FOOD HABITS AND MICRONUTRIENT STATUS OF THE ELDERLYIN RURAL AND URBAN COMMUNITIES IN NORTH-EAST SENATORIAL ZONE OF BENUE STATE, NIGERIA

ABSTRACT

Background: The global population is both growing and ageing quickly, with industrialized nations having the largest share of ageing populations. The world's population is ageing, and many elderly people experience age-related malnutrition, including deficiencies in some micronutrients. Malnutrition in the elderly is a serious condition when the nutritional needs of the elderly do not match their food intake.
Design:A cross-sectional survey was conductedwas conducted for 516 respondents among the elderly.
Methodology:A structured and validated questionnaire was utilized to gather information on the socio-economic and demographic characteristics. Food habit was assessed for their weekly household expenditure, meal preparation and no meals consumed per day. Biochemical analysis of blood samples was determined. Data were analyzed using Statistical Product for Service Solution (SPSS) version 20.0. Descriptive and inferential statistics were used to determine socio-demographic and food habits. Standard deviation was used to separate means of the micronutrient serum levels and compared with the Recommended Serum Level. A p-value of ≤ 0.05 was considered significant.
Results: Most (60.9%) of the respondents were males. About 40.60% and 40.40 elderly were from rural and urban areas within the age bracket of 66 -75 years. Most of the respondents (64.10%) were farmers and derive their income from there. The serum levels of calcium for urban and rural dwellers were 9.15± 2.51 and 9.68± 1.90 mg/dl, sodium was 126.72± 23.32 and 130.96± 40.34 mmol. For iron, were 0.9± 0.09 and 0.87± 0.08 µg/dl. The magnesium values were 2.43± 0.33 and 2.44 ± 0.29, selenium was 0.46± 0.13 and 0.49± 0.11 mg/dl respectively. There was a significant difference ($p < 0.05$) between the serum iron levels of the urban and rural respondents. There was no significant difference ($p > 0.05$) in the serum vitamin levels of the urban and rural respondents.
Conclusion: The study found that serum values for some micronutrient levels were adequate among elderly participants from urban and rural areas, but inadequate for sodium, iron, vitamin B12, selenium and vitamin E.

Keywords: [Food habits, Rural, Urban, Micronutrient, Elderly, Nutrition, Malnutrition}

1. INTRODUCTION

The global population is both growing and ageing quickly, with industrialised nations having the largest share of ageing populations (1). The World Health Organization's (2) Global Health and Ageing Report predicts that the number of individuals 65 and older or 22.0% of the global population will increase from an estimated 524 million in 2010 to 1.2 billion in 2025 and 2 billion in 2050 (3). Nigeria is home to over 206 million people, 9.4 million Persons were 60 years of age or older in 2020. Nigeria's elderly population has increased by over 740,000 individuals between 2018 and 2020. Nigeria is thought to have one of the youngest populations in the world, yet the country's elderly population is also steadily growing. It is anticipated that as the elderly population grows steadily, the percentage will rise to 2.9% by 2030, 4.0% by 2050, and 10.1% by 2100 (3).

According to Mudiare (4), Benue State is expected to have an indicative population of 298,234 old people, making Nigeria the nation with the largest percentage of citizens over 60 (5). There are not many governmental laws and institutional

policies in existence. Many people view becoming older as a flaw or a handicap. However, there is considerable variation in age-related functional changes among the elderly, and their nutritional and dietary requirements may differ (6). The elderly often face changes in their physiology, psychology, and cognition. They need to consume enough food to sustain their independence and stop their health from deteriorating (7). In older adults, the combined effects of ageing and micronutrient deficiencies lead to frailty, cognitive decline, weakened immune systems, cardiovascular disease, cancer, and others.Numerous studies have demonstrated that older adults have low nutritional status, and there is clear evidence that malnutrition is more widespread in geriatric groups (8). Many factors, such as the aftermath of food shortages and armed conflicts, the lack of access to healthy meals in households, and the concomitant effects of HIV infection and AIDS, are frequently blamed for the nutritional difficulties older people in Nigeria face (9,10,11). According to Seid and Fentahun (2013), (12), considerable proportions of senior citizens in Nigerian hospitals suffered from under nutrition and were susceptible to malnutrition; the percentages ranged from 2.24% to 40.46% and 11.8% to 52.7%, respectively. Micronutrient deficits are one particular kind of malnutrition that is common in older persons (13).

