ASSESSMENT OF THE HEALTH AND NUTRITIONAL STATUS OF ELDERLY RESIDING IN SLUMS OF URBAN VADODARA
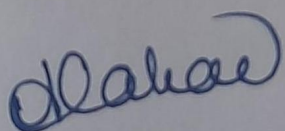
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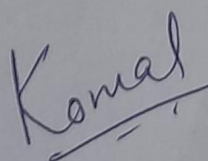**B.Sc.**
FOOD SCIENCE AND NUTRITION

APRIL 2025

CERTIFICATE

This is to certify that the research work, presented in this thesis has been carried out independently by Ms. Riddhi Tarsariya under the guidance of Dr. Komal Chauhan in pursuit of Degree of Master of Science in Family and Community Sciences (M.Sc.F.C.Sc.) with major in Foods and Nutrition (Public Health and Nutrition) and represent her original work.

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ASSESSMENT OF THE HEALTH AND NUTRITIONAL STATUS OF ELDERLY RESIDING IN SLUMS OF URBAN VADODARA

A DEISSERTATION SUBMITTED TO THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA IN PARTIAL FULLFILMENT FOR THE DEGREE OF MASTERS OF SCIENCE IN FAMILY AND COMMUNITY SCIENCES FOODS AND NUTRITION (PUNLIC HEALTH AND NUTRION)

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ABBREVIATION

Full Form

AAY   Antyodaya Anna Yojana

ADL   Activities of Daily Living

APY   Atal Pension Yojana

BMI   Body Mass Index

CIT   Cognitive Impairment Test

EAR   Estimated Average Requirement

GDI   Geriatric Depression Inventory Scale

IADL Instrumental Activities of Daily Living

MNA   Mini Nutritional Assessment

NPICE   National Programme for Health Care of the Elderly

PMJAY   Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana

RVY   Rashtriya Vayoshri Yojana

SDG   Sustainable Development Goals

WHOQOL-BREF   World Health Organization Quality of Life Scale- BREF

ABSTRACT

Urbanization's rapid growth leads to the expansion of slums, where elderly individuals face considerable hardship due to poor living conditions, limited healthcare access, and insufficient support. Specific objectives included collecting data and to evaluate the overall well-being of elderly individuals residing in the urban slums of Vadodara. It focused on assessing their socio-demographic profile, nutritional status through anthropometric measurements, and both mental and physical health. Additionally, the quality of life of the elderly was examined using standardized tools. A key objective was to explore the relationship between health, nutritional status, and quality of life, offering a holistic understanding of the factors influencing elderly well-being in slum settings. Methodology: This study was a cross-sectional study conducted in a free-living population of elderly people residing in slums of urban Vadodara. A sample size of approximately 250 elderly (male and female) participants will be selected purposively. The study will focus on individuals aged 60 and above. A purposive selection of Urban Primary Health Centres (UPHCs) will be carried out to identify areas within the slums of Vadodara with the highest concentration of elderly residents. From these areas, elderly individuals meeting the inclusion criteria (age above 60 years) will be purposively selected for participation in the study.

Results: The study population was predominantly female (75.2%), with a significant proportion (42%) widowed, highlighting the vulnerability of elderly women. While 57.6% lived in permanent housing, 42.4% resided in temporary shelters. A notable percentage (56.4%) of the elderly were unemployed, including many housewives (24.9%), while 32.1% were self-employed. Although most (95.2%) had access to municipal tap water, storage practices were often inadequate, with 63.6% using plastic drums, raising concerns about water safety. The majority (80.4%) lived with family, and a substantial portion (68.4%) received food assistance through government programs.

Average body mass index (BMI) did not differ significantly between genders; however, those aged 75-85 years showed lower average weights and heights compared to the 60-74 age group. Overall, 9.6% of participants were underweight, and 34.4% had a normal BMI.

Dietary assessments revealed a high intake of staple cereals like rice and wheat, with infrequent consumption of other food groups. Many elderly individuals had insufficient intakes of key nutrients, and a large percentage were at risk of malnutrition (49.2%) or were

malnourished (47.6%). Thus according to MNA they fall in at risk or malnutrition category though on the basis of BMI classification majorly participants fall in the overweight and obese category which was also associate with the high in take fat and consume frequently processed food.

Morbidity profiles indicated common oral health problems, particularly among females. Gastrointestinal issues, musculoskeletal discomfort, and psychological problems such as low mood and lethargy were also prevalent, again more often in females. Depression was widespread, with 67.2% participants experienced severe depression. With that also there was majorly cognitive impairment was seen in older elderly as compare to younger elderly. A positive correlation was found between BMI and nutritional status, while nutritional status showed a negative correlation with depression. Quality of life scores did not differ significantly between genders.

In conclusion, elderly individuals in urban slums face a combination of factors that negatively affect their nutrition, physical and mental health, and overall well-being. These findings emphasize the need for interventions focused on improving living conditions, nutritional support, healthcare access, and social support for this vulnerable population.

CHAPTER 1

INTRODUCTION

Ageing is a continuous process that begins at birth and continues until death. Throughout this journey, individuals undergo a range of changes—physical, psychological, social, and emotional. These changes, though natural, evolve as one grows older and often require people to adapt according to their needs and circumstances. While the ageing process is beyond human control, accepting these transitions with grace can lead to a more peaceful and meaningful life.

In India, the challenges associated with ageing are compounded by socioeconomic factors. According to the United Nations Population Fund (UNFPA), over 40% of elderly individuals in the country belong to the poorest wealth quintile, and nearly 18.7% live without any source of income. Such levels of poverty not only diminish their quality of life but also hinder their access to essential healthcare services.

