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Original Article

Physiology Section

Nutritional Status and Food Diversity among Elderly People in an Urban Area of Belagavi, India: A Cross-sectional Study

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ABSTRACT

Introduction: The elderly population (aged ≥60 years) is vulnerable to malnutrition due to age-related physiological and socioeconomic factors. In urban India, challenges such as limited dietary diversity, economic dependence, and inadequate nutrient intake further elevate the risk of poor nutritional outcomes.

Aim: To assess the nutritional status, dietary intake, and food diversity among elderly individuals residing in the urban area of Belagavi, Karnataka, India.

Materials and Methods: A community-based cross-sectional study was conducted from March 2023 to April 2024 in the urban field practice area of Jawaharlal Nehru Medical College, Belagavi. A total of 188 elderly participants were selected using purposive sampling. Data were collected using a pre-tested, semi-structured questionnaire that included sociodemographic details, anthropometric measurements, a 24-hour dietary recall on three non-consecutive days, and a Food Frequency Table (FFT) for dietary diversity. Nutrient intake was compared with ICMR recommendations. Descriptive statistics and chi-square tests were applied to assess associations between food diversity and sociodemographic variables. A p-value <0.05 was considered statistically significant.

Results: In the present study, the mean age of participants was 69.5±7.1 years, and of 188 subjects, 53.2% were male. The average energy intake was 1050.75±233.09 kcal/day and protein intake was 22.43±9.30 g/day, both significantly below ICMR guidelines. Poor food diversity (1-3 food groups/week) was observed in 89.9% of participants. Most had normal BMI, but central obesity was common according to Waist-to-Hip Ratio (WHR). Statistically significant associations were observed between food diversity and gender (χ^2=6.03, p=0.043), educational status (χ^2=8.94, p=0.006), and income status (χ^2=5.36, p=0.018).

Conclusion: This study highlights the widespread prevalence of low dietary diversity and inadequate nutrient intake among the urban elderly in Belagavi. Interventions should focus on nutrition education, improved dietary access, and social support to promote healthy aging in this population.

Keywords: Body mass index, Dietary intake, Food frequency, Malnutrition, Nutritional assessments

INTRODUCTION

Malnutrition among the elderly is an increasingly recognised public health concern, contributing to a wide range of adverse health outcomes, such as increased susceptibility to infections, weakened immunity, functional decline, and poor quality of life. With the proportion of older adults in India steadily rising, addressing age-related nutritional vulnerabilities has become a critical public health priority [1,2].

Although urban areas are generally assumed to offer better access to food and healthcare, elderly individuals in cities continue to face unique challenges that can impact their nutritional status. These include financial dependency, social isolation, limited mobility, poor awareness of balanced diets, and coexisting chronic illnesses such as diabetes and hypertension [3,4]. Furthermore, changes in family structure, increased cost of living, and the shift toward convenience foods can negatively influence dietary diversity in urban elderly populations [3,4].

Although malnutrition among the elderly has been studied in rural India [5-7], there remains limited data on urban elderly populations, particularly in tier-2 cities [5-7]. Studies conducted in rural Tamil Nadu, Manipur, and Puducherry have reported a high prevalence of malnutrition or risk of malnutrition [6-8]. However, there is a noticeable gap in studies that specifically assess nutritional issues among the urban elderly, particularly in tier-2 cities where access to healthcare is improving but sociodemographic vulnerabilities persist [8].

Evidence from urban settings, although limited, also highlights serious concerns. For example, a study from Coimbatore found that over 40% of elderly participants were either malnourished or at risk of malnutrition [8]. Similarly, research conducted in an urban area of Bengaluru reported suboptimal dietary diversity and widespread nutritional inadequacies despite better service availability [9]. These findings challenge the assumption that urban residency alone confers better nutritional outcomes and highlight the need for more localised assessments.

Recent studies have highlighted anthropometric deficits and demographic disparities in nutritional status among elderly populations across India [9,10], with specific rural studies pointing to low education and social isolation as key determinants [11,12]. Community-based studies in India have shown that low educational attainment and social isolation significantly increase the risk of malnutrition among rural elderly individuals [10,11]. However, few studies have explored how these factors interact in urban environments, especially in mid-sized cities where elderly populations are growing but are often overlooked in nutritional surveillance and policy planning [8,9,13-15].

