showed that 42.5% of the respondents skipped their meals while 57.5% reported that they do not skip their meals. About 6.1% of the respondents reported that they do not feel hungry. Very few (8.2%) of those who skipped meals reported that it was as a result of their health condition. Result from favourite foods revealed that half (50.2%) of the respondents had their favourite foods as garri. However, few (16.7%) of the respondents gave a report that rice was their favourite food.

Table 2a: Food habits of the respondents

Variables	Frequency	Percent
Availability of cooked food		
Wife	30	12.2
Children	56	22.9
Myself	130	53.1
Others	29	11.8
Total	**245**	**100.0**
Food supply		
Market	7	2.9
From farm	236	96.3
From donations	2	.8
Total	**245**	**100.0**
Shopping for food		
Self	122	49.8
Children	66	26.9
House-help	2	.8
Spouse	55	22.5
Total	**245**	**100.0**

Table 2b: Food habits of the respondents

Variables	Frequency	Percentage
Skipping meals		
Yes	104	42.5
No	141	57.5
Total	**245**	**100.0**
Meals skipped		
No response	141	57.5
Breakfast only	15	6.1
Lunch only	69	28.2
Super only	20	8.2
Total	**245**	**100.0**
Reasons for skipping		
No response	141	57.5
Do not feel hungry	15	6.1
My normal habit	69	28.2
Health reason	20	8.2
Total	**245**	**100.0**
Favourite foods		
Rice	41	16.7
Cassava flakes	30	12.2
Garri	123	50.2
Fruits	42	17.1
	9	3.7
Others (beans)		
Total	**245**	**100.0**

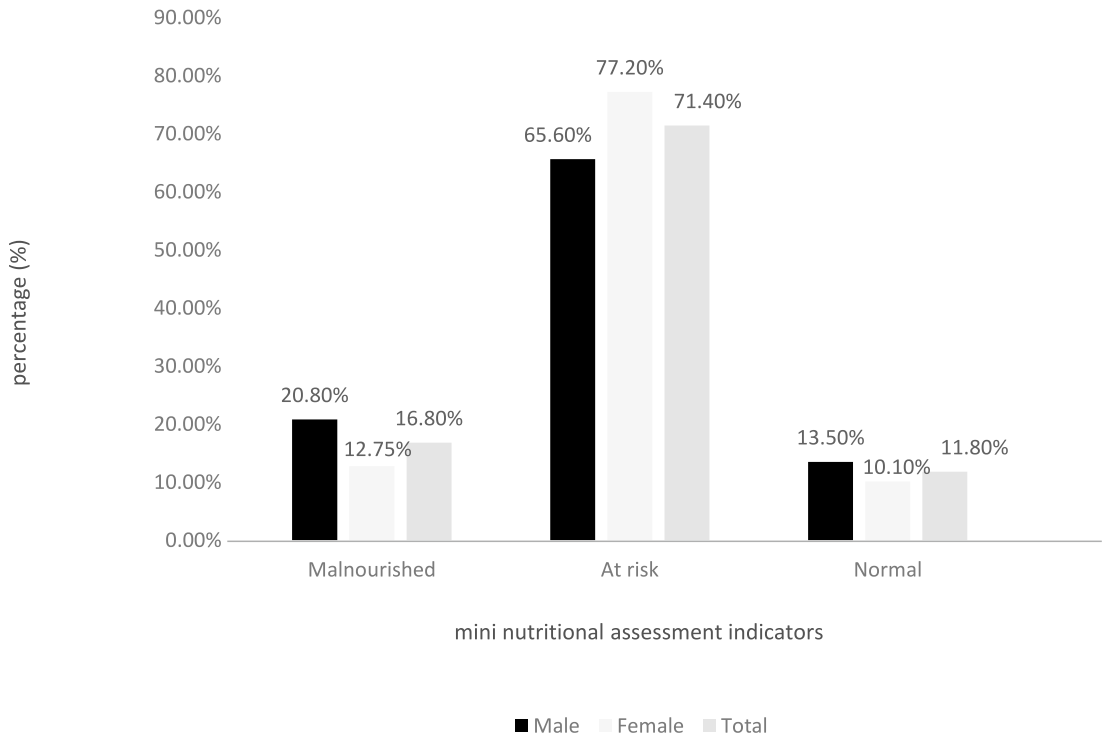
Table 2c: Food habits of the respondents

