Nutritional status, household food security and dietary diversity of the elderly residing in Ilaro, Ogun state, Nigeria

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Abstract
Elderly often suffer from poor health which may be associated with their nutrient intake. Continuous monitoring and evaluation of the underline causes of this will help in providing necessary intervention. This study assessed the nutritional status, household food security and dietary diversity of elderly residing in Ilaro. It was a descriptive and cross sectional in design involving two hundred and twenty (220) elderly selected from Ilaro metropolis. A semi structured questionnaire was used to obtained data on socio-demographic characteristics while household food insecurity and dietary diversity was assessed using a standard questionnaire. Anthropometry measurement (Height and weight) was taken, Body Mass Index (BMI) was calculated and nutritional status indices were classified using WHO standards. Data were analyzed using Spss version 20.0. Nutritional status as assessed by BMI shows that 66.4% were normal, 25% were food secure and nearly all the respondents had minimum dietary diversity score. Significant association (p< 0.05) was observed between the level of food insecurity and socio-demographic characteristics like family structure, present occupation and estimated monthly income. High level of food insecurity was evident among the elderly in the study area. Effort should focus on improving their socio-economic status.

Keywords: nutritional status, household food security, dietary diversity, elderly

1. Introduction

The United Nations defined elderly as people between age 60 years and above [1]. This group of people are usually refers to as vulnerable group because they have been found to be vulnerable to health related predicaments associated with factors like aging, poor socio-economic status, poor eating pattern, under nutrition, over-nutrition, chronic illness and diseases [2]. Aged appears to be more vulnerable than the younger age groups due to problems relating to ignorance on appropriate food choices, loneliness, social isolation which often times lead to depression, apathy, lack of appetite, physical disabilities, cardiovascular problems and poverty among others.

Malnutrition among this group of people is a great hazard and this has been attributed to their vulnerability.

Various researchers [3, 4, 5] has documented that malnutrition is a serious problem among elderly and this have been traced to so many factors. Also, poor socio-economic problem has been identified [6, 7] as one of the factor affecting the nutritional status of elderly in Nigeria and other developing countries. Due to the huge financial burden place on the caregivers of this group in the society, it has resulted into lack in the provision of their nutritional and health need. However, Charlton [8] reported that inadequate household food security and poor socio-economic conditions among others are the cause of poor nutritional status of elderly.

Food security is a situation in which all household members have both economic and physical access to enough, safe and nutritious foods to meet their needs, so that they do not live in hunger or fear of starvation. Food access refers specifically to adequate availability of quality foods for health and wellbeing [9]. A household can be said to be food secure only if it is secure in terms of both the acquisition and the utilization of food. According to FAO [10], about 925 million people are chronically hungry as a result of extreme poverty and over 2 billion people are food insecure intermittently due to varying degrees of poverty globally. Household food insecurity is directly influenced by low access to food. Consequently, households that do not have sufficient access to food have low dietary diversity, reflecting poor nutrient adequacy. Moreover, the emerging socio demographic changes, global financial crisis and present economic situation of most of the developing countries have led to high price of food. This has further highlighted the need to have better understanding of the livelihoods of vulnerable populations such as the elderly. It will enable effective formulation of policies and actions that can save lives and address the root causes of food insecurity and its implementation.

Dietary diversity is the number of different foods or food groups consumed by the household over a reference period not regarding the frequency of consumption [11]. It is an outcome measure of food security at the individual or household level [12]. Dietary diversity is a useful indicator of nutrient adequacy and it is usually assessed by the use of a tool known as dietary diversity scores where the number of food groups consumed over a reference period is scored [13, 14]. These scores have been validated as a good proxy for indicating dietary quality [15, 16]. Dietary diversity score can be used in conjunction with other indicators of food security status to understand household access to certain food groups. The components of

the indicator can also be used to examine dietary patterns.

As stated by Ismail [17], most elderly in Africa consume diet that is generally inadequate in terms of quality and quantity which indicate that elderly in African country were not food secured. In Nigeria, like other countries in Africa with a similar socio-economic status, studies [6, 7] have shown that elderly often suffer from poor health which is associated with poor nutrient intake. In the same vain, studies on dietary diversity [13, 18, 19] have suggested that food security conditions could be enhanced by consuming varieties of food and this has not been extensively examined in Ilaro town in Yewa south local government of Ogun state. Therefore the present study was carried out to assess the nutritional status, dietary diversity and household food security of elderly in Ilaro. Result from this study could be of help in formulating policies and interventional approach to address nutritional status, food access and ultimately food security in the communities.