In light of this gap, the present study was planned to assess the nutritional status, dietary intake, and food diversity among elderly individuals residing in the urban area of Belagavi, Karnataka, India.

MATERIALS AND METHODS

The present cross-sectional study was conducted from March 2023 to April 2024 at Jawaharlal Nehru Medical College, Belagavi, Karnataka, India. This study complied with the ethical standards set by the Institutional Ethics Committee at Jawaharlal Nehru Medical College, Belagavi (Ref. no: MDC/JNMCIEC/292, dated 03-07-2023).

Inclusion criteria: A total of 188 elderly individuals aged 60 years and above who were permanent residents of the study area for at least two years and who were willing and able to provide written informed consent were included.

Exclusion criteria: Individuals were excluded if they refused consent, were acutely ill or hospitalised at the time of data collection, or had fasted or attended a feast in the 24 hours preceding the dietary recall, in order to minimise bias due to atypical dietary intake.

Sample size calculation: The sample size was calculated using a standard formula for cross-sectional studies [12]: $N = \frac{Z^2.p.q}{d^2}$

where Z=1.96 (standard normal deviate at a 95% confidence level), p=0.50 (assumed prevalence of malnutrition), q=1 – p=0.50, and d=0.075 (absolute precision, i.e., allowable error of 7.5%). Substituting these values yielded a minimum required sample size of 170.7. After accounting for a 10% non-response or attrition rate, the final calculated sample size was rounded to 188 participants.

Study Procedure

Trained investigators collected data through house-to-house visits using a pre-tested, semi-structured questionnaire. After obtaining written informed consent, face-to-face interviews were conducted to record information on sociodemographic characteristics, dietary intake, and anthropometric measurements.

- **Socio-demographic profile:** Data were collected on participants' age (in completed years), gender (male/female), religion (Hindu, Muslim, or other), educational status (categorised as illiterate, primary, secondary, or graduate), and occupation (homemaker, self-employed, government-employed, private-employed, or retired). In addition, participants were asked about their source of income, which was recorded as either dependent (no personal income) or independent (receiving pension, salary, or other earnings). Detailed monthly income data were not collected, considering the advanced age of the study population and the likelihood of limited or irregular income sources.
- **Nutritional Assessment:**
  a. The 24-hour dietary recall method was employed to assess the dietary intake of participants over three non-consecutive days, including two regular weekdays and one weekend day, to capture variations in dietary patterns [16]. Trained interviewers conducted face-to-face interviews during house-to-house visits, asking participants to recall all food and beverages consumed in the previous 24 hours, including meals, snacks, and drinks. Food items were categorised into 17 distinct food groups, each assigned a unique serial number. Portion sizes were estimated using standardised tools such as spoons, cups, or visual aids to ensure accuracy. For mixed dishes, details of preparation methods, ingredients, and quantities were collected. Data on food consumed outside the home were also included using the same standardised estimation tools and recall technique. Nutrient analysis was conducted using Indian Food Composition Tables (IFCT) 2020, published by the Indian Council of Medical Research - National Institute of Nutrition (ICMR-NIN) [14]. The average daily intake of total energy (kcal), carbohydrates (g), proteins (g), and fats (g) was calculated for each participant based on reported quantities. These values were then compared with Recommended Dietary Allowances (RDA) provided by ICMR-NIN to assess nutritional adequacy and identify dietary gaps [17].
  b. Food diversity was assessed using an FFT that categorised the consumption of food items into nine mutually exclusive food groups based on the Food and Agriculture Organisation of the United Nations (FAO) guidelines [18]. Participants were interviewed regarding the frequency of consumption of food items from each group over the past week. A score of 1 was assigned for each food group consumed at least once during the week, and 0 if not consumed. For each group, participants were asked about consumption of various food items over the past week. Frequency of consumption was coded numerically on a 5-point scale (e.g., 1=daily, 2=3-4 times/week, etc.), and a food group was considered "consumed" if any item within it was eaten at least once in the past seven days. A score of 1 was assigned for each food group consumed, and the total Food Diversity Score (FDS) ranged from 0 to 9. Scores were categorised as poor (1-3), average (4-6), and good (7-9), adapted from scoring practices described by Kantor RS et al., (2019) in the Indian context [19].
  c. **Anthropometric measurements:** Anthropometric measurements recorded included weight (kg), height (cm), waist circumference (cm), and hip circumference (cm). From these measurements, nutritional indices such as Body Mass Index (BMI) and WHR were calculated [20].