The global population with micronutrient deficiencies is estimated to be 2 billion (27%) (14). The availability of micronutrients is one of the methodological challenges that make micronutrient deficiencies far more difficult to screen for and diagnose than quantitative malnutrition, which manifests as weight loss. All but one dietary consumption survey, however, has found that older persons do not get enough of a wide variety of micronutrients (15).Micronutrient deficiencies, including those in iron (Fe), vitamins C and D, B6 and B12, folic acid, and the trace element zinc (Zn), have been strongly associated with immune function impairment (16). Nigeria, like many other nations across the world, is facing an increasing burden of chronic diseases, and research and nutrition education have not paid much attention to the prevalence of multiple health conditions and their implications for the healthcare system (17). Data on the food consumption, physical characteristics, and biochemical markers of the nation's senior citizens are lacking.An adequate diet is essential for ageing well as it can improve both physical and mental performance and reduce the chances of illness and disability (18). Older individuals need to meet their dietary demands to age better, longer, and healthier. A balanced diet is essential for providing the body with the nourishment it needs to perform everyday functions.

In Nigeria, research on the nutritional health of the elderly has not received enough attention; this is particularly true in North-Central Nigeria and Benue State. To offer critical information for advocacy, instruction, planning, research, and interventions in this particular field, this knowledge gap must be closed. In light of the discussion above, the current study was conducted to evaluate the micronutrient status of the elderly.

2. MATERIAL AND METHODS

2.1 Study design and area

The study adopted a cross-sectional survey research design. The study was carried out in Benue State, one of the 36 states of the Federal Republic of Nigeria, with an estimated population of 5,963,222 according to the National Bureau of Statistics (19). The State is divided into three senatorial Districts with 7.7 and 9 local governments respectively; Zone A (Benue North-East) where the research was conducted and they include; Logo, Ukum, Katsina- ala, Kwande, Ushongo , Vandeikya and Konshisha, Zone B (Benue North-West) include, Gboko, Tarka,Buruku, Makurdi,Guma, Gwer east and Gwer west and Zone C (Benue South) have the following local governments; Ado, Agatu, Apa, Obi, Ogbadibo, Ohimini, Oju, Okpokwu and Oturkpo.