2. Materials and method
2.1 Study area
The study was conducted in Ilaro town; the capital of Yewa South Local Government, Ogun state, Nigeria. Ilaro town is about 50 km from Abeokuta, the Ogun State capital and about 100 km from Ikeja, the capital city of Lagos State. Ilaro is situated on the rich cocoa belt of South Western region of Nigeria and endowed naturally with an expanse of land measuring about 168,750 hectares and a population of 168,850 according to the 2006 provisional census. The inhabitants of Yewa south are mainly Yoruba speaking with various dialects like Yewa, Anago, and Egun, while the three main religions are Christianity, Islam and Traditional.

2.2 Study design
The study was cross-sectional and descriptive in nature. It involves apparently healthy, free- living and non-institutionalized elderly residing in the selected communities in Ilaro.

2.3 Sample size
All participants were at least 60 years of age and had resided in the study area for at least five consecutive years. Oral informed consent to participate in the study was give and the sample size was determined using the formula [20].

$$N = \frac{z^2 (pq)}{d^2}$$

Where N is the sample size;
Z = the standard normal variable for a 95% confidence level (CI) = 1.96
p = the prevalence of the attribute. Prevalence of under nutrition in Ogun state is 15.1% [21].
q = 1-p, d is precision = (0.05).
The sample size for the present study was calculated to be;

$$N = \frac{1.96 \times 1.96 \times 0.15 \times 0.85}{0.05 \times 0.05} = 196$$

An additional 10% was added to account for non-responses [22], yielding a sample size of 216 participants, which was rounded up to 220.

2.4 Sampling Procedure/ Techniques.
Multi-stage sampling procedure was used in selecting the respondent, which involves purposive selection of Ilaro. Ilaro is made up of three wards, which are Ilaro I, Ilaro II and Ilaro III; each of the wards is made up of more than ten communities. Five communities were randomly selected from each ward. Household listing was done for all the household with at least one elderly male or female and the respondent were selected systematically using a regular interval. Simple balloting was used in selecting respondents from the household with more than one elderly.

2.5 Data Collection
A semi-structure and interviewer administered questionnaire was used in assessing the socio-economic and demographic characteristics of the respondent.
The nutritional status was assessed using anthropometric measurement method (height and weight). The weight was measured while standing with both arms by the side and with only light clothing. The pointer of the weighing scale was adjusted to zero before each weighing and recorded to the nearest kilogram. In measuring the height of the respondents, a locally constructed but standardized height meter was placed behind the heels of each subject and the height was measured while standing with the head fixed against the height meter and the level just above the hair marked and recorded to the nearest meter.
Food security of the respondent was assessed using Household Food Insecurity Access Scale (HFIAS) [23] while dietary diversity was assessed using FAO dietary diversity questionnaire Household Dietary Diversity Score (HDDS) [24].

2.5.1 Dietary diversity
Dietary diversity of the respondents was assessed using FAO dietary diversity questionnaire. Based on a 15-food group model as designed by FAO [25], Dietary Diversity Score (DDS) was created and categorized per the number of food groups consumed in the 24 hours preceding the study. Dietary Diversity Score was categorized as low DDS, which is consumption below 6 food groups, minimum DDS (6-10 food groups) and high DDS (11-15 food groups).

2.5.2 Food security assessment
Household food security was assessed using Household food Insecurity Access Scale [23]. HFIAS is a standard tool for measuring the degree of food insecurity (access) in the household in the past four weeks (30 days). The questionnaire is made up of total number of 9 questions with frequency of occurrence of each question which is categorized into three classes; rarely, sometimes and often. Each classes of the frequency of occurrence were coded 1, 2 and 3(rarely 1, sometimes 2 and often 3). HFIAS score for each of the respondents was calculated by summing the codes of frequency of occurrence of each of the question. The maximum score for each respondents is 27 (respondents that

response to all the question with frequency of occurrence coded with response code 3) while the minimum score is 0 (respondent that responded "no" to all questions). The higher the score, the more food insecurity (access) the respondents experienced and vice-versa. HFIAS score was used to classify respondents into one of the four food security categories food secure, mildly food insecure, moderately food insecure and severely food insecure as described by [23].

