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Nutritional status of the elderly seen in a primary care clinic in North Central Nigeria: a cross-sectional study

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Abstract

Introduction: *globally, elderly population is rapidly increasing though more in developing countries. Malnutrition in the elderly remains a highly prevalent public health issue which can lead to some negative consequences. The aim of the study was to determine the nutritional status among the elderly attending primary care clinics in North central, Nigeria.* ***Methods:*** *the study was a hospital-based descriptive cross-sectional study, which was conducted among 307 elderly patients selected by systematic random sampling at the Family Medicine Clinics, University of Ilorin teaching hospital, Ilorin between July and September, 2017. Data was collected by interviewer-administered questionnaires as well as from clinical evaluation. The Mini Nutritional Assessment (MNA) questionnaire was used to assess the nutritional status among the respondents, while serum Albumin of participants was obtained following standard procedures. The data was collated and analyzed using the SPSS-21 statistical package.* ***Results:*** *mean age of the respondents was 66 years ± 4.9 years, 76.5% were females with male to female ratio of 1: 3.3, 61.5% Muslim, 58.0% married, and 43.0% had no formal education. The overall prevalence of malnutrition among elderly patients using MNA was 6% but the prevalence of at risk of malnutrition among the participants was 55%. Majority (56%) of the respondents had hypoalbuminaemia. Malnutrition was found to be associated with low albumin level (p: 0.002, 95% CI: 1.4384 -1.6204). A multiple linear regression of confounding variables shows that family support is a more statistically significant independent predictor of nutritional status (p: 0.002, OR: 1.101, 95% CI: 1.036 - 1.171).* ***Conclusion:*** *routine screening of elderly patients for risk of malnutrition during clinic visits should be done by physicians especially primary care givers. This will facilitate early diagnosis and prompt intervention of malnutrition to improve the well-being of the elderly.*

Introduction

Aging is a natural and inevitable process associated with some health issues [1,2]. According to the United Nations, elderly refers to a group of persons aged 60 years and above adopted in the developing countries while the developed countries use 65 years and above as the cut-off [3]. Globally, the elderly population is rapidly increasing which could be as a result of the rising average life expectancy due to the epidemiological and demographic transitions [2,4]. Nutrition which is an essential component in determining the health status of an individual could negatively affect the aging process if deficient [5]. The diagnosis of nutritional problems in the elderly is usually unrecognized, under-diagnosed and under-treated by healthcare givers and this oversight of malnutrition among the elderly has led to some negative impacts in their well-being, outcome and prognosis of treatment [6]. Malnutrition among the elderly is a major issue and a public health importance which is also a major component of chronic diseases among the geriatric age group [7]. Nutritional status assessment is an important component in comprehensive geriatric assessment (CGA) which is needed to identify malnutrition among the elderly and if not accurately assessed could be a major cause of morbidity and mortality in the elderly [8].

Globally, the prevalence of malnutrition among the elderly varies depending on the setting, region and the methods of assessment used. In a study done by Agarwalla *et al.* among 360 elderly people in India using the Mini Nutritional Assessment (MNA), it was found that 15% were malnourished and 55% were at risk of malnutrition [4]. In Nigeria, a study by Sanya *et al.* in Ilorin had 17% undernourished and 28% obese elderly in-patients in 2013 [6]. The nutritional status in the elderly can be assessed by using various tools which are anthropometric assessment, biochemical markers, clinical assessment, dietary assessment and nutritional

screening tools [9]. The nutritional screening tools especially the Mini Nutritional Assessment (MNA) tool has been shown to be most preferable and extensively used to assess the nutritional status of the elderly [10]. Mini nutritional assessment correlates well with biochemical markers of malnutrition and are able to detect subjects at risk of malnutrition before significant changes occur in weight or serum albumin [11]. Simple biochemical parameters could be used in assessing and monitoring the nutritional status of the elderly. Albumin has been widely used as a nutrition marker due to its ability to predict mortality and other outcomes
including perioperative complications in older populations [9]. Imperatively, for primary care physicians to achieve the best outcome in the management of the elderly, prompt assessment and correction of malnutrition is very important. The objective of the study is to determine the nutritional status of the elderly patients attending the Family Medicine Clinics of the University of Ilorin Teaching Hospital with a view to contributing to the knowledge on the proper care of the elderly.