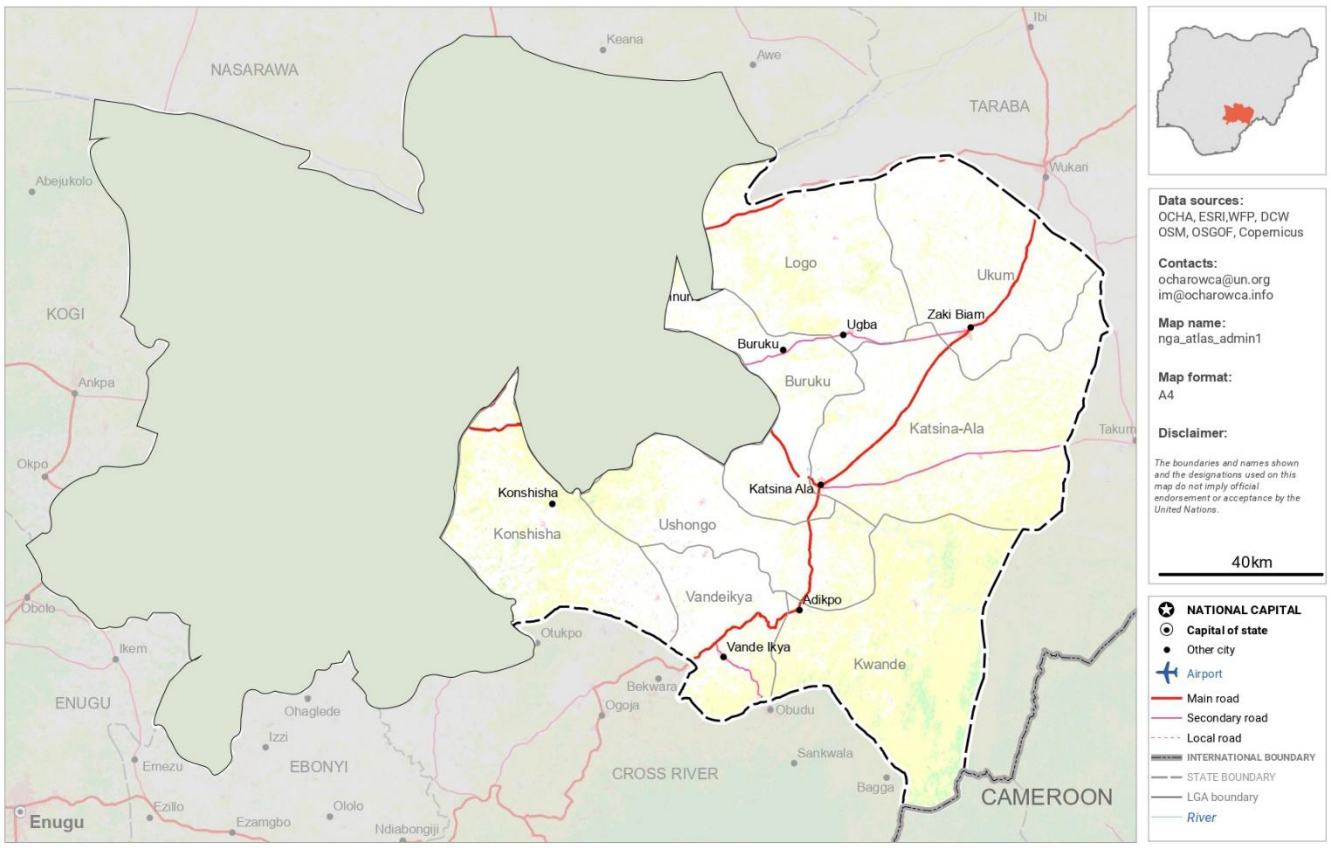

Fig 1: Map of Benue State showing the three senatorial zones with their local governments

2.2 Study population, sampling size and sampling technique

A cross-sectional survey was conducted among the elderly (male and female) aged 60 years and above in the North-East Senatorial District (Zone A) in Benue State. The inclusion criteria were people aged 60 years and above and people who have lived in a household in the study area for not less than 6 months. Exclusion criteria were people under the age of 60 years.

The sample size was calculated using the formula by Anderson, & Finn, (20) at a 95% confidence level as follows: n=N/(1+N(e^2))

n = required sample size
N = population size
e = desired level of precision (margin of error)

A minimum sample size of 397 was obtained. Thirty (30) per cent was added to make up for contingencies, such as incomplete questionnaires, and non-responsive respondents as well as to have a good representation. A total of 516 respondents were selected using multistage sampling. The Purposive sampling technique as well as proportionate sampling were employed to select four (4) local governments out of seven (7) in the northeast senatorial zones in Benue reason being the largest among the LGAs in the zone, the L.G selected were; Logo, Kwande, Ushongo and Vandeikya.. Proportionate sampling helped to ensure both males and females were equally represented in the sample. Simple random sampling was used to select the subject for each L.G.

2.3Method of Data Collection

A structured questionnaire was utilized to gather data on the socio-economic and demographic characteristics, (sex, age, marital status, religion, educational qualification, occupation, income and household size) food habit was assessed by asking the respondents their weekly household expenditure, meals preparation and no of meals consumed per day and biochemical analysis of blood Samples were collected from the sub-sample. A laboratory scientist (phlebotomist) was recruited to draw blood from the respondents. Blood samples collected from each elderly person were sent to the laboratory on the same day of collection. The blood sample was then analysed for serum calcium, iron, magnesium, sodium, selenium and vitamins (A, B12 C, D & E).The Serum Calcium was determined by atomic absorption spectrometry as described by Cali, Mandel and Moore (21), Serum Iron and magnesium was analyzed using spectrophotometric method as described by Darcie & Lewis (22). Sodium was determined by Colorimetric determination by Bradbury (23)and Serum selenium was estimated by atomic absorption spectrophotometry. While Vitamin A and D was determined by High-Performance liduid chromatography (HPLC) vitamin B12 was by chemiluminescence immunoassay, vitamin C was measured by dinitrophenylhydrazine.

2.4Statistical analysis

Data obtained was coded and analyzed using Statistical Product for Service Solution (SPSS) version 20.0. Analysis was conducted on socio-demographic features, and food habits using descriptive and inferential statistics. Standard deviation was used to separate means of the micronutrient serum levels and was compared with the Recommended Serum Level. Significance was accepted at the level of $p \leq 0.05$.

