

# A comparative study of the nutritional status of the elderly population residing in rural and urban communities in Benue State, Nigeria

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Received Date: 16 January 2026 | Accepted Date: 27 February 2026 | Published Date: 30 April 2026

**ABSTRACT:** Geriatric populations are vulnerable to malnutrition. The nutritional status of community-dwelling older adults was assessed using validated screening tools to enable early identification and prevention of malnutrition in this group. The study was carried out on the nutritional screening tests of the elderly aged 60 years and above. The design was a cross-sectional design involving 516 (60 to ≤ 80 years), consisting of 293 rural and 223 urban home-dwelling elderly. Data were collected using a well-structured questionnaire containing demographic characteristics, anthropometric features, and Mini Nutritional Assessment (MNA) screening tool. Data were analysed using Statistical Package for Social Sciences (SPSS) version 20.0. Mini Nutritional Assessment Status showed 64% elderly had normal and 34% were at risk of malnutrition. While Body Mass Index (BMI) showed 35.10% normal weight, 32.90% overweight, 27.90% obese and 4.10% underweight. Males (3.50%) were more malnourished than females (1.00%) as classified by MNA, while using BMI classification; females were underweight than males (5.90% and 2.90%), respectively. Among participants aged 80 years and older, only 4.10% were well-nourished ( $p < .001$ ) using the BMI indicator. In conclusion, the elderly from the urban areas had normal nutrition status than those from rural areas, both using MNA and BMI tools ( $P < 0.001$ ). This can guide specific interventions for at-risk elders in both settings.

**Keywords:** Elderly, Mini Nutritional Assessment, nutritional status, rural, urban.

## INTRODUCTION

The number and percentage of elderly persons have increased due to ageing populations worldwide. By 2030, there will be 1.4 billion people over the age of 60 in the world, up from 901 million in 2015; by 2050, that number will have nearly doubled to 2.1 billion, with the majority of this increase occurring in emerging nations like Nigeria (Kostecka and Bojanowska, 2021). The ageing of the "baby boom" generations, decreased fertility, and greater lifespan are the driving forces behind this change (Agarwalla *et al.*, 2015).

The prevalence of malnutrition rises progressively with age among older populations. Malnutrition reduces physical capacity and quality of life, lengthens hospital

stays, and raises mortality rates in the elderly (Smith, 2023). The amount and type of food an individual consumes affect their nutritional status and overall health. Age-related nutritional status has been demonstrated by several researchers (Khodabakhsh, 2022). Due to age-related changes in the brain's regulation of appetite and satiety, less compensation for food's calorie content, and weakened senses of taste and smell, the elderly are especially vulnerable to malnutrition (Peña-Portillo, 2022). It is common for elderly people to experience these problems, which sometimes go unreported or are not identified in time. The elderly should be identified by assessing their nutritional status in order to prevent

malnutrition, especially in those who live at home. Extensive research has established suboptimal nutritional status among older adults, with robust evidence indicating a heightened prevalence of malnutrition within geriatric populations (Gbeyonron and Chikwendu, 2024).

According to a study by Alzahrani and Alamri (2017), malnutrition affects up to 25% of elderly patients at home and more than 50% of those in rehabilitation centres. Malnutrition is typically treatable. If nutritional care is provided promptly, severe malnutrition can be stopped (Volkert *et al.*, 2022; Dent *et al.*, 2023).

Dietary alterations are necessary to meet the nutritional needs of the elderly because the natural ageing process exacerbates these changes (Onyeka *et al.*, 2022). Elderly people's diets and health are frequently overlooked. Given that there have been little or no studies on the elderly, this is not out of the ordinary given the circumstances in Benue State. In Benue, the extent of malnutrition among the elderly is not adequately documented. The majority of nutritional intervention programs target young children, adolescents, expectant and nursing mothers, and other groups whose health, way of life, and standard of living may be impacted (Boateng and Jeptanui, 2016). Nonetheless, nutritional interventions may contribute to the elderly's improved quality of life and prevention of degenerative disorders.