Methods

Study design and setting: this study was a hospital-based descriptive cross-sectional study. The study was conducted at the Family Medicine Clinics of University of Ilorin Teaching Hospital (UITH), Ilorin. Ilorin is the capital of Kwara State, a state located in the North-Central geopolitical zone of Nigeria. The state shares boundaries with five other states, namely: Kogi, Ekiti, Osun, Oyo and Niger. Ilorin metropolis consists of three local government areas: Ilorin-South, Ilorin-West and Ilorin-East. Ilorin inhabitants are mainly Yorubas, however, people from other ethnic groups also constitute part of the population. University of Ilorin Teaching Hospital is a tertiary health care institution located in Oke-Ose, Ilorin-East Local Government Area that provides health care to inhabitants of Ilorin and its environs. It is a 600-bed tertiary health institution.

Study population: the target population: the study population comprised of elderly male and female patients aged 60 years and above attending Family Medicine Clinic of University of Ilorin Teaching Hospital Ilorin, who gave their consent and satisfied the inclusion criteria.

Inclusion criteria: all consenting elderly (60 years and above) patients attending Family Medicine Outpatient Clinics, UITH, Ilorin who had given written informed consent.

Exclusion criteria: 1) elderly requiring hospital admission; 2) patients with emergencies necessitating immediate attention; 3) patients too weak to stand erect.

Sample size estimation: the required sample size was determined using Leslie Kish's statistical formula for estimating minimum sample size in health studies [12]:

$$n = \frac{Z^2 pq}{d^2}$$

Where n= desired sample size when population is greater than 10,000; z= standard normal deviation, usually set at 1.96 which corresponds to 95% confidence level; p= proportion of the target population estimated to have a particular characteristic. The study by Adebusoye *et al.* which reported 61.9% prevalence of nutritional problems among elderly patients presenting at General Outpatients Department (GOPD) Clinic of University College Hospital (UCH), Ibadan, Nigeria was considered for the calculation of sample size [13]. Thus, p = 0.619; q = 1-0.619= 0.381; d = degree of accuracy desired, usually set at 0.05. Thus;

$$n = \frac{(1.96)^2 \times 0.619 \times 0.381}{(0.05)^2} = 362.4$$

Therefore, minimal calculated sample size used was approximately 362. However, the study population was less than 10,000 (1,500 being the average number of elderly seen annually in the clinics).

Therefore, the sample size was adjusted using the formula:

$$n_f = \frac{n}{1+(\frac{n}{N})}$$

Where n_f= the desired sample size when population is less than 10,000; n= estimated sample size= 362; n= the estimated population size= 1500.

$$n_f = \frac{362.4}{1+\frac{362.4}{1500}} = 291.88 \approx 292$$

As a cross-sectional study, patients were recruited during regular clinic hours. However, to take care of incomplete or missing data; 95% response rate was assumed. Hence the final sample size was adjusted to compensate for the response rate using the formula: ns= n/r (ns=adjusted sample size of the response rate); n= calculated sample size= 292; r= response ratio= 0.95; ns= 292/0.95= 307; thus, the sample size of 307 was used for this study.

