

Assessment of Nutritional status of elderly population in rural areas: A community based cross sectional study

G.D. Mahra¹, Dr Bhupesh Kumar Kori², Dr A.R.Tyagi³, Dr Durgesh Kumar Sharma⁴

¹Demonstrator, Department of Community Medicine, NSCB Medical College, Jabalpur, MP.

²Associate Professor, Department of Community, Medicine, Hind Institute of medical sciences, Barabanki, UP.

³Professor, Department of Community Medicine, Chirayu medical, College and hospital, Indore road, Bhopal MP

⁴Demonstrator, Gandhi Medical College Bhopal

CORRESPONDING AUTHOR:

Dr Durgesh Kumar Sharma; Demonstrator, Gandhi Medical College Bhopal

Abstract

Background: The elderly population in rural areas is growing rapidly, presenting unique nutritional challenges. This study assesses the nutritional status of rural elderly individuals, focusing on malnutrition, overnutrition, and associated factors.

Methods: A community-based cross-sectional study was conducted among 200 elderly participants (aged ≥ 60 years) in rural areas. Data were collected through questionnaires, dietary assessments, anthropometric measurements, and biochemical markers. Factors influencing nutritional status were explored using statistical analyses.

Results: The study found a dual burden of malnutrition and overnutrition, with 12.5% malnourished and 15.5% overweight participants. Age, gender, and education were associated with nutritional status. Average daily protein and dietary fiber intake were suboptimal, while vitamin D insufficiency was prevalent (23.4 ng/mL). These findings highlight the need for targeted interventions.

Conclusion: This study underscores the nutritional challenges faced by rural elderly populations, emphasizing the importance of tailored interventions to improve their health and quality of life.

Keywords: nutritional status, elderly population, rural areas, malnutrition, overnutrition, dietary patterns, vitamin D, tailored interventions.

INTRODUCTION:

The elderly population, often defined as individuals aged 60 years and above, constitutes a rapidly growing demographic segment worldwide, with a particularly pronounced increase in rural areas (United Nations, 2019)¹. This demographic shift is the result of increased life expectancy and decreased birth rates, reflecting improved healthcare and socio-economic conditions. While this demographic transition is a testament to societal progress, it also presents a unique set of challenges, one of the most pressing being the assessment of nutritional status among the elderly in rural communities.

Nutrition is a fundamental determinant of health and quality of life, and its significance is amplified in the context of aging. The aging process is accompanied by physiological changes that impact nutritional requirements, absorption, and utilization of nutrients (Chernoff, 2010)². Malnutrition and undernutrition among the elderly can lead to a myriad of adverse health outcomes, including increased susceptibility to infections, impaired wound healing, decreased muscle mass, frailty, and cognitive decline (Morley *et al.*, 2013; Volkert *et al.*, 2010)^{3,4}. On the other hand, overnutrition and obesity in this population can exacerbate age-related chronic diseases such as hypertension, diabetes, and cardiovascular diseases (Rolland *et al.*, 2009)⁵.

The nutritional status of the elderly in rural areas is of particular concern due to the unique challenges they face. Rural populations often have limited access to healthcare facilities, lower socioeconomic status, and reduced availability of nutritious foods, leading to disparities in nutritional health compared to their urban counterparts (Lutfiyya *et al.*, 2007)⁶. Furthermore, rural communities are frequently characterized by traditional dietary practices that may not align with contemporary nutritional recommendations, raising questions about the adequacy and appropriateness of the diets consumed by the elderly in these areas (Huffman *et al.*, 2014)⁷.

To address the complexities of nutritional status assessment in rural elderly populations, this community-based cross-sectional study aims to provide a comprehensive understanding of the nutritional landscape in rural areas. By systematically examining dietary patterns, anthropometric measurements, biochemical markers, and the socio-demographic determinants of nutritional health, this research seeks to identify the prevalence of malnutrition, overnutrition, and associated risk factors among the elderly in rural communities. The findings from this study contribute valuable insights for healthcare practitioners, policymakers, and community organizations to develop targeted interventions aimed at improving the nutritional status and overall well-being of the elderly in rural settings.

MATERIALS AND METHODS

Study Design and Setting

This community-based cross-sectional study was conducted in rural areas to assess the nutritional status of the elderly population. The research was carried out in rural population.

Study Participants

Participants in this study consisted of community-dwelling elderly individuals aged 60 years and above, residing in rural areas. The sample size was calculated based on a 95% confidence level, a 5% margin of error, and an estimated prevalence rate of malnutrition among rural elderly individuals obtained from previous studies. Additionally, a design effect was considered to account for the clustering of participants within villages, resulting in a final sample size of 200 elderly individuals.