Variables	Frequency	Percentage
Whom you eat with		
Spouse	92	37.6
Children	46	18.8
Nobody	103	42.0
my friends	4	1.6
Total	**245**	**100.0**
Beliefs restricting food consumption		
Yes	13	5.3
No	232	94.7
Total	**245**	**100.0**

Table 2c showed the data on beliefs restricting food consumption. The result revealed that a very few (5.3%) of the respondents had restrictions on the consumption of certain foods. Majority (94.7%) reported that they had no beliefs restricting food consumption.

Figure 1 shows the Mini Nutritional Assessment status of the respondents. The result showed that majority (77.2%) of the female respondents were at risk of being malnourished compared to 65.6% of their male counterparts. About 20.8% of the male respondents were malnourished while 12.7% of their female counterparts were malnourished. However, 13.5% and 10.1%, male and female respondents respectively, had normal MNA status.

Figure 2 reveals the anthropometric status of the older adult population studied. Few (15.8%) of the male respondents were underweight compared to 17.4% of their female counterparts. More than half (55.7%) of the male respondents were normal compared to 46.2% of their female counterparts. Some (28.5% and 36.4%, respectively) of the male and female respondents were overweight.



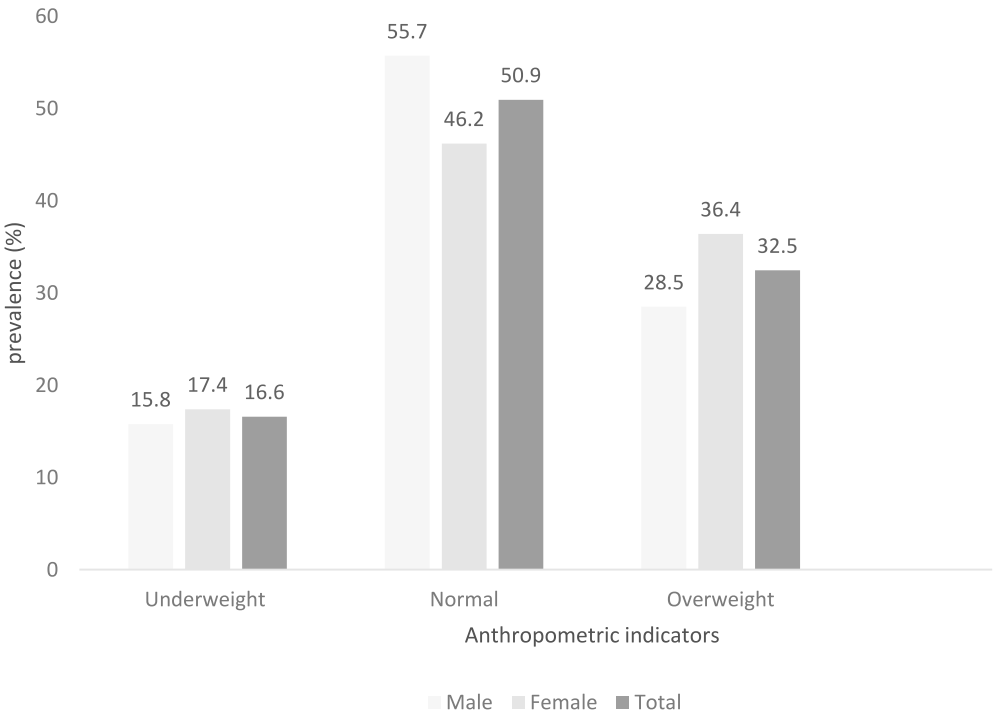