Sampling: patients that met the inclusion criteria from the study population were recruited into this study using the systematic random sampling technique. Data was collected over a three-month period. The number of participants interviewed every clinic day was 5. According to the Medical Records Department of the hospital, an estimate of 500 elderly patients was seen monthly. Total number of elderly patients expected to be seen during this 3-month period was 1500. The sampling interval (sampling frame/sample size) with a recruitment plan of 307 patients was 1500/307 which gave approximately 5. The first subject was selected by simple balloting, and thereafter every 5th consenting participant was selected for the study until the required sample size for each day was obtained. The folder of each patient selected was labelled and the hospital number written in a research register to avoid the pitfall of double sampling. In cases where the ballot picked a subject that had already been included in the sample, the next consenting candidate that met the inclusion criteria was selected. This procedure was repeated every clinic day until the total sample size of 307 was obtained.

Instruments: semi-structured and structured interviewer-administered questionnaires were used. The semi-structured questionnaire was designed by the researchers to obtain information on socio-demographic data while information on the nutritional status among the respondents was obtained using a structured nutritional assessment tool for the elderly, the Mini Nutritional Assessment (MNA). Laboratory estimation of serum albumin was also used to assess the nutritional status of the respondents.

The Mini Nutritional Assessment tool (MNA) is the most useful tool in clinical practice to evaluate the risk of malnutrition in the elderly and is thus limited to this age group. It was originally developed in the 1990´s and has evolved over time [14]. It is a simple, reliable tool that has been validated in many clinics around the world and also translated into many languages [15]. The original MNA has 18 self-reported questions derived from four parameters: (1) anthropometrics (Body Mass Index (BMI), Mid-Upper Arm Circumference (MUAC), Calf Circumference (CC), and weight loss in the last 3 months), (2) general assessment (living arrangement, number of prescribed medications, psychological stress in the last 3 months, mobility, neuropsychological problems, pressure), (3) dietary assessment (number of full meals per day, protein intake, fruit and vegetable intake, decrease in food/fluid intake), and (4) subjective assessment (on nutritional and health status). Based on the MNA questionnaire, the anthropometric assessment has a total score of 8; general assessment has a total score of 8; dietary assessment has a total score of 7; and subjective assessment has a total score of 7. The nutritional status of the respondents was classified using MNA scores as follows: above 24 as “well nutritional status”; 17 to 24 as “at risk of malnutrition”, less than 17 as “malnutrition” [9].

Serum albumin analysis was measured from the blood sample collected into the heparinized sample

bottle using spectrophotometry. After participants consented, about five milliliters (5mL) of venous blood sample was collected via venipuncture into a heparinized sample bottle for serum albumin analysis, while ensuring maintenance of all universal precautions. The blood sample was transported to the chemical pathology laboratory for analysis where it was centrifuged, and the separated serum analyzed by the principle of spectrophotometry using serum albumin reagents manufactured by Agappe diagnostics Limited, Switzerland. The procedure described requires measurement of absorbance change in the range of absolute absorbance. The albumin reagents consisted of succinate buffer (pH 4.20) and bromocresol green (0.14g/L). There was an albumin standard concentration of 3g/dl for the comparison with the sample.

Data collection: data was collected by the researcher and two trained research assistants. Balloting was done based on the available folders to select the first patient to be interviewed. Afterwards the fifth elderly patient from the index patient was picked and subsequently every fifth elderly patient was picked until the target for the day was met. Patients that gave informed consent were interviewed. Respondents´ folders were serialized with numbers written on them to avoid multiple administrations. Information from the interview, clinical measurements and laboratory results were recorded in the participants´ questionnaires.

Data analysis: the collected data was sorted, coded and entered into the computer for analysis using the Version 21 software of the Statistical Package for Social Sciences (SPSS). Results were presented using frequency tables and charts. Frequency distribution was generated to reveal percentages and proportions of the various variables. Chi-square test was used to find out the level of significance of association between categorical variables. Multiple logistic regression was used to determine the possible predictors of nutritional status. The level of significance of this study was set at 5% ($p<0.05$).

Ethical consideration: approval for the study was received from the Ethical Review Committee of University of Ilorin Teaching Hospital (Reference number of the approval: UITH/CAT/189/19A/082). The study was introduced to prospective subjects at presentation to the clinics. Subjects were adequately informed about the study that their participation was voluntary and they could withdraw from the study at any time without victimization. A written informed consent was obtained from each participant before being recruited into the study.