2.6 Data analysis
Data obtained was subjected to descriptive and inferential analysis using Statistical package for social sciences (Spss version 20.0). Continuous and categorical variables were analyzed using descriptive statistics (frequency, percentage, mean and standard). Pearson chi-square was used to determine the association between the categorical variable while Analysis of variance (ANOVA) was used to determine the differences between the means

Result
The socio-demographic characteristics of the sampled elderly are shown on table 1. More than half (69.0%) of the respondents were female while 39.1% were male. The age assessment has determined chronologically reveals that 32.7% of the respondents were between the age brackets of 60-64, 21.8% were between 65-69 years, 20.5% were between 70-74 years and 9.5% were between 75-79 years. Nearly all the respondents (98.2%) were Yoruba while others were either Igbo (1.4%) or Hausa (0.5%). Majority (66.8%) of the respondents practice christen religion while 2.3% practice traditional religion and 30.9% practices Islamic religion. About 52% of the respondents were married while almost half of the respondents (45.9%) were single, either as a result of divorce (12.3%), or death of spouse, widow (32.3%) and widower (3.2%).

Table 1: Socio-demographic characteristics of the respondents

	Frequency	Percentage
Sex		
Male	86	39.1
Female	134	60.9
Age		
60-64	72	32.7
65-69	48	21.8
70-74	45	20.5
75-79	21	9.5
80 and above	34	15.5
Ethnic group		
Yoruba	216	98.2
Igbo	4	1.4
Hausa	1	0.5
Religion		
Christianity	147	66.8
Islam	68	30.9
Traditional	5	2.3
Family structure		
Monogamy	126	57.3
Polygamy	94	42.7
Type of family		
Nuclear	119	54.1
Extended	67	30.5
Joint family	34	15.5
Marital status		
Single	2	0.9
Married	113	51.4
Divorce	27	12.3
Widow	71	32.3
Widower	7	3.2

Also, Socio-economic characteristics of the respondents as presented on table 2 shows that more than half (53.2%) of the respondents had no formal education, 34.5% has primary education and few (0.9%) of them were either university graduate or HND holder. As at the period of data collection, 12.3% of the respondents had retired from civil/ public services, 24.5% were self-employed, 12.3% engage in farming as means of their lively hood, 4.5% were civil servants, 24.1 engaged in petty trading and 18.2% can no longer work for money. Almost half (40.5%) of the respondents earn less than ₦5,000 (13.88USD) monthly and 27.3% earn more than ₦20,000 (55.55USD) monthly.

Table 2: Socio-economic characteristics of the respondents

Variable	Frequency	Percentage
Educational level		
No education	117	53.2
Primary education	76	34.5
Secondary education	7	3.2
NCE/ND	7	3.2
HND/B.Sc.	2	0.9
Modern 3	6	2.7
Standard 6	5	2.3
Present occupation		
Retired	27	12.3
Self employed	54	24.5
Farming	27	12.3
Civil servant	10	4.5
Petty trading	53	24.1
Employee of private organization	4	1.8
Personal business	5	2.3
Can no longer work for money	40	18.2
Previous occupation		
Self employed	94	42.7
Farming	33	15.0
Civil servant	30	13.6
petty trading	55	25.0
Employee of private Organization	4	1.8
Personal business	4	1.8
Estimated monthly income		
₦1,000 - ₦5,000	89	40.5
₦6,000 - ₦10,000	49	22.3
₦11,000 - ₦15,000	10	4.5
₦16,000 - ₦20,000	11	5.0
₦20,000 and above	60	27.3

Table 3 shows the food habit of the respondents. It reveals that, more than half (55.9%) of the respondents do eat three times daily while 40.9% do skipped meal. The meal usually skipped by majority of the respondent (37.7%) is lunch and this was indicated to be due to financial problem (22.7%), poor appetite (8.6%) and various activities they engaged in which prevent them from having time for lunch (10.5%). Consumption of in-between meal among the respondents (83.2%) is very high and the common in-between mealsamong the elderly in the study area are; fruit (43.6%), snacks (29.5%), Kolanut (7.3%), corn (1.4%) while 2.7% gives no response to the question.