Figure 2: Anthropometric status of the respondents

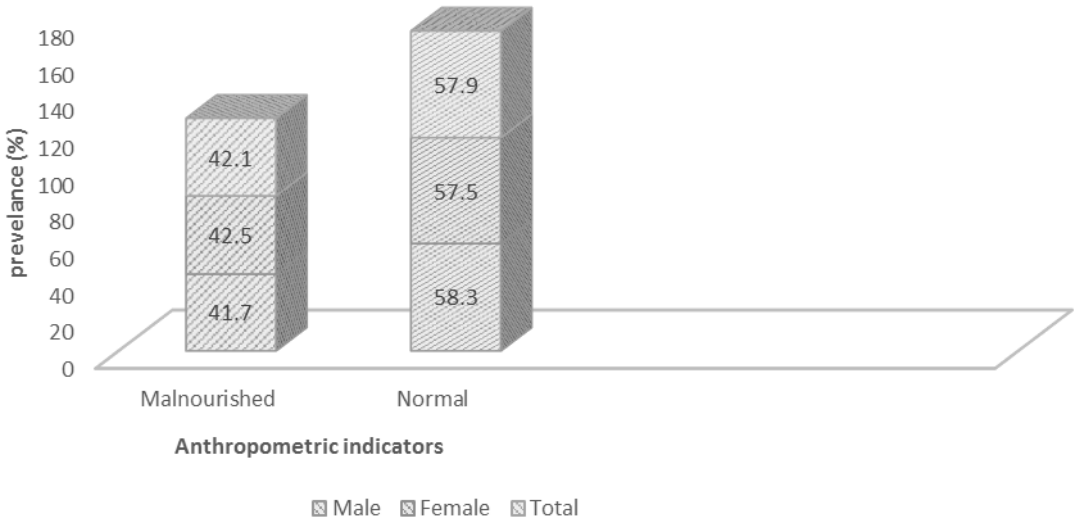


Figure 3. Mid upper arm circumference status of the respondents.

Figure 3 shows the mid upper arm circumference (MUAC) status of the respondents. The result showed that more than half (58.3% and 57.5%, respectively) of the male and female respondents had normal MUAC status. However, 42.5% of the female respondents were malnourished while 41.7% of the male respondents were also malnourished, as reflected by their MUAC status.

Table 3 revealed that there was a significant relationship ($p<0.05$) between skipping meals and the MNA status of the older adults. There was also a significant relationship ($p<0.05$) between "who prepared the meals" and the MNA status of the respondents.

Table 3: Cross tabulation of nutritional status by the food habits of the respondents.

Variables	Malnourished	At risk	Normal	p-value
Skipping meals				0.000
Yes	37(94.9%)	65(36.5%)	2(7.1%)	
No	2(5.1%)	113(63.5%)	26(92.9%)	
Total	**39(100.0%)**	**178(100.0%)**	**28(100.0%)**	
Availability of cooked food				0.000
Wife	7(17.94%)	20(11.23%)	3(10.7%)	
Children	10(25.64%)	43(24.2%)	3(10.7%)	
Myself	3(7.69%)	105(59.0%)	22(78.6%)	
Others	19(48.72)	10(5.61)	0(0.0%)	
Total	**39(100.0%)**	**178(100.0%)**	**28(100.0%)**	