Results

Table 1 shows the socio-demographic characteristics of the respondents. A total of 307 participants were enrolled in the study. The age range of respondents was 60 to 89 years with a mean age of 66 years (SD ± 4.9). The highest number of respondents, 120 (39.1%) were in the 60 to 64 years age category. Majority of the participants were female 235 (76.5%), with a female to male ratio of 3.3: 1. Furthermore, most of the participants were Yorubas (90.2%) and 61.5% practiced Islam. More than half of them were currently married (58.0%) and one hundred and thirty-two (43.0%) of the respondents had no formal education. One hundred and thirty-two respondents (43.0%) were unemployed; however, 49.9% of the respondents earned below eighteen thousand Naira monthly. Majority of the respondents with no income had other source of financial support from their children (95.6%). Majority of the respondents 234 (76.2%) had not been receiving adequate support. Table 2 shows the pattern of nutritional status using Mini Nutritional Assessment (MNA). More than half of the respondents 170 (55%) were at risk of malnutrition, 39% (119) were well nourished while 6% (18) were malnourished. Table 3 shows the serum albumin level. More than half of all the respondents, 177 (56.0%) had low albumin level while 44.0% had normal level of albumin.

Table 4 shows the relationship between serum albumin and nutritional status using MNA. Eighty-eight point nine percent (88.9%) of the malnourished elderly had low serum albumin while 47.1% of well-nourished respondents had low serum albumin. The relationship between serum albumin and nutritional status was statistically significant
(χ^2= 12.314, Df = 2, p = 0.002). Table 5 shows the relationship between nutritional status using MNA and socio-demographic characteristics. Age was statistically related to nutritional status (p-value= 0.001) as those above 80 years were more malnourished. The married were well nourished (40.4%) than the separated/divorced who were more at risk of malnutrition (70.8%). The respondents with tertiary level of educational were more likely to be well-nourished (42%), while the unemployed had the highest prevalence of malnutrition (8.2%), followed closely by retired respondents (6.3%) and self-employed respondents (3.5%). By way of occupation, the civil servants were the most at risk of malnutrition (62.5%). Table 6 shows the regression of confounding variables on nutritional status. A multivariate regression analysis of confounding variables had nutritional status as the dependent. Family support is a significant independent factor associated with nutritional status among elderly (p= 0.002, OR = 1.101, β= 0,096).

Discussion

This cross-sectional study showed that the prevalence of malnutrition among the elderly was 6%, although more than half of the respondents (55%) were at risk of malnutrition. The prevalence of malnutrition among the elderly in this study is in tandem with previous similar studies by Adebusoye in Ibadan, Nigeria (7.8%) and Boulos *et al.* in rural Lebanon (8%) [13,16]. The high prevalence of "at risk of malnutrition" among this age group in this study could be due to the associated morbidities among the elderly which could have caused poor feeding habits among them. However, a much higher prevalence of 17% was got in a study done in Netherlands [17]. The main reason given for this was that there was high number of unhealthy older patients with multiple morbidities used in the study. The prevalence of malnutrition is however lower in a study done by Robb in South Africa (3.2%) [11]. The reason for the low prevalence of malnutrition in the study of Robb *et al.* could be due to the study area which was a higher socio-economic area in which the respondents had more income to consume adequate foods. Majority (56%) of the respondents had hypoalbuminaemia which is similar to the finding in the studies by Akirov *et al.* and Arabi *et al.* [18,19]. Malnutrition was found to be increasing as age advanced. This observation was statistically significant; therefore, there is an association between nutritional status and albumin. The finding in this study could be due to the fact that reduced food intake due to the aging process among elderly patients could cause low albumin level. This is similar to the study done by Brock et in South of Brazil and Alzahrani *et al.* in Saudi Arabia which noted a significantly lower albumin level (28.2 ± 7.7) among the malnourished elderly [20,21]. In this study, it was found that majority of the unemployed and retired elderly were malnourished. This could be due to the reduction in their income to cater for their needs. This reason may probably explain why malnutrition was more common among respondents that earned less than 18000 Naira as monthly income in the index study. Majority of the elderly with no adequate support were at risk of malnutrition. This observation was statistically significant (P < 0.039). This could be because of lack of resources to cater for their needs.