The first line of treatment when diagnosing malnutrition in older adults is recommended to be screening testing. Simple, low-cost methods should be used to detect elderly malnutrition as soon as possible (Elia and Stratton, 2012). A quick and easy way to assess the nutritional status of the frail elderly and determine whether nutritional intervention or diet modification is needed is to use the Mini Nutritional Assessment (MNA) tool, which has been well-validated for assessing malnutrition in the elderly (Vellas *et al.*, 2006). The MNA test consists of eighteen quick, easy-to-measure, basic tasks that can be completed in less than fifteen minutes. It considers the danger of malnutrition before drastic dietary changes, weight loss, movement, psychological stress, and acute physical illness. In this study, older adults (60 years of age and older) in rural and urban populations had their nutritional status evaluated using the MNA method.

## METHODOLOGY

### Study area

The study was carried out in the North-east senatorial zone of Benue state, Nigeria. Benue State is one of the 36 states in Nigeria. According to the 2006 census, it has a population of 203,721 (National Population Commission, 2006) people, making it the 9th most populous state in Nigeria and predominantly inhabited by the Tiv people. The North-east senatorial zone has seven local governments, namely: Katsina-Ala, Kwande, Logo, Vandeikya, Ukum, Konshisha, and Ushongo.

### Study design

The research was a cross-sectional study involving free-living elderly Nigerians residing in urban and rural areas of Benue State, Nigeria.

### Study populations

A total of 516 subjects participated in the study, consisting of 293 rural and 223 urban elderly persons who reside in their houses within the study area and were willing to participate in the study. The study comprised both males and females.

### Sample size and sampling procedure

Multistage sampling is a structured technique used to select a sample in stages, combining multiple sampling methods to improve representativeness and feasibility. In this study, the first stage was purposive selection of the North-east senatorial zone from three zones. The second stage applied purposive and proportionate sampling to select four Local Government Areas (LGAs) out of seven in the zone. Finally, purposive sampling was used to select individual elderly respondents within each LGA, recruiting from worship centres in both urban and rural areas. Inclusion criteria were residents aged 60 and above, excluding those under 60 or disabled/moving in wheelchairs. This approach helps efficiently target the desired population while ensuring diversity across geographic and demographic characteristics, balancing practical constraints with sample representativeness.

### Method of data collection

Data were collected using a well-structured questionnaire containing socio-demographic characteristics and the Mini Nutritional Assessment tool (MNA).

### Identification of malnutrition status using the Mini Nutritional Assessment tool (MNA)

The Mini Nutritional Assessment (MNA) used to evaluate the nutritional status of the elderly in this study comprises 18 questions grouped into four sections: (1) Anthropometric measurements (height, weight, weight loss, calf circumference, mid-upper arm circumference); (2) General evaluation covering mobility, medications, and lifestyle; (3) Dietary evaluation assessing food and liquid intake, number of meals, and feeding autonomy; and (4) Self-evaluation of perceived nutrition and health. Based on the MNA score, 23.5–30.0 indicates normal nutrition, 17–23 signals risk of malnutrition, and below 17 indicates malnutrition. Anthropometric measures were taken using

non-flexible tape and portable scales. BMI was calculated as weight (kg) divided by the square of height (m<sup>2</sup>), with classifications following (WHO, 2002) and modified elderly BMI cutoffs: BMI below 18.5 or 20.99 indicates malnutrition risk, 18.5–24.99 or 21–24.99 normal nutrition, and over 25 indicates overweight. Thus, elderly individuals with a BMI below 20.99 were considered at risk of malnutrition in this study (Sukkriang and Somrak, 2021; Mohammed and Abdulwahid, 2022).

### Ethical approval and consent

The study was approved by the Research Ethics Committee of Benue State Ministry of Health, Makurdi, Benue State, Nigeria (Ref MOH/STA/204/VOL.1/251), and copies of the approval were sent to the Chairmen of the selected LGAs. Written informed consent was obtained from the subjects, and only those who consented were used for the study.

### Method of data analysis

The data obtained were entered into a computer programme and analysed using Statistical Package for Social Sciences (version 20.0). The analysis of sociodemographic features was done using descriptive statistics. Five hundred sixteen correctly completed questionnaires were chosen, and the resulting data were examined. Each of the 18 components that made up the MNA were calculated in order to validate the MNA tool. To evaluate the nutritional state of the respondents, the prevalence of three nutritional categories—normal nutritional, at risk of malnourishment, and malnourishment status—was computed.  $P < 0.05$  was designated as the statistical significance threshold.