Table 3: Food habit of the respondents

Variable	Frequency	Percentage
How many times did you eat in a day?		
once	7	3.2
twice	90	40.9
thrice	123	55.9
Did you use to skip meal?		
yes	97	44.1
no	123	55.9
Meals usually skipped		
Breakfast	6	2.7
Lunch	83	37.7
Dinner	8	3.6
not applicable	123	55.9
Reasons for skipping meal		
no money	50	22.7
no appetite	19	8.6
very busy	23	10.5
no responces	11	5.0
not applicable	117	53.2
Did you eat in-between meal?		
Yes	183	83.2
no	37	16.8
If yes what?		
fruit	96	43.6
snacks	65	29.5
not applicable	34	15.5
no response	6	2.7
collanut	16	7.3
corn	3	1.4

Table 4 shows the mean anthropometry measurement (weight, height and body mass index) of the respondents. The mean height of the male and female respondent was found to be; 1.63±0.08 and 1.56±0.07 respectively while their weight was found to be 58.38±10.66 and 58.08±13.96 respectively. Body mass index was found to have the mean value of 22.04±3.57 and 23.93±5.54 for male and female respondents respectively and value obtained for female respondents was significantly($p < 0.05$) higher than that of male respondents. Also, male elderly were found to be significantly taller than their female counterpart ($p < 0.05$) in the study area and no

significant difference was observed in the weight of both male and female respondents in the study area.

Table 4: Anthropometry measurement of the respondents

Sex	Weight	Height	Body Mass Index
Male	58.38±10.66	1.63±0.08	22.04±3.57
Female	58.08±13.96	1.56±0.07	23.93±5.54
F	0.029	51.77	7.91
p-value	0.864	0.000*	0.005*

Statistical significant at $p \leq 0.05$

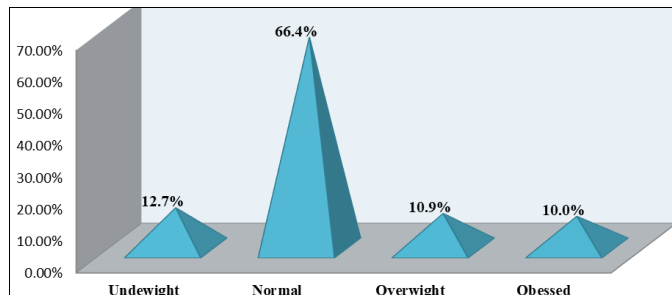**Fig 1:** Nutritional status of the respondents based on gender.

Figure 1 present the nutritional status of the respondent as

assessed by their body mass index. Majority of the respondents (66.4%) has normal body mass index, 10.9% were overweight, 10.0% were obsessed while 12.7% were underweight.
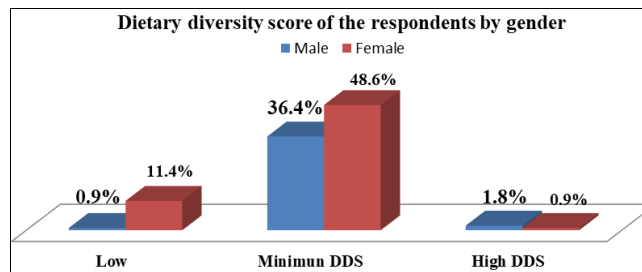

Fig 2: Dietary diversity score of the respondents by gender

Furthermore, majority of the studied elderly; male (36.4%) and female (48.6%) were found to have a minimum dietary diversity score while few; 1.8% (male) and 0.9 (female) had high dietary diversity score and low dietary diversity score was discovered among 0.9% and 11.4% of male and female respondents respectively as presented on figure 2.

Table 5: Percentage distribution of food groups consumed by the respondents

Food groups	Percentage
Cereals	82.7
Root and tuber	53.6
Vitamin A rich vegetable	5.5
Dark green leafy vegetable	55.0
Other vegetable	84.5
Fruit	23.6
Organ meat	5.0
Flesh meat	20.5
Egg	10.9
Fish	60.5
Legumes nut and seed	46.8
Milk and milk product	16.8
Oil and fat	84.5
Sweet	30.5
Spice and condiment	84.5

Table 5 present the percentage distribution of food groups consumed by the respondents. Food groups like cereals (rice, maze and it product), other vegetables (tomatoes, onion, egg plants etc.) oil and fat, spice and condiment was found to be highly consumed by 82.7%, 84.5%, 84.5% and 84.5% of the respondents respectively. Also, Root and tubers, dark green leafy vegetable, fish, legumes and nut seed consumption was found to be commonly consumed by 53.6%, 55.0%, 60.0% and 46.8% of the respondents respectively while few of the respondents do consume fruit (23.6%), organ meat (5.0%), flesh meat (20.5%), egg (10.9%) milk and milk product (16.8%).
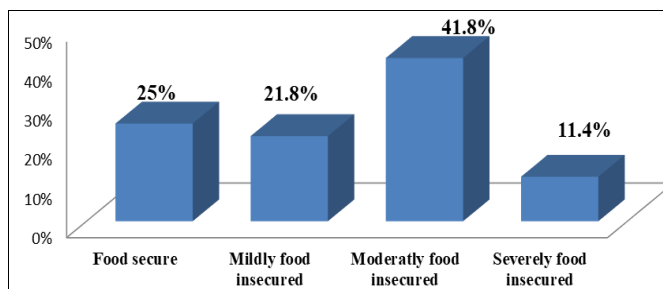

Fig 3: Food security status

Result of food security status on figure 3 revealed that 25% of the elderly were food secured, 21.8% were mildly food insecure, 41.8% were moderately food insecure and 11.4% were severely food insecure.