Among the variables that were associated with malnutrition in the elderly after the effects of confounders were eliminated using linear regression, family support was found to be a strong predictor of malnutrition among respondents (p= 0.002, OR = 1.101, β= 0,096). In a study done by Adebusoye *et al.* in Ibadan, Nigeria among elderly people presenting in a primary care clinics, being unmarried (OR = 1.355) was found to be the most associated confounding factor for under-nutrition

among the elderly [13]. A multivariate analysis done in the study of Hsu *et al.* showed that albumin level was an independent factor associated with functional status, the length of hospital stay and in-hospital mortality rate [22]. These generally indicate that elderly people are vulnerable to malnutrition which could be due to physiological, pathological, psychological and socio-economic factors. Routine screening for malnutrition is recommended to be done for all elderly patients as part of the holistic geriatric care by primary care physicians. Further evaluation of serum albumin profile as a reliable biochemical marker of nutritional status among the elderly is also recommended.

This study was a hospital-based cross-sectional study means that the various significant associations between the variables tested were not necessarily causal. Only a prospective or randomized controlled study can confirm the causal relationship between these variables. The research instruments used were based on self-report and observations are prone to self-report bias. Respondents could have over or underestimated their responses. The instruments used have been validated for use in local and international research. This research could serve as a basis for more studies to be carried out by primary care physicians among elderly patients to confirm some of the findings above and more importantly overcome the limitations of this study.

Conclusion

This study observed that even though the overall prevalence of malnutrition among elderly patients attending the Family Medicine Clinics at the University of Ilorin Teaching Hospital, Ilorin, Kwara State, Nigeria, using Mini Nutritional Assessment was low (6%), however, the prevalence of at risk of malnutrition among the participants was 55%. The serum albumin will need further study to scientifically advance the knowledge of the serum albumin profile in relations to the nutritional status in our population. The impact of poor support from the family to the elderly mostly in the developing countries like Nigeria could increase the morbidities among this age group and subsequently increase the cost of their care with the possibility of frequent inpatient care. So, there is a need for the government to pay close attention to this group of people.

What is known about this topic

- *Most studies had provided the prevalence of malnutrition among hospitalized elderly patients using different tools in different regions with fewer studies in the out-patient clinics;*
- *Knowledge on the use of Mini Nutritional Assessment (MNA) to assess nutritional status among the elderly.*

What this study adds

- *Nutritional status among the elderly can be assessed effectively using MNA and serum albumin in the primary care clinics;*
- *The relationship between Mini Nutritional Assessment (MNA) and serum albumin among elderly people in primary care clinics;*
- *Some socio-demographic characteristics are related to malnutrition among elderly people.*

Competing interests

The authors declare no competing interests.

Authors' contributions

Conception and study design: Adewale Oluwafemi Ayadi, Kola Moradeyo Alabi. Data collection: Adewale Oluwafemi Ayadi, Abimbola Ayobola Ayadi and Tolulope Oluwaseun Bamidele. Data analysis and interpretation: Adewale Oluwafemi Ayadi, Kola Moradeyo Alabi, Abimbola Ayobola

Ayadi, Abayomi Sikiru Biliaminu and Anthonia Nkechiyem Alabi. Manuscript drafting: Adewale Oluwafemi Ayadi, Abimbola Ayobola Ayadi, Tolulope Oluwaseun Bamidele. Manuscript revision: Adewale Oluwafemi Ayadi, Abimbola Ayobola Ayadi, Kola Moradeyo Alabi and Tolulope Oluwaseun Bamidele. All the authors have read and agreed to the final manuscript.