3. RESULTS

The socio-demographic profile of the respondents indicates in table 1, that most (60.9%) of the respondents were males with 47.5% and 71% residing in the urban and rural areas respectively. The percentage of male respondents (71%) residing in rural areas was significantly higher than in rural. Also, 40.60% and 40.40 of the respondents in the rural and urban areas were within the age bracket of 66 -75 years. Many (58.7%) of the respondents both from urban and rural were married. The tiv ethnic group dominated in both areas (98.3%).

Table 2 shows that about 31.20% of the respondents in both areas had no formal education and 29.30% attained primary education as their highest qualification while 37.2% of the rural dwelling respondent attained primary. The table also shows that most (64.10%) of the urban and rural respondents were farmers. There was a statistically significant difference ($p= 0.05$) in the income source of the respondents residing in urban and rural areas. About 62% of the urban dwellers and 56% of rural dwellings had farming as their income source. The household size having 5-7 members in the rural and urban areas were 48.9% and 35.2% respectively.

Table 3 showed that out of the 223 respondents from the urban population who were assessed, 21.1% spent more than ₦3,000 per week, while 41.3% of the respondents from the rural population spent more than ₦2,000 per week. About 32.3% of the urban respondents had their meals prepared by their grandchildren, whereas 15.7% of urban settlers cooked their meals. A higher percentage of respondents (44.0%) from rural residents said their grandchildren make their meals. 6.8% of respondents said they prepared their food. Elderly individuals in both urban and rural areas ate two to three times each day (89.2%) and (85.3%), respectively.

Table 4 presents the serum levels of minerals (calcium, iron, magnesium, sodium and selenium) of the elderly by gender in Benue North-East senatorial zone. The serum calcium for both male and female respondents was 9.77±1.78 mg/dl and 9.12±2.52 mg/dl respectively, while the serum sodium was 130.95±22.12 mmol and 127.00±37.09 mmol for males and females respectively. The male and female respondents had an equal level of serum iron (0.90±0.06 µg/dl and 0.91±0.11 µg/dl) respectively, serum magnesium level was 2.42±0.28 mg/dl and 2.44±0.33 mg/dl for male and female respondents, while for serum selenium level was 0.48± 0.12 mg/dl and 0.47±0.13 mg/dl for male and female respondents respectively.

Table 5 shows the serum levels of vitamins (A, B12, C, D, & E) of the elderly by gender. For both male and female respondents, the serum vitamin A levels were 5.45±4.82 µg/ml and 5.89± 5.07 µg/ml respectively while serum vitamin B12 levels were 63.91± 69.97 mg/100ml and 73.08±78.00 mg/100ml for male and female respectively. The serum levels of vitamin C for both males and females were 0.56± 0.32 mg/100ml and 0.59± 0.34 mg/100ml respectively while serum vitamin D levels had equal levels of 0.27± 0.16 mg/100ml for both males and female respondents.

Table 6 presents serum levels of minerals (calcium, iron, magnesium, sodium and selenium) of the elderly persons in urban and rural areas of Benue North-East senatorial zone. The serum levels of calcium for urban and rural dwellers were 9.15± 2.51 mg/dl and 9.68± 1.90 mg/dl, while serum sodium levels among the urban and rural respondents were 126.72±

23.32 mmol and 130.96± 40.34 mmol respectively. For iron, the serum levels for both urban and rural settlers were 0.9± 0.09 µg/dl and 0.87± 0.08 µg/dl respectively. The magnesium serum levels were 2.43± 0.33 and 2.44 ± 0.29 for urban and rural respondents respectively, while serum selenium levels were 0.46± 0.13 mg/dl and 0.49± 0.11 mg/dl for urban and rural dwellers respectively. There was a significant difference ($p < 0.05$) between the serum iron levels of the urban and rural respondents.

Table 7 presents serum levels of vitamins (A, B12, C, D, & E) of elderly persons by area of residence in Benue North-East senatorial zone. The table shows that the serum vitamin A levels for both urban and rural settlers were 4.57± 4.53 µg/ml and 7.15± 5.13 µg/ml and the serum vitamin B12 level of the urban residents (57.26± 71.88 mg/100ml) was lower than that of the rural respondents (84.65± 76.04 mg/100ml), though, it was not statistically significant ($p = 0.189$). Serum vitamin C levels were 0.50± 0.32 mg/100ml and 0.67± 0.31 mg/100ml respectively for both urban and rural dwellers. Vitamin E serum levels for urban and rural respondents were 1.14±1.04 mg/100ml and 1.69± 1.14 mg/100ml respectively while vitamin D serum levels were 0.24±0.15 mg/100ml and 0.30±0.15 mg/100ml for both rural and rural respondents. There was no significant difference ($p > 0.05$) in the serum vitamin levels of the urban and rural respondents.