Table 4: Food frequency consumption of the respondents

FOOD GROUPS	DAILY F (%)	WEEKLY F (%)	MONTHLY F (%)	RARELY F (%)	TOTAL F (%)
STARCHY-ROOTS ANI TUBERS	205 (83.7)	25 (10.2)	10 (4.1)	5 (2.0)	245 (100.0)
CEREALS	180 (73.5)	40 (16.3)	15 (6.1)	10 (4.1)	245 (100.0)
LEGUMES	80 (32.7)	65 (26.5)	65 (26.5)	35 (14.3)	245 (100.0)
STARCHY FRUITS	0 (0)	90 (32.7)	3 (1.2)	152 (62.0)	245 (100.0)
GREEN LEAFY VEG.	200 (81.6)	20 (8.2)	15 (6.1)	10 (4.1)	245 (100.0)
NON-LEAFY VEG.	180 (73.5)	40 (16.3)	20 (8.2)	5 (2.0)	245 (100.0)
FRUITS	50 (20.4)	80 (32.7)	100 (40.8)	15 (6.1)	245 (100.0)
MEAT AND MEAT PRODUCTS	50 (20.4)	65 (6.1)	126 (51.4)	4 (1.6)	245 (100.0)
DIARY PRODUCTS	30 (12.2)	50 (20.4)	100 (40.8)	65 (26.5)	245 (100.0)
BAKERY PRODUCTS	30 (12.2)	83 (33.9)	122 (49.8)	10 (4.1)	245 (100.0)
FATS AND OIL	220 (89.8)	15 (6.1)	5 (2.0)	5 (2.0)	245 (100.0)
INSECTS	0 (0)	0 (0)	0 (0)	245 (100.0)	245 (100.0)
PASTA	40 (16.3)	62 (25.3)	70 (28.6)	73 (29.8)	245 (100.0)

F = Frequency; % = Percentage.

Table 4 above reveals the food frequency consumption of the respondents. The result revealed that, majority (83.7%) of the respondents consumed starchy roots and tubers daily, while 73.5% of them consumed cereals daily, 81.6% consumed green leafy vegetables daily, while 73.5% consumed non leafy vegetables daily. However, majority (89.8%) of the respondents use fat and oil daily, when cooking. Some (32.7% and 20.4%, respectively) of the respondents consumed legumes and fruits daily. Meat and meat products (20.4%), dairy products (12.2%), bakery products (12.2%) and pasta (16.3%). Starchy fruits and insects were never consumed daily, by the respondents.

Discussion

Higher number of females in this study may be

linked to a higher life expectancy in females than males (13) and receptive nature of men when it comes to research. The high number of the respondents in the study that earned less than N10,000 monthly, could suggest that they do not engage in a high yielding and/or paying businesses (jobs).This is in agreement with Afolabi, Olayiwola, Sanni and Oyawoye (14) who found that majority (70.0%) of the older persons in low income areas of south west Nigeria had average monthly income of not more than N10,000 and also agrees with Nzeagwu and Uwaegbute (4) who reported that (66.67%) of the older adults in Umuahia North and Ikwuano Local Government Area of Abia State earned less than N12,000 monthly. Most of the respondents skipped meals as a result of their already formed habit. This is in agreement with Souter and Keller (15) who reported that habits and preferences that are formed during childhood are difficult to change in adult life. Few skipped meals as a result of their health condition while many of them complained of poor dentition, diminished sense of taste and smell. This agrees with that of Lutz and Przytubki (16) who reported that food habits are being changed or affected by health condition of an individual. It is also in conformity with Ene-obong, Enugu and Uwaegbute (17) who reported that dietary habits, poor dentition, diminished sense of taste and smell affect dietary intake while studying the older persons.

MNA status revealed that majority of the older adults were at risk of being malnourished. This was in agreement with Nzeagwu and Uwaegbute (4) who reported that 75% of the elderly in Umuahia North and Ikwuano Local Government Area of Abia State were nutritionally vulnerable to malnutrition. Furthermore, Ebere (8) reported in a study carried out on the nutritional vulnerability of the elderly in Umuahia South that 17.63% were malnourished which is 0.83% higher than the result from this study. A higher proportion of the older adult females who were at risk of being malnourished could be an indication that older adult males are responsible for making decisions about food, health services and number of births in the areas study area as confirmed by the respondents.