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Tables

Table 1: socio-demographic characteristics of the respondents

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Table 4: relationship between serum albumin and nutritional status using MNA of the respondents

Table 5: relationship between nutritional status using MNA and the socio-demographic variables of the respondents

Table 6: multivariate analysis of nutritional status and confounders

References

1. Omotara BA, Yahya SJ, Wudiri Z, Amodu MO, Bimba JS, Unyime J. Assessment of the determinants of healthy ageing among the rural elderly of North-Eastern Nigeria. Health. 2015;7(06): 754. **Google Scholar**
2. Lunenfeld B, Stratton P. The clinical consequences of an ageing world and preventive strategies. Best Pract Res Clin Obstet Gynaecol. 2013 Oct;27(5): 643-59. **PubMed**| **Google Scholar**
3. Kowal P, Dowd JE. Definition of an older person. Proposed working definition of an older person in Africa for the MDS Project. Geneva: World Health Organization; 2001.
4. Agarwalla R, Saikia AM, Baruah R. Assessment of the nutritional status of the elderly and its correlates. J Family Community Med. 2015 Jan-Apr;22(1): 39-43. **PubMed**| **Google Scholar**
5. Amarya S, Singh K, Sabharwal M. Changes during aging and their association with malnutrition. Clin Gerontol Geriatr. 2015;6(3): 78-84. **Google Scholar**
6. Sanya EO, Kolo PM, Adekeye A, Ameh OI, Olanrewaju TO. Nutritional status of elderly people managed in a Nigerian tertiary hospital. Ann Afr Med. 2013 Apr-Jun;12(2): 140-1. **PubMed**| **Google Scholar**
7. Adebusoye LA, Ladipo MM, Owoaje ET, Ogunbode AM. Morbidity pattern among elderly patients presenting at a primary care clinic in Nigeria. Afr J Prim Heal Care Fam Med. 2011;3(1): 1-6. **Google Scholar**
8. Salva A, Coll-Planas L, Bruse S, De Groot L, Andriru S, Abellan G *et al*. Nutritional assessment of residents in long-term care facilities (LTCFs): recommendations of the task force on nutrition and ageing of the IAGG European region and the IANA. J Nutr Health Aging. 2009 Jun;13(6): 475-83. **PubMed**| **Google Scholar**
9. Ahmed T, Haboubi N. Assessment and management of nutrition in older people and its importance to health. Clin Interv Aging. 2010 Aug 9;5: 207-16. **PubMed**| **Google Scholar**