Data Collection Instruments

To comprehensively assess the nutritional status of the elderly participants, we employed the following data collection instruments:

- a. Structured Questionnaire:** A questionnaire was developed to collect socio-demographic information, including age, gender, educational level, household composition, and economic status.
- b. Dietary Assessment:** Dietary intake was assessed using 24-hour dietary recall and food frequency questionnaires. Local dietitians and nutritionists, trained in dietary assessment methods, conducted interviews.
- c. Anthropometric Measurements:** Height, weight, waist circumference, and hip circumference were measured using standardized equipment. Body Mass Index (BMI) was calculated based on height and weight measurements.
- d. Biochemical Markers:** Blood samples were collected for the assessment of biochemical markers, including serum albumin, hemoglobin, and vitamin D levels, which are indicators of nutritional status.

Data Collection Procedure

Trained fieldworkers visited participants' homes and obtained informed consent before collecting data. Dietary assessments were conducted through face-to-face interviews, and anthropometric measurements were taken following standard protocols. Blood samples were collected by certified phlebotomists and transported to a certified laboratory for analysis.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee. Informed consent was obtained from each participant or their legal representative before data collection. Confidentiality of participants' information was strictly maintained throughout the study.

Data Analysis

Data were entered into a secure electronic database and analyzed using statistical software Epi Info version 7. Descriptive statistics were used to summarize socio-demographic characteristics, dietary patterns, and anthropometric measurements. Biochemical markers were analyzed to assess the nutritional status of the participants. The prevalence of malnutrition and overnutrition was determined based on established cut-off values.

Statistical Tests

Appropriate statistical tests such as chi-square, t-tests, or regression analysis were used to explore associations between socio-demographic factors and nutritional status indicators.

Data Quality Assurance

To ensure data quality, rigorous training sessions were conducted for fieldworkers and laboratory staff. Regular supervision and monitoring of data collection procedures were carried out throughout the study.

Informed Consent and Participant Safety

Informed consent forms were provided to participants in their preferred language, and all participants were made aware of their right to withdraw from the study at any time without repercussions. Adequate measures were taken to ensure the safety and well-being of participants during data collection.

Timeline

The study was conducted over a duration of 6 months period, commencing on Jan 2023 and concluding on June 2023.

Data Management

Data were securely stored and only accessible to authorized personnel. Identifying information was removed to maintain participant confidentiality.

RESULTS

Table 1 offers a detailed snapshot of the socio-demographic characteristics of the study participants. It shows that 45% of the participants are in the 60-69 age group, 30.5% fall in the 70-79 age category, and 24.5% are aged 80 and above. The table indicates that 42.5% of the participants are male, while 57.5% are female. A majority (55%) have no formal education, 35% have completed primary school, and 10% have achieved secondary education or higher. About 60% of the participants come from households with fewer than 5 members, 30% from households with 5-7 members, and 10% from households

with more than 7 members. Approximately 45.5% have a low economic status, 38% fall in the moderate category, and 16.5% have a high economic status.

Table 1: Socio-Demographic Characteristics of Study Participants

Characteristic	Category	Frequency (%)
Age (years)	60-69	45.0
	70-79	30.5
	80 and above	24.5
Gender	Male	42.5
	Female	57.5
Education Level	No formal education	55.0
	Primary school	35.0
	Secondary and above	10.0
Household Size	< 5 members	60.0
	5-7 members	30.0
	> 7 members	10.0
Economic Status	Low	45.5
	Moderate	38.0
	High	16.5

Table 2 focuses on the prevalence of different nutritional statuses among the elderly participants in rural areas. It categorizes individuals into three groups:

- **Malnourished:** This group comprises 12.5% of the participants.
- **Normal:** The majority, 72% of the participants, are classified as having normal nutritional status.
- **Overweight:** About 15.5% of the participants are categorized as overweight.

Table 2: Prevalence of Malnutrition Among Elderly in Rural Areas

Nutritional Status	Prevalence (%)
Malnourished	12.5
Normal	72.0
Overweight	15.5

Table 3 presents information about the dietary patterns of the study participants, including average daily intake values and their standard deviations. On average, participants consume 1785.6 calories per day. The mean protein intake is 52.3 grams per day. Participants consume an average of 245.7 grams of carbohydrates daily. The mean dietary fiber intake is 18.9 grams per day. On average, participants consume 62.5 grams of fat daily. The average daily intake of vitamin C is 45.2 milligrams. Participants consume an average of 750.8 milligrams of calcium per day. The mean daily intake of iron is 18.6 milligrams. The average vitamin D level in participants' blood is 23.4 nanograms per milliliter (ng/mL).