4. DISCUSSION

The present study assessed the food habits and micronutrient status of the elderly (60 years of age and older) in rural and urban communities in the north-east senatorial zone of Benue State, Nigeria. According to this study on the food habits of the elderly, in urban settlements, meals prepared by their grandchildren were lower than what was reported in rural settlements. This demonstrates that they continue to practice extended families, in which the grandparents live with the parents and their children as well as their wives, and this was supported by Agbozo et al. (24). The majority of the respondents ate two to three meals daily. As one age, it has been noticed that their energy and food consumption typically decline (25). This fact may be a result of a decline in physical activity and muscle mass. Reduced eating habits could be caused by disease or ageing-related problems with hunger, taste perception, chewing, swallowing digestion, and nutrient absorption (26). Eating two meals a day could also be mostly attributed to a shortage of food and the fact that the respondents may be on their farms.

The study also observed that the serum magnesium levels were also met, which agrees with the study that was conducted on senior hypertension patients with ionised magnesium deficiency. They found that all patients had normal serum magnesium concentrations, except one elderly hypertension patient who had serum magnesium concentrations < 1.5 mg/dL (27). The respondents did not meet the recommended level of selenium. These study findings conflict with those of Kieliszek et al.'s (28) investigation on selenium and health issues in the Middle East. Ibrahim et al. (29) assert that attaining health advantages from selenium requires a balanced diet. This stems from the recognition that selenium, based on its state, can assume vital functions or be involved in the development of various health conditions, encompassing neurodegenerative diseases, diabetes, cancer, and cardiovascular problems in older individuals. The elderly in Benue should be urged to continue consuming selenium because it helps to reduce inflammation caused by reactive oxygen species and DNA damage. Ibrahim et al. (30) assert that attaining health advantages from selenium requires a balanced diet.

The elderly attained the necessary blood levels of several vitamins. This is contrary to the findings of the study by Maruapula& Novakofski (31) which reports that despite gender differences in micronutrient intake for vitamin A, the elderly had poor vitamin A intake. Chronic vitamin A overexposure has been related to hair loss, dry mucous membranes and skin, cortical bone loss and fractures, and maybe an elevated risk of mortality, according to Watson et al. (9). In such a situation, it is important to educate the elderly about the need for proper vitamin A intake rather than overconsumption. Lavrisa et al. (32) conducted a study on vitamin B12 levels and dietary intake in elderly Slovenians. They found that low vitamin B12 levels are detrimental, especially for vulnerable populations, which agrees with the current study of low levels of vitamin B12. This current research revealed that elderly individuals from both urban and rural areas met the necessary serum level of vitamin C. The outcomes differ from those of the Kalambe et al. (33) meta-analysis, which looked at 128 serum vitamin C assays. While the findings of this study imply that the elderly take less vitamin E, Zhang et al. (34) in a meta-analysis on dietary vitamin E found that the elderly consume significant amounts of vitamin E, contradicting the findings of this study.

The needed serum level of vitamin D was not achieved by the elderly in the study. This disagrees with research by Adimora et al. (35), which looked at the nutritional sufficiency of important vitamins and minerals consumed by old people. In another study, where Alpdemir&Alpdemir (36) conducted a meta-analysis of vitamin D deficiency in Turkey, a significant portion of the population was vitamin D deficient; particularly vulnerable to vitamin deficiencies are older women. According to some studies, vitamin D deficiency affects people of all ages, genders, and ethnicities worldwide and is a significant public health issue (37). Serum vitamin D levels in elderly people can be used to predict the degree of

functional decline and skeletal muscle atrophy (34). The incidence of vitamin D insufficiency in the elderly population can be reduced by consuming dairy products (38).