10. Hailemariam H, Singh P, Fekadu T. Evaluation of mini nutrition assessment (MNA) tool among community dwelling elderly in urban community of Hawassa city, Southern Ethiopia. BMC Nutrition. 2016 Dec;2(1): 1-6. **Google Scholar**
11. Robb L, Walsh CM, Nel M, Nel A, Odendaal H, van Aardt R. Malnutrition in the elderly residing in long-term care facilities: a cross sectional survey using the Mini Nutritional Assessment (MNA®) screening tool. South Afr J Clin Nutr. 2017 Jun 23;30(2): 34-40. **Google Scholar**
12. Singh AS, Masuku MB. Sampling techniques & determination of sample size in applied statistics research: An overview. Int J Econ Commer Manag. 2014;2(11): 1-22. **Google Scholar**
13. Adebusoye LA, Ajayi IO, Dairo MD, Ogunniyi AO. Nutritional status of older persons presenting in a primary care clinic in Nigeria. J Nutr Gerontol Geriatr. 2012;31(1): 71-85. **PubMed**| **Google Scholar**
14. Kiesswetter E, Poulhausen S, Uhling K, Diekmann R, Lesser S, Uter W *et al*. Prognostic differences of the Mini Nutritional Assessment short form and long form in relation to 1-year functional decline and mortality in community-dwelling older adults receiving home care. J Am Geriatr Soc. 2014 Mar;62(3): 512-7. **PubMed**| **Google Scholar**
15. Bauer JM, Kaiser MJ, Anthony P, Guigoz Y, Sieber CC. The Mini Nutritional Assessment--its history, today's practice, and future perspectives. Nutr Clin Pract. 2008 Aug-Sep;23(4): 388-96. **PubMed**| **Google Scholar**
16. Boulos C, Salameh P, Barberger-Gateau P. Factors associated with poor nutritional status among community dwelling Lebanese elderly subjects living in rural areas: results of the AMEL study. J Nutr Health Aging. 2014 May;18(5): 487-94. **PubMed**| **Google Scholar**
17. Agarwal E, Miller M, Yaxley A, Isenrig E. Malnutrition in the elderly: a narrative review. Maturitas. 2013 Dec;76(4): 296-302. **PubMed**| **Google Scholar**
18. Akirov A, Masri-iraqi H, Atamna A, Shimon I. Low Albumin Levels Are Associated with Mortality Risk in Hospitalized Patients. Am J Med. 2017 Dec;130(12): 1465.e11-1465.e19. **PubMed**| **Google Scholar**
19. El Arabi F, Nejjar B, Samara I, Bour A. Nutritional status and body composition of elderly persons hospitalized in the public hospitals of Greater Casablanca, Morocco. IOSR-JNHS. 2017;6(6): 49-54. **Google Scholar**
20. Brock F, Bettinelli LA, Dobner T, Stobbe JC, Pomatti G, Telles CT. Prevalence of hypoalbuminemia and nutritional issues in hospitalized elders. Rev Lat Am Enfermagem. 2016 Aug 8;24: e2736. **PubMed**| **Google Scholar**
21. Alzahrani SH, Alamri SH. Prevalence of malnutrition and associated factors among hospitalized elderly patients in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. BMC Geriatr. 2017 Jul 3;17(1): 136. **PubMed**| **Google Scholar**
22. Hsu HY, Hwang LC, Lin CH, Lin CJ, Tjung JJ. Impact of serum albumin on functional status and hospital outcome in oldest-old inpatients. International Journal of Gerontology. 2015 Dec 1;9(4): 220-2. **Google Scholar**

Table 1: socio-demographic characteristics of the respondents		
Variables	**Frequency (n)**	**Percentage (%)**
Age groups		
60 - 64	120	39.10
65 - 69	108	35.10
70 - 74	42	13.70
75 - 79	30	9.80
≥ 80	7	2.30
Mean ± SD[1]	66 ± 4.9	
Range	60 - 89	
Gender		
Male	72	23.50
Female	235	76.50
Religion		
Christianity	116	37.80
Islam	189	61.50
Traditional	2	0.70
Marital status		
Married	178	58.00
Separated/divorced	24	7.80
Widowed	105	34.20
Ethnicity		
Hausa	22	7.20
Yoruba	277	90.20
Igbo	1	0.30
Others[a]	7	2.30
Level of education		
Tertiary	50	16.30
Secondary	82	26.70
Primary	43	14.00
No formal education	132	43.00
Occupation		
Unemployed	132	43.00
Self-employed[b]	104	33.90
Civil servant	8	2.60
Retired	63	20.50
Income[c]		
≤ 18000	153	49.9
> 18000	40	13
No income	114	37.1
Sources of support for those with no income	**n=114**	
Children	109	95.6
Spouse	1	0.9
Others[d]	4	3.5
Adequacy of support receive		
Very adequate	43	14.0
Not quite adequate	234	76.2
Not adequate at all	30	9.8
Note: 1 = Standard deviation; a = including other ethnic groups in Nigeria; b = including traders, artisans, drivers, farmers; c = the cut-off of eighteen thousand naira per month was based on the national minimum wage; d = including friends, in-laws, government		