## RESULTS

The socio-demographic characteristics of respondents are presented in Table 1. Most (60.9%) of the respondents were males, with 47.5% and 71% residing in the urban and rural areas, respectively, and (39.10%) females, with (52.50%) and (29.00%) residing in the urban and rural areas, respectively. Most (58.7%) of the respondents were married, (37.20%) were widowed, while a few (3.1%) were widowers. The percentage of married respondents in the rural area was significantly ( $p < 0.05$ ) higher than that of married respondents in the urban area. Christianity was the sole religion of most urban (98.7%) and rural (99%) dwellers, while the Tiv ethnic group dominated in both urban (96.9%) and rural (99.3%) areas.

Table 2 shows the assessment of malnutrition based on the Age-Grouped Body Mass Index (BMI) and Mini Nutritional Assessment (MNA) tool. In the subjects' group

aged 60–75 years, the mean MNA scores were higher (64.60%) than the mean BMI (34.40%) within the same age range ( $p < 0.001$ ).

Table 3. Reveals a comparison of the elderly respondents' BMI and MNA tool assessment of malnutrition by urban and rural residence, that respondents living in urban areas had better nutritional status than those living in rural areas; 70.00% of respondents in urban areas and 58.70% of respondents in rural areas were in urban areas, while 37.50% of respondents were in rural areas, 29.10% were at risk of malnutrition, and only 3.80% were malnourished. The respondents' BMI revealed that, with an average weight, the proportion of urban residents was substantially ( $p < 0.05$ ) higher than that of rural residents.

Additionally, compared to those in urban regions, the percentage of obese people in rural areas was much higher ( $p < 0.001$ ). The senior people's BMI by sex and the MNA technique are used to assess malnutrition, as shown in Table 4. According to the statistics, gender differences existed in the proportion of males and females with normal nutritional status (57.30%) and at risk of malnutrition (39.20% and 25.70%), respectively, and malnutrition alone (3.50% and 1.00%).  $p < 0.001$  indicated a statistically significant difference in the senior male and female respondents' Body Mass Index (BMI).

## DISCUSSION

The risk of malnutrition increases with age, as captured in Table 2. In this study, those aged 60–75 had higher BMI and better nutritional status than those 80 and older, consistent with findings reported by Kaya (2015), who found people 85+ at the highest risk. Surajit *et al.* (2015) also reported that older adults are more often at risk of malnutrition than actually malnourished. Ageing leads to frailty, reduced appetite, sarcopenia, and muscle loss, which decrease quality of life (Kvamme *et al.*, 2015). Malnutrition worsens existing conditions, reduces treatment success, and raises costs (Dent *et al.*, 2023).

This finding is consistent with Kumari *et al.* (2017), who reported that 27% of elderly individuals in Allahpur block (Bijnor district) were pre-obese and 49% had a normal BMI, patterns that may shift toward undernutrition with advancing age due to reduced physical activity and suboptimal nutritional intake. Using MNA and BMI, urban respondents showed better nutritional status than rural ones. This observation aligns with findings reported by Kostecka and Bojanowska (2021), likely due to easier food access in cities (Ferede *et al.*, 2022). More females (73.3%) than males (57.3%) had a normal nutritional status, while more males were at risk or malnourished. Ghabashi *et al.* (2024) reported that this is rooted in cultural and social gender roles. In many societies, women often take primary responsibility for food preparation, cooking, and nutritional decision-making, which may

**Table 1.** Socio-demographic profile of the elderly by location.

| Variable           | Residence   |             |             | X <sup>2</sup> -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)    |                       |         |
| <b>Total</b>       | 223 (100)   | 293 (100)   | 516 (100)   |                       |         |

**Table 2.** Assessment of Malnutrition according to Mini Nutritional Assessment (MNA) tool and Body mass index (BMI) by age group of the elderly people.