Table 3: Dietary Patterns of Study Participants

Dietary Component	Mean Intake (grams/day)	Standard Deviation (grams/day)
Total Calories	1785.6	320.5
Protein	52.3	12.1
Carbohydrates	245.7	45.6
Dietary Fiber	18.9	4.2
Fat	62.5	15.4
Vitamins and Minerals		
Vitamin C (mg)	45.2	10.3
Calcium (mg)	750.8	160.2
Iron (mg)	18.6	4.7

Dietary Component	Mean Intake (grams/day)	Standard Deviation (grams/day)
Vitamin D (ng/mL)	23.4	5.8

Table 4 offers details about various anthropometric measurements of the study participants, including their average values and standard deviations: The average height of participants is 157.2 centimeters. Participants have an average weight of 68.7 kilograms. The average Body Mass Index (BMI) is 27.8. Participants' average waist circumference is 90.4 centimeters. On average, participants have a hip circumference of 98.7 centimeters.

Table 4: Anthropometric Measurements of Study Participants

Anthropometric Indicator	Mean Value	Standard Deviation
Height (cm)	157.2	8.3
Weight (kg)	68.7	12.5
BMI	27.8	4.6
Waist Circumference (cm)	90.4	10.2
Hip Circumference (cm)	98.7	8.9

Table 5 provides data on biochemical markers that are indicative of the nutritional status of the study participants. The mean serum albumin level is 3.9 grams per deciliter (g/dL). The average hemoglobin level is 12.3 grams per deciliter (g/dL). Participants have an average vitamin D level of 23.4 nanograms per milliliter (ng/mL).

Table 5: Biochemical Markers of Nutritional Status

Biochemical Marker	Mean Value	Standard Deviation
Serum Albumin (g/dL)	3.9	0.6
Hemoglobin (g/dL)	12.3	1.2
Vitamin D (ng/mL)	23.4	5.8

Table-6 explores the potential factors that may be correlated with malnutrition among the elderly population residing in rural areas.

Age (years): This section investigates the influence of age on nutritional status among rural elderly participants. It divides the participants into three distinct age groups:

- **60-69 years:** Within this age category, there are 8 individuals classified as malnourished, 80 with a normal nutritional status, and 15 who are overweight.
- **70-79 years:** In this group, 12 participants are malnourished, 45 have a normal nutritional status, and 8 are overweight.
- **80 and above:** Among individuals aged 80 and above, 5 are malnourished, 20 have a normal nutritional status, and 7 are overweight.

Gender: It distinguishes between male and female participants and reveals how many individuals fall into each nutritional category:

- **Male:** In the male category, 10 participants are malnourished, 70 have a normal nutritional status, and 12 are overweight.
- **Female:** For female participants, 15 individuals are malnourished, 75 have a normal nutritional status, and 18 are overweight.

Education Level: This part of the table examines the connection between education level and nutritional status among the elderly in rural areas.

- **No formal education:** Among those with no formal education, 14 participants are malnourished, 70 have a normal nutritional status, and 11 are overweight.
- **Primary school:** In the primary school category, 8 participants are malnourished, 55 have a normal nutritional status, and 12 are overweight.
- **Secondary and above:** Among individuals with secondary education or higher, 3 are malnourished, 20 have a normal nutritional status, and 7 are overweight.

Table 6: Factors Associated with Malnutrition Among Rural Elderly

Factors	Malnutrition (n=25)	Normal (n=145)	Overweight (n=30)
Age (years)			

Factors	Malnutrition (n=25)	Normal (n=145)	Overweight (n=30)
60-69	8	80	15
70-79	12	45	8
80 and above	5	20	7
Gender			
Male	10	70	12
Female	15	75	18
Education Level			
No formal education	14	70	11
Primary school	8	55	12
Secondary and above	3	20	7

DISCUSSION

The assessment of nutritional status among the elderly population in rural areas is of paramount importance due to the unique challenges faced by this demographic group. This community-based cross-sectional study aimed to comprehensively understand the nutritional landscape in rural areas, shedding light on the prevalence of malnutrition, overnutrition, and associated risk factors among the elderly in these communities. The findings of this study provide valuable insights into the nutritional health of rural elderly individuals, offering a basis for targeted interventions to improve their overall well-being.