Significant ($p< 0.05$) association was observed between nutritional status of the respondents and socio-demographic characteristics like age ($\chi 2 = 36.75$, p = 0.000), marital status ($\chi 2 =40.94$, p= 0.000), present occupation ($\chi 2 = 41.20$, p = 0.005) and estimated monthly income ($\chi 2 = 27.40$, p = 0.007) of the respondent. However, no significant ($p>0.05$) association was observed between nutritional status and socio-demographic characteristic like sex, ethnic group and educational level as presented on table 6.

Table 7 also shows the association between socio-demographic characteristics and dietary diversity score of the respondent. Significant ($p<0.05$) association was observed between dietary diversity scores and socio-demographic characteristics like sex ($\chi 2 = 14.36$, p = 0.01), age ($\chi 2 = 36.750$, p = 0.000), marital status ($\chi 2 = 28.034$, p = 0.000), estimated monthly income ($\chi 2 = 16.33$, p = 0.038) while socio-demographic characteristics like family structure, educational level, and present occupation were significantly ($p> 0.05$) associated with dietary diversity score of the respondents

Table 6: Socio-demographic characteristics and Nutritional status of the respondents

	Underweight	Normal	Over weight	Obese	$\chi 2$	p-value
Sex						
Male	13(5.9)	64(29.1)	5(2.3)	4(1.8)	9.413	0.024
Female	15(6.8)	82(37.3)	19(8.6)	18(8.2)		
Age						
60-64	8(3.6)	42(19.1)	14(6.4)	8(3.6)	36.750	0.000*
65-69	5(2.3)	35(15.9)	3(1.4)	5(2.3)		
70-74	4(1.8)	38(17.3)	0(0.0)	3(1.4)		
75-79	1(0.5)	15(6.8)	0(0.0)	5(2..3)		
80 and above	10(4.5)	16(7.3)	7(3.2)	1(0.5)		
Ethnic group						
Yoruba	28(12.7)	144(65.5)	23(10.5)	21(9.5)	11.107	0.085
Igbo	0(0.0)	2(0.9)	1(0.5)	0(0.0)		
Hausa	0(0)	0(0)	0(0)	1(0.5)		
Marital status						
Single	0(0.0)	0(0.0)	1(0.5)	1(0.5)	40.942	0.000*
Married	7(3.2)	77(35.0)	15(6.8)	14(6.4)		
Divorce	7(3.2)	18(8.2)	1(0.5)	1(0.5)		
Widow	9(4.1)	49(22.3)	7(3.2)	6(2.7)		
Widower	5(2.3%)	2(0.9)	0(0.0)	0(0.0)		
Educational level						
No formal education	19(8.6)	73(33.2)	16(7.3)	9(4.1)	21.489	0.255
Primary education	7(3.2)	55(25.0)	3(1.4)	11(5.0)		
Secondary education	0(0.0)	5(2.3)	1(0.5)	1(0.5)		
NCE/ND	1(0.5)	3(1.4)	3(1.4)	0(0.0)		
HND/B.Sc.	0(0.0)	2(0.9)	0(0.0)	0(0.0)		
Modern three	0(0.0)	4(1.8)	1(0.5)	1(0.5)		
Standard six	1(0.5)	4(1.8)	0(0.0)	0(0.0)		
Present occupation						
Retired	1(0.5)	19(8.6)	4(1.8)	3(1.4)	41.209	0.005*
Self employed	1(0.5)	37(16.8)	8(3.6)	8(3.6)		
Farming	6(2.7)	21(9.5)	0(0.0)	0(0.0)		
Civil-servant	1(0.5)	5(2.3)	4(1.8)	0(0.0)		
Petty trading	7(3.2)	36(16.4)	6(2.7)	4(1.8)		
Employee of private organization	2(0.9)	1(0.5)	0(0)	1(0.5)		
Personal business	1(0.5)	2(0.9)	1(0.5)	1(0.5)		
Can no longer work for money	9(4.1)	25(11.4)	1(0.5)	5(2.3)		
Estimated monthly income						
1000-5000	8(3.7)	59(26.9)	11(5.0)	11(5.0)	27.480	0.007*
6000-10,000	4(1.8)	41(18.7)	1(0.5)	3(1.4)		
11,000-15,000	5(2.3)	3(1.4)	1(0.5)	1(0.5)		
16,000-20,000	1(0.5)	7(3.2)	3(1.4)	0(0.0)		
20,000 and above	10(4.6)	35(16.0)	8(3.7)	7(3.2)		