Table 2: nutritional status of the respondents using Mini Nutritional Assessment (MNA)		
Variables	**Frequency (n =307)**	**Percentages (%)**
Nutritional status		
Malnourished	18	6
At risk of malnutrition	170	55
Well nourished	119	39

Table 3: serum albumin level among the respondents		
Variables	**Frequency (n = 307)**	**Percentage (%)**
Albumin level		
Low	172	56
Normal	135	44

Table 4: relationship between serum albumin and nutritional status using MNA of the respondents				
Variables	**Albumin**		**P-value**	**Confidence interval**
	Low (%)	**Normal (%)**	**0.002**	
Nutritional status				
Malnourished	16 (88.9)	2 (11.1)		0.9503-1.2719
Nutritional Risk	100 (58.8)	70 (41.2)		1.3370-1.4865
Well Nourished	56 (47.1)	63 (52.9)		1.4384-1.6204

Table 5: relationship between nutritional status using MNA and the socio-demographic variables of the respondents				
Variables	**Mini Nutritional Assessment (MNA)**			
	Malnourished (%)	**Nutritional risk (%)**	**Well nourished (%)**	**P-value**
Age groups				0.001
60 - 64	2 (1.7)	66 (55.0)	52 (43.3)	
65 - 69	6 (5.6)	64 (59.3)	38 (35.2)	
70 - 74	4 (9.5)	24 (57.2)	14 (33.3)	
75 - 79	3 (10.0)	14 (46.7)	13 (43.3)	
≥ 80	3 (42.8)	2 (28.6)	2 (28.6)	
Marital status				0.507
Married	9 (5.1)	97 (54.5)	72 (40.4)	
Separated/divorced	1 (4.2)	17 (70.8)	6 (25.0)	
Widowed	8 (7.6)	56 (53.3)	41 (39.0)	
Ethnicity				0.315
Hausa	0 (0.0)	17 (77.3)	5 (22.7)	
Yoruba	18 (6.5)	149(53.8)	110(39.7)	
Igbo	0 (0.0)	0 (0.0)	1(100.0)	
Others	0 (0.0)	4 (57.1)	3 (42.9)	
Level of education				0.783y
Tertiary	0 (0.0)	29(58.0)	21 (42.0)	
Secondary	5 (6.1)	49(59.8)	28 (34.1)	
Primary	4 (7.6)	27(50.9)	22 (41.5)	
No formal education	9 (7.4)	65(53.3)	48 (39.3)	
Occupation				0.924y
Unemployed	10(8.2)	63(51.6)	49 (40.2)	
Self employed	4 (3.5)	68(59.6)	42 (36.8)	
Civil servant	0 (0.0)	5 (62.5)	3 (37.3)	
Retired	4 (6.3)	34(54.0)	25 (39.7)	
Adequacy of support received				0.039
Very adequate	2 (4.7)	20 (46.5)		
Not quite adequate	16 (6.8)	126 (53.8)		
Not adequate at all	0 (0.0)	24 (80.0)		
Forms of support received				
Monetary	16 (5.9)	150 (55.6)		
Material	2 (8.7)	10 (43.5)		
Rendering service	0 (0.0)	10 (71.4)		
Income				0.006
≤ 18000	8 (5.2)	91 (59.5)	54 (35.3)	
> 18000	1 (2.5)	18 (45.0)	21 (52.5)	

Table 6: multivariate analysis of nutritional status and confounders				
Variables	**β**	**P**	**Odd ratio**	**Confidence interval**
Age	-0.057	0.742	0.944	0.671 - 1.328
Income	0.144	0.350	1.154	0.854 - 1.560
Occupation	-0.658	0.125	0.518	0.223 - 1.200
Adequacy of support	-0.658	0.125	0.518	0.223 - 1.200
Family support	0.096	0.002	1.101	1.036 - 1.171
Albumin	-0.004	0.903	0.996	0.937 - 1.059
β: Coefficient of regression; p: significance; NB: dependent variable = nutritional status				