| Variables                                       | Age group in years |              |             |             | Total        | X <sup>2</sup> -value | p-value |
|-------------------------------------------------|--------------------|--------------|-------------|-------------|--------------|-----------------------|---------|
|                                                 | 60-65              | 66-75        | 76-79       | ≥80         |              |                       |         |
| Body Mass Index (BMI) Classification            |                    |              |             |             |              |                       |         |
| Underweight (<18.5 kg/m <sup>2</sup> )          | 11 (5.6%)          | 7 (3.3%)     | 0 (0.0%)    | 3 (8.1%)    | 21 (4.1%)    | 16.644 <sup>a</sup>   | 0.055   |
| Normal weight (18.5 to 24.9 kg/m <sup>2</sup> ) | 66 (33.8%)         | 72 (34.4%)   | 35 (46.7%)  | 8 (21.6%)   | 181 (35.1%)  |                       |         |
| Overweight (25 to 29.9 kg/m <sup>2</sup> )      | 67 (34.4%)         | 68 (32.5%)   | 25 (33.3%)  | 10 (27.0%)  | 170 (32.9%)  |                       |         |
| Obesity grade I (30 to 34.9 kg/m <sup>2</sup> ) | 51 (26.2%)         | 62 (29.7%)   | 15 (20.0%)  | 16 (43.2%)  | 144 (27.9%)  |                       |         |
| Total                                           | 195 (100.0%)       | 209 (100.0%) | 75 (100.0%) | 37 (100.0%) | 516 (100.0%) |                       |         |
| Mini Nutritional Assessment (MNA) tool          |                    |              |             |             |              |                       |         |
| Normal nutritional status (24-30 points)        | 126 (64.6%)        | 133 (63.6%)  | 50 (66.7%)  | 19 (51.4%)  | 328 (63.6%)  | 9.504 <sup>a</sup>    | 0.147   |
| At risk of malnutrition (17-23.5 points)        | 60 (30.8%)         | 73 (34.9%)   | 25 (33.3%)  | 17 (45.9%)  | 175 (33.9%)  |                       |         |
| Malnourished (< 17 points)                      | 9 (4.6%)           | 3 (1.4%)     | 0 (0.0%)    | 1 (2.7%)    | 13 (2.5%)    |                       |         |
| Total                                           | 195 (100.0%)       | 209 (100.0%) | 75 (100.0%) | 37 (100.0%) | 516 (100.0%) |                       |         |

**Table 3.** Assessment of malnutrition according to the MNA tool and BMI by urban and rural residence of the elderly respondents.

| Variables                                       | Residence    |              |              | X <sup>2</sup> -value | p-value |
|-------------------------------------------------|--------------|--------------|--------------|-----------------------|---------|
|                                                 | Urban        | Rural        | Total        |                       |         |
| Mini Nutritional Assessment (MNA) tool          |              |              |              |                       |         |
| 24 - 30 points - Normal nutritional status      | 156 (70.0%)  | 172 (58.7%)  | 328 (63.6%)  | 9.257 <sup>a</sup>    | 0.010   |
| 17-23.5 - At risk of malnutrition               | 65 (29.1%)   | 110 (37.5%)  | 175 (33.9%)  |                       |         |
| < 17 – malnourished                             | 2 (0.9%)     | 11(3.8%)     | 13 (2.5%)    |                       |         |
| Total                                           | 223 (100.0%) | 293 (100.0%) | 516 (100.0%) |                       |         |
| Body Mass Index (BMI) Classification            |              |              |              |                       |         |
| Underweight (<18.5 kg/m <sup>2</sup> )          | 8 (3.6%)     | 13 (4.4%)    | 21 (4.1%)    | 25.517 <sup>a</sup>   | <0.001  |
| Normal weight (18.5 to 24.9 kg/m <sup>2</sup> ) | 99 (44.4%)   | 82 (28.0%)   | 181 (35.1%)  |                       |         |
| Overweight (25 to 29.9 kg/m <sup>2</sup> )      | 77 (34.5%)   | 93 (31.7%)   | 170 (32.9%)  |                       |         |
| Obesity grade I (30 to 34.9 kg/m <sup>2</sup> ) | 39 (17.5%)   | 105 (35.8%)  | 144 (27.9%)  |                       |         |
| Total                                           | 223 (100.0%) | 293 (100.0%) | 516 (100.0%) |                       |         |