*Statistically significant ($p \leq 0.05$), Figures in parenthesis denote percentages.

Table 7: Socio- demographic characteristics and Dietary Diversity Score (DDS) of the Respondents

	Low DDS	Minimum DDS	High DDS	χ^2	p-value
Sex					
Male	2(0.9)	80(36.4)	4(1.8)	14.369	0.001*
Female	25(11.4)	107(48.6)	2(0.9)		
Age					
60-64	6(2.7)	66(30.0)	0(0.0)	17.132	0.029*
65-69	10(4.5)	10(16.8)	1(0.5)		
70-74	1(0.5)	42(19.1)	2(0.9)		
75-79	3(1.4)	16(7.3)	2(0.9)		
80 and above	7(3.2)	26(11.8)	1(0.5)		
Family structure					
Monogamy	19(8.6)	105(47.7)	2(0.9)	3.394	0.183
Polygamy	8(3.6)	82(37.3)	4(1.8)		
Marital status					
Single	0(0.0)	2(0.9)	0(0.0)	28.035	0.000*
Married	7(3.2)	105(47.7)	1(0.5)		
Divorce	1(0.5)	24(10.9)	2(0.9)		
Widow	19(8.6)	50(22.7)	2(0.9)		
Widower	0(0.0)	6(2.7)	1(0.5)		
Educational level					
No formal education	19(8.6)	95(43.2)	3(1.4)	9.413	0.667
Primary education	6(2.7)	68(30.9)	2(0.9)		
Secondary education	1(0.5)	5(2.3)	1(0.5)		
NCE/ND	0(0.0)	7(3.2)	0(0.0)		
HND/B.Sc.	0(0.0)	2(0.9)	0(0.0)		
Mordern 3	1(0.5)	5(2.3)	0(0.0)		
Standard 6	0(0.0)	5(2.3)	0(0.0)		
Present occupation					
Retired	1(0.5)	24(10.9)	2(0.9)	21.206	0.096
Self-employ	5(2.3)	49(22.3)	0(0.0)		
Farming	4(1.8)	23(10.5)	0(0.0)		
Civil servant	0(0.0)	9(4.1)	1(0.5)		
Petty trading	12(5.5)	40(18.2)	1(0.5)		
Employee of private organization	0(0.0)	4(1.8)	0(0.0)		
Personal business	2(0.9)	3(1.4)	0(0.0)		
Can no longer work for money	3(1.4)	35(15.9)	2(0.9)		
Estimated monthly income					
1000-5,000	15(6.8)	73(33.3)	1(0.5)	16.333	0.038*
6,000-10,000	6(2.7)	42(19.2)	1(0.5)		
11,000-15,000	1(0.5)	9(4.1)	0(0.0)		
16,000-20,000	2(0.9)	7(3.2)	2(0.9)		
20,000 and above	3(1.4)	55(25.1)	2(0.9)		

*Statistically significant ($p \leq 0.05$), Figures in parenthesis denote percentages.

As presented on table 8, significant association was observed between food security status and socio-demographic characteristics like, family structure ($\chi^2 = 9.463$, p = 0.024) present occupation ($\chi^2 = 54.143$, p = 0.000), and estimated monthly income ($\chi^2 = 28.11$, p = 0.005) while socio-demographic characteristics like sex, age, marital status and educational level were not significantly associated with the food security status of the respondents.