The normal body mass index (BMI) of majority of the respondents can be traced to the food habit of the respondents who reported that they do not skip meals. This result agrees with Olayiwola and Ketiku (5) who reported that more than half of the elderly Yorubas in Nigeria had a normal nutritional status. A higher number of older adult females who were underweight may be due to lack of spousal support and self-supporting financially as more widows were involved in the study (18). More females were overweight in this study which conforms with several studies reviewed. Among older Nigerians, more than two-thirds of the overweight persons were females (19). In a study of older persons presenting in a primary care clinic in Ibadan, South-western Nigeria, more females were also overweight (18). Higher number of female older adults who were malnourished from the mid upper arm circumference may be as a result of decrease in lean body mass and sarcopenia compared to the older adult males who were mostly involved in farm work in the study area. A decrease in lean body mass may also be attributed to a decreased intake of protein rich foods especially the animal proteins in women compared to men. There was a significant relationship ($p<0.05$) between "skipping of meals" and "who prepared the meals" and the mini nutrition assessment status of the older adults. Older men who are not married, particularly those who are widowed, are susceptible to poor nutritional health because they often skip meals, do not know how to shop or cook for themselves while when older women no longer have anyone to cook for, they tend to cook less for themselves (20). Saletti et al. (21) in his study reported that not cooking independently was associated with both risk of malnutrition and being malnourished.

The foods consumed by the older adults in this study were mostly from plant based sources (starchy roots and tubers, cereals, legumes, green leafy vegetables, fruits and non-leafy vegetables). The pattern of food intake in this study was in line with a study carried out in low income areas of South West Nigeria (15). Animal based foods (meat and meat products) were only consumed when they had economic access to it. An increased intake of starchy roots and tubers, fats and oil based foods could be a leading cause of non-communicable diseases in older adults. Protein intake is associated with the impairment of lean body mass, muscle function and immune response as well as increased loss of bone density (22). There was a low consumption of dairy products which is a good source of calcium, contributing to loss of bone density in both sexes revealed by the MNA tool.

Furthermore, the consumption of baked products and pasta by the older adults could be linked to change in food habit. This contrasts the findings

that older adults tend to abide to their cultural ways of eating since habits and preferences that are formed during childhood and youth are difficult to change in adult life (23).

Conclusion

Thus, it is imperative to pay attention to reasons why the older persons skip meals, who prepares their foods and other factors which could affect their food intake when planning their nutritional regimen for adequate and optimal intervention. The prevalence of overweight, especially among older women in this study is increasing and there is need for urgent nutrition and lifestyle intervention, in order to have healthy and active older persons.

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Conflicts of interest and other disclosures

I confirm that this manuscript is an original work and has not been submitted for publication elsewhere. There is no conflict of interest.