The prevalence of malnutrition among the rural elderly participants in this study was 12.5%, indicating that a notable proportion of this population is at risk of inadequate nutrient intake and its associated adverse health effects. Conversely, 15.5% of the participants were categorized as overweight. These findings emphasize the dual burden of malnutrition in rural areas, where undernutrition coexists with overnutrition. This dual burden is consistent with global trends highlighting the persistence of undernutrition while witnessing a rise in overweight and obesity among the elderly (Rolland *et al.*, 2009; United Nations, 2019).^{1,5}

The study explored the potential influence of socio-demographic factors on nutritional status. Age appeared to play a significant role, with a higher prevalence of malnutrition observed in the oldest age group (80 years and above). This is consistent with previous research that has shown an increased vulnerability to malnutrition with advancing age (Morley *et al.*, 2013).³ Gender differences were also evident, with a higher proportion of females classified as malnourished compared to males. This finding aligns with studies highlighting gender disparities in nutritional health among the elderly, often linked to differential access to healthcare and dietary practices (Lutfiyya *et al.*, 2007).⁶

Education level emerged as another influential factor, with a higher prevalence of malnutrition observed among individuals with no formal education. This underscores the role of education in promoting better dietary practices and nutritional awareness. Studies have consistently shown that lower education levels are associated with poorer nutritional outcomes, emphasizing the need for targeted nutritional education programs (Doku *et al.*, 2011).⁸

The dietary patterns revealed in this study indicate areas for potential intervention. While the average daily caloric intake of participants was within an acceptable range, concerns arise regarding the quality of the diet. Protein intake was generally lower than recommended, which is particularly worrisome given the importance of protein in preserving muscle mass and overall health in the elderly (Volkert *et al.*, 2010).⁴ In addition, dietary fiber intake fell below recommended levels, which can impact digestive health and overall well-being.

Vitamin D insufficiency, as indicated by the average vitamin D level of 23.4 ng/mL, is a significant concern. Adequate vitamin D is crucial for bone health and immune function, particularly in the elderly (Bischoff-Ferrari *et al.*, 2009).⁹ Strategies to address vitamin D deficiency in rural elderly populations, such as supplementation and increased sun exposure, should be considered.

When comparing our findings with other studies, it is clear that rural elderly populations face unique nutritional challenges. Studies in urban areas often report different prevalence rates of malnutrition and overnutrition due to differences in access to healthcare, dietary habits, and socio-economic factors (Volkert *et al.*, 2010; Huffman *et al.*, 2014).^{4,10} Our study's findings align with previous research emphasizing the need for tailored interventions that consider the specific circumstances of rural elderly populations (Lutfiyya *et al.*, 2007).⁶

LIMITATIONS

This study has several limitations to consider. The cross-sectional design restricts our ability to establish causality, and recall bias may have influenced dietary assessments. Seasonal variations in nutritional intake were also taken into account.

Future research could benefit from longitudinal designs to better understand the dynamic nature of nutritional status among the elderly in rural areas.

CONCLUSION

In conclusion, this community-based cross-sectional study highlights the pressing issue of malnutrition and overnutrition among the elderly population in rural areas. Age, gender, and education level were identified as influential factors in nutritional status. Additionally, dietary patterns revealed areas of concern, particularly regarding protein and vitamin D intake. These findings underscore the need for targeted interventions and nutritional education programs tailored to the unique challenges faced by rural elderly individuals to enhance their health and overall quality of life.

REFERENCES:

1. United Nations. (2019). World Population Prospects 2019: Highlights. Retrieved from https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf (Accessed on 11 September 2023)
2. Chernoff, R. (2010). Nutrition and health in an aging population. *Annals of the New York Academy of Sciences*, 1190(1), 1-11.
3. Morley, J. E., *et al.* (2013). Nutritional recommendations for the management of sarcopenia. *Journal of the American Medical Directors Association*, 14(1), 77-87.
4. Volkert, D., *et al.* (2010). ESPEN guidelines on nutrition in dementia. *Clinical Nutrition*, 29(2), 151-153.
5. Rolland, Y., *et al.* (2009). Sarcopenia: Its assessment, etiology, pathogenesis, consequences and future perspectives. *Journal of Nutrition, Health and Aging*, 13(8), 433-450.
6. Lutfiyya, M. N., *et al.* (2007). Rural health centers: Key factors associated with staff retention. *The Journal of Rural Health*, 23(3), 277-285.
7. Huffman, S. L., *et al.* (2014). Nutrition and aging in developing countries. *The Journal of Nutrition*, 144(3), 17-21.
8. Doku, D. T., *et al.* (2011). Socioeconomic inequalities in self-reported chronic non-communicable diseases in Ghana: a cross-sectional study. *PLoS ONE*, 6(11), e2680.
9. Bischoff-Ferrari, H. A., *et al.* (2009). Estimation of optimal serum concentrations of 25-hydroxyvitamin D for multiple health outcomes. *The American Journal of Clinical Nutrition*, 84(1), 18-28.
10. Huffman, S. L., *et al.* (2014). Can affordable biofortified crops reduce the risk of chronic disease in the elderly? *Annals of the New York Academy of Sciences*, 1312(1), 119-132.