Table 8: Socio- demographic characteristics and food security status of the respondents

	Food secure	Mildly food secure	Moderately food insecure	Severely food insecure	χ^2	p-value
Sex						
Male	18(8.2)	14(6.4)	44(20.0)	10(4.5)	5.878	0.118
Female	37(16.8)	34(15.5)	48(21.8)	15(6.8		
Age						
60-64	12(5.5)	21(9.5)	32(14.5)	7(3.2)	16.279	0.179
65-69	10(4.5)	7(3.2)	24(10.9)	7(3.2)		
70-74	12(5.5)	8(3.6)	18(8.2)	7(3.2)		
75-79	9(4.1)	6(2.7)	4(1.8)	2(0.9)		
80 and above	12(5.5)	6(2.7)	14(6.4)	2(0.9)		

Family structure						
Monogamy	23(10.5)	26(11.8)	62(28.2)	15(6.8)	9.483	0.024*
Polygamy	32(14.5)	22(10.0)	30(13.6)	10(4.5)		
Marital status						
Single	0(0.0)	0(0.0)	1(0.5)	1(0.5)	16.064	0.188
Married	28(12.7)	25(11.4)	50(22.7)	10(4.5)		
Divorce	8(3.8)	3(1.4)	12(5.5)	4(1.8)		
Widow	17(0.9)	20(9.1)	27(12.3)	7(3.2)		
Widower	2(0.9)	0(0.0)	2(0.9)	3(1.4)		
Educational level						
No formal education	34(15.5)	29(13.2)	36(16.4)	18(8.2)	24.526	0.139
Primary education	13(5.9)	15(6.8)	42(19.1)	6(2.7)		
Secondary education	1(0.5)	1(0.5)	4(1.8)	1(0.5)		
NCE/ND	4(1.8)	1(0.5)	2(0.9)	0(0.0)		
HND/B.Sc.	1(0.5)	0(0.0)	1(0.5)	0(0.0)		
Modern 3	0(0.0)	1(0.5)	5(2.3)	0(0.0)		
Standard 6	2(0.9)	1(0.5)	2(0.9)	0(0.0)		
Present occupation						
Retired	10(4.5)	4(1.8)	12(5.5)	1(0.5)	54.143	0.000*
Self employed	4(1.8)	12(5.5)	32(14.5)	6(2.7)		
Farming	3(1.4)	6(2.7)	10(4.5)	8(3.6)		
Civil servant	4(1.8)	2(0.9)	3(1.4)	1(0.5)		
Petty trading	16(7.3)	18(8.2)	17(7.7)	2(0.9)		
Employee of private organization	1(0.5)	0(0.0)	1(0.5)	2(0.9)		
Personal business	0(0.0)	3(1.4)	2(0.9)	0(0.0)		
Can no longer work for money	17(7.7)	3(1.4)	15(6.8)	5(2.3)		
Estimated monthly income						
1000-5000	15(6.8)	25(11.4)	36(16.4)	13(5.9)	28.113	0.005*
6,000-10,000	9(4.1)	6(2.7)	29(13.2)	5(2.3)		
11,000-15,000	1(0.5)	3(1.4)	5(2.3)	1(0.5)		
16,000-20,000	3(1.4)	4(1.8)	4(1.8)	0(0.0)		
20,000 and above	27(12.3)	9(4.1)	18(8.2)	6(2.7)		

*Statistically significant (p ≤ 0.05), Figures in parenthesis denote percentages.

Discussion

The significant interaction between nutritional status and food security cannot be ignored. Food insecurity can affect, health, quality of life and general well-being, either directly or indirectly through nutritional status [26, 27]. Food insecurity also brings about additional physical and economic burdens to the elderly and their care giver which in-turn affect their dietary intake. The present study assessed the nutritional status, dietary diversity and household food security of elderly in Ilaro, Ogun state. Larger percentages of the subjects were female between the age bracket of 60 and 64 years with no formal education, engage in petty trading or self-employed and realize between ₦1,000-₦5,000 monthly. The socio-demographic characteristics and economic status observed in this study is similar to that observed by [6] and [7] in a study conducted among elderly in Ibadan and Olayiwola 2013 in a similar study conducted in Ogun state. This low socio-economic status will go a long way in affecting their quality of life and food security and dietary intake as opined by [27].

Poor eating habit was discovered among the elderly in the study area. Almost half of the elderly studied were found with the habit of meal skipping and the meal usually skipped is lunch. This eating habit was found to be due to their poor socio-economic status as affirmed by more than half of the respondents who usually skip meal. This finding give credence to Ogden et al., [28] who opined that Poverty remains a major contributory factor to many of the dietary related disorders among the elderly and in agreement previous studies [30-32] which indicated that income is one of the major hindrance for the elderly people to eat well and have normal nutrition. However, intake of in between meal is common among the respondents; nearly all of them do take different kind of in between meal like snacks, corn, kolanut and intake of different kind of fruits was also found to be more prevalent among them.