REFERENCES

1. Saka, B., Kaya, O., Osturk, G. B., Erten, N., Karan, M. A. (2010). Malnutrition in the elderly and its relationship with other geriatric syndromes. *Journal of Clinical Nutrition,* 29(6): 745-48.
2. Ojofeitimi, E. O., Ijandonola, K. T., and Jegede, V. A. (2002). Nutritional Status and Physical Activity Relation to Cognitive Function in the Elderly Population in Ilesha Town Ship, Osun State, Nigeria. *Journal of Nutrition. Elderly*, 22: 49-60.
3. Anderson, A. L., Harris, T. B., Tylavsky, F. A., Perry, S.E., Houston, D. K., Hue, T. F., et al. (2011). Dietary patterns and survival of older adults. *Journal of American Dietetics Association*. 111: 84-91.
4. Nzeagwu, O. C. And Uwaegbute, A. C. (2010). Assessment of Nutritional Vulnerability of the Elderly Using Mini Nutritional Assessment (MNA). *Nigerian Journal of Nutritional Sciences*, (2) 40-46.
5. Olayiwola, I. O. And Ketiku, A. O. (2006). Sociodemographic and Nutritional Status Assessment of the Elderly Yorubas in Nigeria. *Asia Pacific. Journal of Clinical Nutrition*, 15 (1): 95-101.
6. Adebusoye, L. A., Ajayi, I. O., Dairo, M. D. and Ogunniyi, A. O. (2012). Nutritional Status of Older Persons Presenting in a Primary Care Clinic in Nigerian, *Journal of Nutrition in Gerontology and Geriatrics,* 31:1, 71-85.
7. Darnton-Hill I, Nishida C, James WP. (2004). A life course approach to diet, nutrition and the prevention of chronic diseases. Public Health Nutrition, 7: 101-21.
8. Ebere, U. (2012). Nutritional Vulnerability in Older Adults in Umuahia South Local Government of Abia State. Pp. 40-55.
9. Areoye, M. O. (2003). Research Methodology with Statistics for Health and Social Sciences. Nathadax Publishers, Nigeria. Pp 117-119.
10. Golden, M. H. N. and Golden, B. E. (2001). Severe Malnutrition. In: Human Nutrition and Dietetics. J. S. Garrow, W. I .P James and A. Ralph (eds). 10th ed. Churchill Livingstone. Harcourt Publishers Ltd. Uk. Pp 515-526.
11. Wahab, E. (2013). Socio-Demographic Indicators of Elderly Economic Well-Being in Nigeria. Department of Sociology, Lagos State University, Nigeria. Pp 50.
12. Wardlaw, G. M., Hampl, J. S. And Di Silveston, A. R. (2004). Nutrition during Adult Hood. In: Perspectives in Nutrition. 6th ED. Mcgraw Hill Higher Education. Pp 647-680.
13. Clausen, F., Sandberg, E., Ingstaad, B., Hjortdan, P. (2000). Morbidity and healthcare utilization among the elderly people in Mmankgodi village, Botswana. *Journal of Epidemiology Community Health*, 54:58–63.20.
14. Afolabi, W. A. O., Olayiwola, I. O., Sanni, S. A. and Oyawoye, O. (2015). Nutrient Intake and Nutritional Status of the Aged in Low Income Areas of South West,

Nigeria. *Journal of Aging Research Clinical Practice,* 4 (1): 66-72.
15. Souter, S. And Keller, C. (2002). Food Choice in the Rural Dwelling Older Adult. *Southern Online Journal of Nutrition Research. 3 (5): 1-18.*
16. *Lutz and* Przytubki (2004). Nutrition and Diet Therapy (2nd ed.). Davis company, Philadelphia. Pp 16-19.
17. Ene-Obong, H. N., Enugu, G. L. and Uwaegbute, A. C. (2001). Factors Affecting Food Choice and Nutritional Intake of the Elderly with Restricted Mobility. *Journal of Human Population and Nutrition*, (19) 320-30.
18. Nutritional Status of Older Persons Presenting in a Primary Care Clinic in Nigeria.Availablefrom:https://www.researchgate.net/publication/221833409_Nutritional_Status_of_Older_Persons_Presenting_in_a_Primary_Care_Clinic_in_Nigeria [accessed Jan 17 2021].
19. Bakare, O.E., Ojofeitimi, E. O. and Akinyemi, A. (2004). Nutritional assessment and health status of the elderly in Southwestern, Nigeria. *Journal of Nutrition for the Elderly*. 22:49–60
20. Hughes, G., Bennett, K. M., Hetherington, M. M. (2004). Old and alone: barriers to healthy eating in older men living on their own. 43: 269-76
21. PSaletti, A., Johansson, L., Yifter-Lindgren, E., Wissing, U., Osterberg, K. and Cederholm, T. (2005). Nutritional Status and a 3-Year Follow-Up in Elderly Receiving Support at Home. *Gerontology*. 51(3):192-8.
22. Asp, M. L., Richardson, J. R., Collene, A. L., Droll, K. R., Belury, M. A. (2012). Dietary protein and beef consumption predict for markers of muscle mass and nutritional status in older adults. *Journal of Nutrition Health and Aging*. 16 (9), 784-90.
23. Fjellström, C., Sidenvall, B., Nydahl, M. (2001). Food intake and the elderly: social aspects. Food, People and Society: A European Perspective of Consumers' Food Choices, Frewer L, Risvik E, Schifferstein H, Eds., 197–209, Springer, Berlin, Germany.