STATISTICAL ANALYSIS

The data were initially entered into Microsoft Excel for cleaning and organisation. The cleaned dataset was then imported into IBM SPSS Version 26 for statistical analysis. Descriptive statistics, such as mean, standard deviation (SD), and percentages, were used to summarise demographic, anthropometric, and dietary data. To evaluate the adequacy of nutrient intake, a one-sample t-test was applied to compare the mean daily intake of energy, protein, fat, and carbohydrates against the corresponding RDA, as per the ICMR-NIN 2020 guidelines. A p-value <0.05 was considered statistically significant.

A majority of participants were aged ≤70 years (100, 53.2%) and were predominantly male, the mean age of participants was 69.5±7.1 years (100, 53.2%). Most were homemakers (157, 83.5%) and had completed only primary education (113, 60.1%), while a significant portion were illiterate (50, 26.6%). About 130 (69.1%) participants were financially dependent. The sample was composed mainly of Hindus (149, 79.3%). Regarding health conditions, 106 (56.4%) participants reported having diabetes, 116 (61.7%) had hypertension, and 66 (35.1%) had a history of surgery or operation. Additionally, 118 (62.8%) were currently on medication for chronic conditions [Table/Fig-1].

Variable	Category	Frequency (n)	Percentage (%)
Age group (in years)	≤70	100	53.2
	71-80	70	37.2
	>80	18	9.6
Gender	Male	100	53.2
	Female	88	46.8
Occupation	Homemaker	157	83.5
	Govt. Employed	15	8.0
	Self-Employed	12	6.4
	Private Employed	4	2.1
Education	Illiterate	50	26.6
	Primary	113	60.1
	Secondary	11	5.9
	Graduate	14	7.4
Source of income	Dependent	130	69.1
	Independent	58	30.9

Religion	Hindu	149	79.3
	Muslim	37	19.7
	Other	2	1.0
Diabetes	Yes	106	56.4
Hypertension	Yes	116	61.7
History of surgery	Yes	66	35.1
Current medication use	Yes	118	62.8
Health conditions			
Diabetes	Yes	106	56.4
Hypertension	Yes	116	61.7
History of surgery/ operation	Yes	66	35.1
On medication	Yes	118	62.8

[Table/Fig-1]: Demographic and health characteristics of participants (n=188).

The mean daily intake of calories and protein was significantly lower than the ICMR RDA recommendations (p<0.001), while fat and carbohydrate intakes were within acceptable limits. Gender-wise comparison revealed that males had significantly higher intakes of calories, protein, and carbohydrates, whereas females had significantly higher fat intake (p<0.001) [Table/Fig-2].

Nutrient	ICMR RDA	Overall Mean±SD	p-value	Male Mean±SD	Female Mean±SD	p-value
Total energy (kcal)	~1900-2100	1050.75±233.09	<0.001	1200±233	1050±200	<0.0001
Carbohydrates (g)	275-400	315.00±5.03	0.072	315±9	285±8	<0.0001
Protein (g)	60 (M) / 55 (F)	22.43±9.30	<0.001	32.56±6	22.4±8	<0.0001
Fat (g)	20-30	20.59±8.64	0.158	24.59±5	35±4	<0.0001

[Table/Fig-2]: Comparison of nutrient intake with ICMR RDA and gender-wise differences (n=188).
**Statistical tests: one-sample t-test vs. RDA; independent-samples t-test for gender comparison. RDA values are based on ICMR-NIN 2020 guidelines for sedentary elderly.

[Table/Fig-3] shows the association between food diversity and selected sociodemographic variables among the 188 participants. A significantly higher proportion of males (87.0%) had poor dietary diversity compared to females (93.2%), and this association between gender and dietary diversity was statistically significant (χ^2 test, p=0.043). Although poor dietary diversity was slightly more common among participants aged >70 years (92.0%) than among those ≤70 years (88.0%), the association between age group and dietary diversity was not statistically significant (p=0.112). Overall, education and financial independence appeared to be significantly associated with better dietary diversity, while age showed no significant effect.