Table1. Socio-demographic profile of the elderly by location

Variable	Residence			X^2-value	p-value
	Urban	Rural	Total		
Sex					
Male	106 (47.50)	208 (71.00)	314 (60.90)	29.245	0.001
Female	117 (52.50)	85 (29.00)	202 (39.10)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		
Age group in years					
60-65	79 (35.40)	116 (39.60)	195 (37.80)	7.331	0.062
66-75	90 (40.40)	119 (40.60)	209 (40.50)		
76-79	42 (18.80)	33 (11.30)	75 (14.50)		
≥ 80	12 (5.40)	25 (8.50)	37 (7.20)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		
Marital status					
Single	1 (0.40)	4 (1.40)	5 (1.00)	10.631	0.014
Married	119 (53.40)	184 (62.80)	303 (58.70)		
Widowed	99 (44.40)	93 (31.70)	192 (37.20)		
Widower	4 (1.80)	12 (4.10)	16 (3.10)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		
Religion					
Christianity	220 (98.70)	290 (99.00)	510 (98.80)	3.170	0.205
Islam	3 (1.30)	1 (0.30)	4 (0.80)		
Others	0 (0.00)	2 (0.70)	2 (0.40)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		
Ethnic group					
Tiv	216 (96.90)	291 (99.30)	507 (98.30)	5.364	0.147
Idoma	4 (1.80)	2 (0.70)	6 (1.20)		
Igede	2 (0.90)	0 (0.00)	2 (0.40)		
Others	1 (0.40)	0 (0.00)	1 (0.10)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		

Table 2: Socio-economic characteristics of the respondents by location

Variable	Residence			X2-value	p-value
	Urban	Rural	Total		
Educational level					
No formal education	85 (38.12)	76 (25.92)	161 (31.20)	29.150	0.001
Primary	42 (18.83)	109 (37.23)	151 (29.30)		
Secondary	50 (22.42)	76 (25.92)	126 (24.40)		
Tertiary	46 (20.63)	32 (10.93)	78 (15.10)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		
Occupation					
Pensioner/unemployed	36 (16.10)	62 (21.20)	98 (19.00)	5.597	0.231
Civil servant	10 (4.50)	6 (2.00)	16 (3.10)		
Farming	150 (67.30)	181 (61.80)	331 (64.10)		
Trading /Artisan	26 (11.70)	43 (14.70)	69 (13.40)		
Contractor	1 (0.40)	1 (0.30)	2 (0.40)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		
Source of Income					
Pension	23 (10.30)	19 (6.40)	42 (8.1)	17.987	0.001
Salary	6 (2.70)	5 (1.70)	11 (2.1)		
Private business	39 (17.50)	45 (15.40)	84 (16.3)		
Support from children/ family members	17 (7.60)	60 (20.50)	77 (14.9)		
Farming	138 (61.90)	164 (56.00)	302 (58.5)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		
Household size					
2-4 members	41 (18.40)	97 (33.10)	138 (26.70)	16.104[a]	**0.001**
5-7 members	109 (48.90)	103 (35.20)	212 (41.10)		
More than seven	73 (32.70)	93 (31.70)	166 (32.20)		
Total	**223 (100)**	**293 (100)**	**516 (100)**		

Table 3: Food habits for the elderly by location

Variable	Residence			x^2-value	p-value
	Urban	Rural	Total		
Weekly household food expenditure (₦)					
Less than 2000	29 (13.00)	109 (37.20)	138 (26.70)	38.357	0.001
2000	92 (41.30)	86 (29.30)	178 (34.50)		
3000	55 (24.60)	48 (16.40)	103 (20.00)		
Above 3000	47 (21.10)	50 (17.10)	97 (18.80)		
Total	223 (100)	293 (100)	516 (100)		
Meals are prepared by					
Mother	42 (18.80)	90 (30.71)	132 (25.60)	31.926	0.001
House help	74 (33.20)	54 (18.40)	128 (24.70)		
Grandchildren	72 (32.30)	129 (44.00)	201 (39.00)		
Self	35 (15.70)	20 (6.80)	55 (10.70)		
Total	223 (100)	293 (100)	516 (100)		
Number ofmeals per day					
Once	0 (0.00)	7 (2.40)	7 (1.40)	5.804	0.055
2-3 times	199 (89.20)	250 (85.30)	449 (87.00)		
More than 3 times.	24 (10.80)	36 (12.30)	60 (11.60)		
Total	223 (100)	293 (100)	516 (100)		

Table 4: the serum levels of minerals (calcium, iron, magnesium, sodium and selenium)of the elderly by gender