In the present study nutritional status of the respondent was assessed using anthropometry method. Measurement of height and weight was done and the Body mass index was determined. Men were found to be significantly taller than the women. This is similar to the findings of [32] in a study conducted among the elderly in Asaba, Delta state in South-South Nigeria as well as that of [33, 7] in a similar study

conducted in southwest Nigeria. Also male respondents were found to be heavier than their female counterpart but the difference is not significant. Also, body mass index of female respondents was found to be significantly higher than that of male respondents and this is similar to the findings of Afolabi *et al*. [7] Based on Body Mass Index, more than half of the respondents (66.4%) had an acceptable nutritional status while some of the respondents were overweight, obese. This finding is in agreement with that of Nancy, *et al*. [34] in which prevalence of obesity was found to have increased in all ages and older adults are not exempted. This indicate that elderly in the study area must be duly taken care of so as to reduce the prevalence of obesity among them cause obesity is associated with increase in mortality which may contribute to different kind of chronic diseases. Moreover, nutritional status was found to be significantly associated with the some socio-demographic and economic characteristics like age, marital status, present occupation and estimated monthly income of the respondent. This agrees with the findings of [6].

The study also found that 75% of the elderly household experience one stage of food insecurity or another as only 25% were food secured. This finding concur with the study conducted by Sanusi *et al*. [35] in selected local government area in Ibadan and Lagos which report a prevalence of 70% for household food insecurity. The study conducted by Ukebgu [36] in rural community household in Ahiazu Mbaise local government area of Imo state was also in agreement with this finding. On the contrary, the prevalence of severe food insecurity (11.4%) reported in this study was lower than that reported by Nigeria Food Consumption and Nutrition Survey (NFNS), carried out between 2001 and 2003 which found 60% of severe household food insecurity occurring in the moist savannah regions (Southwest) of the country.

Significant association was observed between household food security of the elderly studied and their socio-economic characteristics like, family structure, present occupation and estimated monthly income. This implies that high prevalence of food insecurity discovered in the study area was as a result of poor availability and accessibility to food which can be attributed to their low socio-economic status. This finding is in line with the opinion of Sanusi *et al*. [35] in which food insecurity in Nigeria was tied to poverty and any true solution to this must focus on the socio-economic, socio cultural and political improvement of the nation. Furthermore, significant association was observed between the nutritional status and level of household food security in the study area. This indicates that food insecurity is one of the major factors affecting the nutritional status.

Percentage distribution of food group consumed by the respondents reveals that cereals, root and tubers, vegetables, fish, oil and fat are the dominant food groups consumed by the elderly in the study area. Majorly, consumption of cereals like rice and maze was found to be very high in the study area and this can be attributed to high inflow, availability and accessibility of rice and maize in the study area. Consumption of root and tuber especially cassava and its product like fufu, lafun, gari etc. was also on the high side in the study area and this can be attributed to their high production of cassava. This is in agreement with the findings of Olayiwola [38] in a similar study conducted in Ogun state Nigeria. Conversely, intake of high protein food groups like meat flesh, milk and milk product was very low in the study area and this can be attributed to their low socio-economic status. This finding concur with that of other researchers [39-40] that poor households subsist on monotonous staple based diet and lack access to nutritious food such as vegetable and animal source foods like fish, meat, eggs and dairy products [41]. also observed a low intake of protein of animal sources and low calorie intake among the elderly in Nigeria. However, despite the fact that intake of nutritious food is low among the elderly studied; almost half of the respondents had minimum dietary diversity score. This implies that having minimum dietary diversity score does not translate to having adequate diet. Study conducted by [42] in rural household in North central of Nigeria supported this.

In consonance with the previous study [43-44] dietary diversity was found to be significantly associated with socio-demographic characteristics like sex, age, marital status and estimated monthly income. This indicates that all these socio demographic characteristics have a positive impact on dietary diversity and appropriate food choice depends on income levels. The finding of this study support the opinion of Mayen *et al*. [45] that people of higher socio economic status are more likely to consume healthy foods such as whole grains, lean meats, fish, low-fat dairy products, and fruit and vegetables, whereas people with low socio economic status tend to consume more fat and less fiber.

Conclusion

In conclusion, high prevalence of underweight which co-exist with overweight and obesity was discovered among the elderly in Ilaro. Also, incidence of food insecurity was very high and this was found to be significantly associated with their socio-economic characteristics. Minimum dietary diversity score was discovered among the elderly in Ilaro but the intake of high protein diet was very low. Thus this study established that having minimum dietary diversity score does not translate to having adequate diet.

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