Variable	Category	Poor n (%)	Average n (%)	Good n (%)	p-value (Chi²)
Gender	Male (n=100)	87 (87.0%)	11 (11.0%)	2 (2.0%)	0.043
	Female (n=88)	82 (93.2%)	5 (5.7%)	1 (1.1%)	
Age group	≤70 y (n=100)	88 (88.0%)	10 (10.0%)	2 (2.0%)	0.112
	>70 y (n=88)	81 (92.0%)	6 (6.8%)	1 (1.1%)	
Education	Illiterate	49 (98.0%)	1 (2.0%)	0 (0.0%)	0.006
	Primary	100 (88.5%)	12 (10.6%)	1 (0.9%)	
	Secondary+	20 (80.0%)	3 (12.0%)	2 (8.0%)	
Income source	Dependent (n=130)	122 (93.8%)	7 (5.4%)	1 (0.8%)	0.018
	Independent (n=58)	47 (81.0%)	9 (15.5%)	2 (3.5%)	

[Table/Fig-3]: Association between food diversity and demographic variables (n=188).
Note: Only gender, age group, education, and income source were included in the analysis as these are established determinants of dietary diversity in prior research and showed meaningful variability in our sample. Other parameters (e.g., occupation, religion, medication use) had limited variability or showed no significant association in preliminary analysis.

The mean BMI of participants was 23.19±3.61, with the majority in the normal range. Overall, 25.5% of participants were overweight or obese. The mean WHR was 0.903±0.043. Significant associations were found between BMI and gender (χ^2=6.03, p=0.049) and between BMI and education level (χ^2=8.94, p=0.033). No significant associations were observed with age group, income source, occupation, or religion [Table/Fig-4].

Component	Result
Mean BMI±SD (kg/m²)	23.19±3.61
Waist-to-Hip Ratio (WHR) (Mean±SD)	0.903±0.043
BMI classification (WHO asia-pacific)	
Underweight (<18.5)	9 (4.8%)
Normal (18.5-24.9)	131 (69.7%)
Overweight (25-29.9)	38 (20.2%)
Obese (30-34.9)	9 (4.8%)
Obese Class I (35-39.9)	1 (0.5%)
Extreme Obese (>40)	0 (0.0%)
Association between BMI and demographic variables	
BMI vs gender	χ^2=6.03, p=0.049
BMI vs age group	χ^2=2.87, p=0.238
BMI vs education	χ^2=8.94, p=0.033
BMI vs income source	χ^2=5.36, p=0.068
BMI vs occupation	χ^2=4.12, p=0.248
BMI vs religion	χ^2=1.92, p=0.382

[Table/Fig-4]: BMI status and distribution among study participants (n=188).
**Statistical test: Chi-square (χ^2); significance considered at p<0.05.

DISCUSSION

The present study aimed to assess the nutritional status and dietary behavior of elderly individuals residing in an urban area of Belagavi, India. The findings provide valuable insights into prevalent dietary patterns, nutritional risk factors, and sociodemographic correlates of malnutrition among the elderly population. Previous research across urban and rural Indian settings has emphasised the importance of understanding elderly nutrition through detailed dietary and anthropometric assessments. For instance, studies have reported malnutrition prevalence ranging from 14.3% to 18.3%, and risk of malnutrition from 41.7% to 58.8% in elderly populations across Coimbatore, Manipur, and Puducherry, underscoring the relevance of the present study [6-8].

The present study identified meaningful relationships between nutrition and sociodemographic variables. A high proportion of participants were homemakers (83.5%), and most had low education (60.1% primary level; 26.6% illiterate). Similar trends were observed in a comparative study by Naik R et al., which evaluated elderly populations in urban and slum areas and highlighted education and financial dependency as significant barriers to achieving nutritional adequacy. Lower educational attainment is often associated with poor dietary knowledge and limited health literacy, impacting food diversity and nutrient adequacy [13].

Furthermore, 69.1% of participants were financially dependent, which could restrict food access and quality. Financial dependency was associated with lower dietary diversity in our findings and has also been linked to malnutrition risk in elderly populations in other Indian studies [3].

The 24-hour dietary recall conducted in this study revealed an average daily energy intake among participants of 1050.75±233.09 kcal, significantly lower than the ICMR-NIN 2020 RDA of 1800-2200 kcal for sedentary elderly adults (ICMR-NIN, 2020). Low caloric intake can lead to undernutrition, fatigue, and reduced immunity in older populations. Similar concerns about low caloric intake among the elderly have been echoed in Indian studies. For instance, a study on rural elderly populations in South India reported average caloric intakes ranging between 1100 and 1300 kcal/day [14], while a recent urban dietary study in Tamil Nadu found a similar trend of suboptimal intake depending on gender and activity level [21].