Sex	Calcium (mg/dl)		Sodium (mmol)		Iron (ug/dl)		Magnesium (mg/dl)		Selenium (mg/dl)	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Male	9.77	± 1.78	130.95	± 22.12	0.90	± 0.06	2.42	± 0.28	0.48	± 0.12
Female	9.12	± 2.52	127.00	± 37.09	0.91	± 0.11	2.44	± 0.33	0.47	± 0.13
t-value	1.026		0.437		-0.515		-0.248		0.176	
p-value	0.310		0.664		0.609		0.805		0.861	
RSL	8.5 - 10.5		135-145		10.74 - 30.43		1.8 - 2.2		60 - 150	

RSL = Recommended serum level SD =standard deviation

Table 5: The serum levels of vitamins (a, b12, c, d, & e) of the elderly by gender

Sex	Vitamin A (ug/ml)		Vitamin B_{12} (mg/100ml)		Vitamin C (mg/100ml)		Vitamin E (mg/100ml)		Vitamin D (mg/100ml)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	5.45	± 4.82	63.91	± 69.97	0.56	± 0.32	1.30	± 1.07	0.27	± 0.16
Female	5.89	± 5.07	73.08	± 78.00	0.59	± 0.34	1.45	± 1.15	0.27	± 0.16
t-value	-0.308		-0.433		-0.311		-0.469		-0.086	
p-value	0.759		0.667		0.757		0.641		0.931	
RSL	0.70 - 2.09		160 - 950		0.3		5.5 - 17		0.015	

RSL = Recommended serum level SD =Standard deviation

Table 6: The serum levels of minerals (calcium, iron, magnesium, sodium and selenium) of the elderly by area of residence

Residence	Calcium (mg/dl)		Sodium (mmol)		Iron (ug/dl)		Magnesium (mg/dl)		Selenium (mg/dl)	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Urban	9.15	± 2.51	126.72	± 23.32	0.93	± 0.09	2.43	± 0.33	0.46	± 0.13
Rural	9.68	± 1.90	130.96	± 40.34	0.87	± 0.08	2.44	± 0.29	0.49	± 0.11
t-value	-0.841		-0.475		2.609		-0.024		-0.603	
p-value	0.404		0.637		0.012		0.981		0.549	
RSL	8.5 -10.5		135-145		10.74-30.43		1.8-2.2		60-150	

RSL = Recommended serum level SD =Standard deviation

Table 7: The serum levels of vitamins (A, B12, C, D, & E) of the elderly in urban and rural areas

Residence	Vitamin A (ug/ml)		Vitamin B_{12} (mg/100ml)		Vitamin C (mg/100ml)		Vitamin E (mg/100ml)		Vitamin D (mg/100ml)	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Urban	4.57	± 4.53	57.26	± 71.88	0.50	± 0.32	1.14	± 1.04	0.24	± 0.15
Rural	7.15	± 5.13	84.65	± 76.04	0.67	± 0.31	1.69	± 1.14	0.30	± 0.15
t-value	-1.929		-1.330		-1.891		-1.817		-1.247	
p-value	0.059		0.189		.064		0.075		0.218	
RSL	0.70 - 2.09		160 - 950		0.3		5.5 - 17		0.015	

RSL = Recommended serum level SD =Standard deviation

5. CONCLUSION

The study discovered that,it is important to point out that both rural and urban elderly still practice an extended type of family settings which allows a communal and mutual way of eating.With the exception of sodium, iron, vitamin B12, selenium, and vitamin E, the serum values for the majority of micronutrient levels were appropriate among older people from both urban and rural locations. Regardless of geography or gender, the elderly consumed enough of the majority of micronutrients. It was determined that the elderly lacked basic knowledge about healthy eating, underscoring the need for better education and awareness among this population. Micronutrient deficiencies in the aged may lead to a host of comorbidities, including heart disease, hypertension, diabetes, electrolyte imbalance, dementia, and anemia, all of which lower the quality of life of the elderly. Health promotion is necessary in order to raise awareness of the nutritional needs and food quality of the elderly, since these factors can support a healthy aging process and improve their quality of life.

ETHICAL APPROVAL AND CONSENT

Ethical approval reference number MOH/STA/204/VOL. 1/251 was obtained from the Benue State Ministry of Health from the research ethical committee. Informed written consent was obtained verbally from the respondents after the purpose of the study was explained to them before participating.

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