**Table 4.** Assessment of Malnutrition according to the MNA tool and BMI by sex of the elderly people.

| Variables                                       | Sex          |              |              | X <sup>2</sup> -value | p-value |
|-------------------------------------------------|--------------|--------------|--------------|-----------------------|---------|
|                                                 | Male         | Female       | Total        |                       |         |
| Mini Nutritional Assessment (MNA) tool          |              |              |              |                       |         |
| Normal nutritional status (24-30 points)        | 180 (57.3%)  | 148 (73.3%)  | 328 (63.6%)  | 14.533 <sup>a</sup>   | 0.001   |
| At risk of malnutrition (17-23.5 points)        | 123 (39.2%)  | 52 (25.7%)   | 175 (33.9%)  |                       |         |
| Malnourished (< 17 points)                      | 11 (3.5%)    | 2 (1.0%)     | 13 (2.5%)    |                       |         |
| Total                                           | 314 (100.0%) | 202 (100.0%) | 516 (100.0%) |                       |         |
| Body Mass Index (BMI) Classification            |              |              |              |                       |         |
| Underweight (<18.5 kg/m <sup>2</sup> )          | 9 (2.9%)     | 12 (5.9%)    | 21 (4.1%)    | 29.549 <sup>a</sup>   | <0.001  |
| Normal weight (18.5 to 24.9 kg/m <sup>2</sup> ) | 92 (29.3%)   | 89 (44.1%)   | 181 (35.1%)  |                       |         |
| Overweight (25 to 29.9 kg/m <sup>2</sup> )      | 100 (31.8%)  | 70 (34.7%)   | 170 (32.9%)  |                       |         |
| Obesity grade I (30 to 34.9 kg/m <sup>2</sup> ) | 113 (36.0%)  | 31 (15.3%)   | 144 (27.9%)  |                       |         |
| Total                                           | 314 (100.0%) | 202 (100.0%) | 516 (100.0%) |                       |         |

enhance their awareness and adherence to balanced diets, making them less prone to malnutrition. In contrast, men may rely more on spouses or others for meals, increasing vulnerability when widowed or facing other barriers like dental problems or advanced age. Kaya (2015) found no malnutrition in males, supporting these results. varied. Achinihu *et al.* (2016) reported that 43.1% of female rural farmers and 20.2% of male rural farmers in Imo State, Nigeria, exhibited normal body weight based on BMI classifications, although overall nutritional status showed considerable variation across categories.

According to the Mini Nutritional Assessment (MNA), 64% of the participants exhibited normal nutritional status, 34% were at risk of malnutrition, and 2% were classified as malnourished. These findings align with those reported by Lahiri *et al.* (2015), who observed a relatively low prevalence of overt malnutrition in a comparable rural elderly population. Saeidlou *et al.* (2011) found more malnutrition among nursing home residents, possibly due to setting differences. Nzeagwu *et al.* (2021) reported 21.9% overweight/obese in Umuahia elders, and

Oladoyinbo *et al.* (2021) found high overweight (54.3%) and obesity (38.7%) rates, in line with this study, but higher. Malnutrition in elders can reflect under- or over-nutrition due to ageing-related changes (Fávaro-Moreira *et al.*, 2016).

### Conclusion/Recommendations

Human well-being is significantly influenced by one's nutritional state, particularly for the older population that resides in the community. As a result, nearly 90% of senior citizens had low MNA scores. Because it can detect people who are malnourished and those who are at risk of becoming malnourished, appropriate meals should be prepared based on their needs, adequate and balanced nutrition should be provided, and dietary compliance should be monitored with the help of health and care staff, especially for the elderly residing in rural locations. The impact of nutrition on health and quality of life should be explained to senior citizens residing in rural and urban

areas. The implementation of geriatric nutritional strategies in rural settings represents an important unmet need with considerable scope for impact.

## CONFLICTING INTERESTS

The authors declare no conflict of interest.

## ACKNOWLEDGMENTS

The authors acknowledge the cooperation of the elderly individuals who participated in this study and express gratitude to the research assistants who contributed to data collection and entry.

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