The average protein intake of 22.43±9.30 grams corresponds to approximately 0.35 g/kg body weight, far Below the ICMR recommendation of 1.0-1.2 g/kg/day for elderly individuals. Similar protein inadequacy has been quantitatively documented in other Indian studies. A study by Tattari S et al., emphasised the gap between actual protein consumption and recommendations in the elderly [19], and Sathiyamoorthi S et al., observed limited dietary diversity, which further impacts protein adequacy in urban older adults, both of which fall short of recommended intake levels [21]. Nonetheless, these findings consistently show a protein gap across different settings. This insufficiency poses risks of sarcopenia, poor functional status, and longer recovery times in older adults [3].

Low dietary diversity was prevalent, with 89.9% of participants classified as having poor diversity (1-3 food groups), 8.5% with average diversity (4-6 food groups), and only 1.6% exhibiting good diversity (7-9 food groups). This classification aligns with methods used in international studies such as that by Savy M et al., which also adopted a 9-food-group scoring model [22]. According to ICMR, a balanced Indian diet should include cereals (50-60%), fruits and vegetables (20-30%), proteins (10-15%), and fats (15-25%). The observed shortfall in food-group variety in this study reflects a deficiency in nutrient-dense foods such as pulses, fruits, and dairy, contributing to micronutrient inadequacy. Further, dietary diversity was significantly associated with gender, education, and income status. Males, individuals with higher educational attainment, and those who were financially independent had comparatively higher diversity scores. These associations underscore the role of sociodemographic determinants in influencing dietary quality. Similar relationships between food diversity and demographic factors have been documented in both urban and rural elderly populations in India [10,11].

Most participants had a normal BMI (69.7%), but 20.2% were overweight and 4.8% underweight. These findings are similar to urban Indian studies, suggesting a gradual shift toward overnutrition in cities [4,8]. In contrast, studies from rural areas such as Manipur and Puducherry continue to report higher underweight rates, highlighting India's dual burden of malnutrition [6,7].

WHR was another indicator of central obesity, with the mean study WHR at 0.903±0.043. Males had a mean WHR of 0.92±0.03, and females 0.88±0.04, slightly above the WHO thresholds of 0.90 and 0.85, respectively. This suggests increased cardiovascular risk, especially among male participants, a trend also observed in international studies on elderly central obesity and cardiovascular risk [20].

In summary, the findings highlight the complex interplay between nutritional intake, food diversity, and sociodemographic determinants, underscoring the importance of comprehensive, community-based interventions to address elderly malnutrition in urban India.

Limitation(s)

One limitation of the study is the reliance on a single 24-hour dietary recall. This may not reflect habitual intake patterns, although care was taken to avoid feast or fast days.

CONCLUSION(S)

The study reveals a significant prevalence of low caloric and protein intake, limited food diversity, and high levels of nutritional risk among urban elderly in Belagavi. These challenges are compounded by sociodemographic vulnerabilities such as low education and financial dependency. Targeted nutrition education, improved social support, and geriatric-focused food-security programs are urgently needed to promote healthy aging. Future studies should incorporate repeated recalls or food-frequency questionnaires to improve dietary intake accuracy. Additionally, the cross-sectional design limits causal inference, and longitudinal studies are warranted to better understand the long-term effects of dietary habits on aging and health outcomes.

REFERENCES

[1] United Nations, Department of Economic and Social Affairs, Population Division. World Population Ageing 2020 Highlights. New York: UN; 2020. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2020/Sep/un_pop_2020_pf_ageing_10_key_messages.pdf. Last accessed on 08-07-2025.

[2] Bloom DE, Mahal A, Rosenberg L, Sevilla J. Economic security arrangements in the context of population ageing in India. Int Soc Secur Rev. 2010;63(3-4):59-89.

[3] Besora-Moreno M, Llaurado E, Tarro L, Sola R. Social and economic factors and malnutrition or the risk of malnutrition in the elderly: A systematic review and meta-analysis of observational studies. Nutrients. 2020;12(3):737.

[4] Muhammad T, Balachandran A, Kumar P, Srivastava S. Obesity-related measures and successful ageing among community-dwelling older adults in India: A cross-sectional study. Sci Rep. 2022;12(1):17186.

[5] Selvakumar R, Maheswari RU, Damodaran V. IJCM_6A: Prevalence of Malnutrition and its associated factors among elderly population in rural field practice area of Madras Medical College- A Cross-Sectional Study. Indian J Community Med. 2024;49(Suppl 1):S2.

[6] Joymati O, Ningombam M, Rajkumari B, Gangmei A. Assessment of nutritional status among elderly population in a rural area in Manipur: Community-based cross-sectional study. Int J Community Med Public Health. 2018;5(7):3125-29.

[7] Krishnamoorthy Y, Vijayageetha M, Kumar SG, Rajaa S, Rehman T. Prevalence of malnutrition and its associated factors among elderly population in rural Puducherry using mini-nutritional assessment questionnaire. J Family Med Prim Care. 2018;7(6):1429-33.

[8] Mathew AC, Das D, Sampath S, Vijayakumar M, Ramakrishnan N, Ravishankar SL. Prevalence and correlates of malnutrition among elderly in an urban area in Coimbatore. Indian J Public Health. 2016;60(2):112-17.

[9] Ramya MS, Ranganath TS, Jadhav J, Swetha NB. To assess the nutritional status among elderly and factors influencing it in an urban area, Bengaluru - A cross-sectional study. Int J Community Med Public Health. 2017;4(5):1727-32.

[10] Khan J, Chattopadhyay A, Shaw S. Assessment of nutritional status using anthropometric index among older adult and elderly population in India. Sci Rep. 2023;13(1):13015.

[11] Vedantam A, Subramanian V, Rao NV, John KR. Malnutrition in free-living elderly in rural south India: Prevalence and risk factors. Public Health Nutr. 2010;13(9):1328-32.

[12] Govind R, Rajeev J, Bhatt AN. Malnutrition among community dwelling older adults in a rural block area of South India. J Family Med Prim Care. 2020;9(12):5982-87.

[13] Naik R, Dudeja P, Thamban N, Aggarwal V. Nutrition assessment of elderly residing in urban areas and urban slum: A comparative study. Indian J Community Health. 2018;30(4):390-94.

[14] Tattari S, Gavaravarapu SM, Pullakhandam R, Bhatia N, Kaur S, Sarwal R, et al. Nutritional requirements for the elderly in India: A status paper. Indian J Med Res. 2022;156(3):411-20.

[15] Hebert JR, Gupta PC, Bhonsle RB, Sinor PN, Mehta H, Mehta FS. Development and testing of a quantitative food frequency questionnaire for use in Gujarat, India. Public Health Nutr. 1999;2(1):39-50.

[16] Ma Y, Olendzki BC, Pagoto SL, Hurley TG, Magner RP, Ockene IS, et al. Number of 24-hour diet recalls needed to estimate energy intake. Ann Epidemiol. 2009;19(8):553-59.

[17] ICMR-NIN. A Brief Note on Nutrient Requirements for Indians, Recommended Dietary Allowances (RDA).https://www.nin.res.in/rdabook/brief_note.pdf. Last accessed on 03rd June 2025.

[18] FAO. Guidelines for measuring household and individual dietary diversity. Rome: Food and Agriculture Organization of the United Nations; 2012. Available from: http://www.fao.org/3/i1983e/i1983e00.htm. Last accessed on 04th August 2025.

[19] Tattari S, Gavaravarapu SRM, Pullakhandam R, Bhatia N, Kaur S, Sarwal R, et al. Nutritional requirements for the elderly in India: A status paper. Indian J Med Res. 2022;156:411-20. Doi: 10.4103/ijmr.ijmr_2784_21.

[20] WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;363(9403):157-63.

[21] Sathiyamoorthi S, Naidu NK. Aravindakshan R, Bianca R. Diet diversity among urban households in a town in South India - A cross-sectional study. Preventive Medicine Research & Reviews. 2024;2(3):114-18.

[22] Savy M, Martin-Prevel Y, Sawadogo P, Kameli Y, Delpeuch F. Use of variety/ diversity scores for diet quality measurement: Relation with nutritional status of women in a rural area of Burkina Faso. Eur J Clin Nutr. 2005;59(5):703-16.

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