The Longitudinal Ageing Study of India (LASI) 2021, conducted by the Ministry of Health & Family Welfare, offers deeper insights into the lives of India's ageing population. The study reveals that 75% of elderly individuals suffer from at least one chronic illness, while 24% face limitations in performing basic daily activities (ADLs), such as bathing and dressing. Additionally, 48% report difficulty in managing instrumental activities of daily living (IADLs), including cooking, shopping, and handling finances.

Mental health issues also emerge as a serious concern among the elderly. One in three older adults reports symptoms of depression, and 32% experience low life satisfaction. Despite these challenges, access to social protection remains limited. Only 18% of the elderly population is covered under any health insurance scheme, and just 28% are aware of concessions available for senior citizens. Moreover, 24% face difficulties in submitting documentation to avail of these benefits.

The report further highlights the stark reality of financial dependency among India's elderly. Around 70% rely on others for their everyday needs, and a staggering 78% live without any pension support. This economic vulnerability significantly affects their well-being, independence, and overall quality of life.

Trends in Population Aged 60 Years or Over

Year	% of Population Aged 60+ in South & South-West Asia	India: Population Aged 60+ (in millions)
1950	5.8%	19.1
2022	10.0%	148.7
2050	19.5%	347.6

Source: United Nations, Department of Economic and Social Affairs, Population Division (2022). World Population Prospects 2022, Online Edition.

On a global scale, the year 2022 witnessed a demographic segment of 1.1 billion individuals aged 60 years or above which constitute 13.9 percent of the overall population of 7.9 billion. In South and South-West Asia, the proportion of people aged 60 years or older has steadily increased from 5.8% in 1950 to 10.0% in 2022, with projections indicating a further rise to 19.5% by 2050. In India, the elderly population has grown significantly from 19.1 million in 1950 to 148.7 million in 2022, and is expected to reach 347.6 million by 2050. While the percentage share of elderly population in Gujarat is expected to increase from 10% in 2021 to 15.4% in 2036.

In India, gender disparities in life expectancy persist, reflecting broader social and economic inequalities. A study by Thingnam S et al. (2021) reveled that in 2020, life expectancy in India reached 69.73 years, marking a 0.33% increase compared to 2019. A longer lifespan, however, may result in greater functional impairments, leading to increased physical and financial dependence on others. As of 2022, the life expectancy at age 60 in India is 16.3 years, with a notable difference between men and women. Male life expectancy at age 60 stands at 15.4 years, while female life expectancy is slightly higher at 17.2 years. However, the female advantage in life expectancy at this age is only 1.8 years, making it one of the lowest among countries in Asia and the Pacific. This smaller gender gap in life expectancy compared to other nations is influenced by multiple factors, including differences in healthcare access, nutritional status, disease burden, and lifestyle behaviors. While women generally outlive men, many

elderly women in India face greater financial and social insecurity due to lower workforce participation and limited access to social protection schemes.

India is experiencing an ageing population before achieving widespread economic prosperity. According to a 2012 study by the United Nations Population Fund, poverty rates are notably higher among the elderly, with a huge portion relying on others for financial support—52% being fully dependent and 18% partially dependent. Due to economic burden, many older individuals either continue working or are compelled to work to sustain themselves. In 2019-20, approximately 9.3 million individuals aged 61 and above accessed work benefits under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). By 2021, seniors 61 years and older accounted for nearly 10% of the total workforce under the scheme.

With ageing, India is also experiencing rapid urbanization. Demographic and socio-economic factors are reshaping the population across time, space, and location. By 2036, urban India is expected to accommodate 40% of the total population, while by 2050, the older adult population is projected to double, reaching approximately 20%. Urbanization and population aging are two major demographic transitions in societies that have caused various unprecedented challenges to the world (Lewis & Buffel, 2020). Urbanization is not just for economic growth; it is an important part of the process. In India, cities play a key role in the economy, contributing about two-thirds of the total economic output. Urban areas are centers for innovation, foreign investments, and new technologies, while also attracting more people looking for better job opportunities. Over the next 20 years, India's urban population is expected to grow from 282 million to 590 million, as more people move to cities in search of work and a better life.

However, this rapid urban growth creates many challenges, especially in housing, basic services, and slums. Many cities struggle to provide clean water, proper sanitation, and transportation to their growing populations. Already, slums house about 26% of India's urban population, with Mumbai being a major example—more than half its people live in slums. Unlike other countries, in India, slums are often close to job centers, making them an important but often neglected part of urban life.

The chapter "Problems and Development of Slums: A Study of Delhi and Mumbai" by S.K. Sinha and Ravi Shekhar (2017) explores the various challenges faced by slum dwellers in these two major Indian cities. The authors emphasize that slums are a result of deep-rooted urban inequalities, primarily characterized by insufficient access to essential services and infrastructure. They attribute the growth of slums to large-scale migration from rural areas and small towns, where economic stagnation pushes individuals to seek better opportunities in urban centres. However, cities often fail to meet the increasing demand for housing, employment, and basic amenities, leading to the rapid expansion of slum settlements.

Many slums are built in risky areas, such as places prone to landslides and floods, making the residents highly vulnerable to natural disasters. Additionally, slum dwellers often face more social and health challenges compared to people living in other parts of the city or rural areas. Local governments often do not provide municipal services in slums because they are considered "illegal" settlements. Moreover, the problem is so large that city authorities, with their limited resources, struggle to manage it effectively.

Formation of Slums

Rural Poverty & Unemployment

↓

Migration to Cities for Better Opportunities

↓

High Cost of Living & Housing in Cities

↓

Settling in Informal or Unplanned Areas

↓

Lack of Basic Infrastructure (Water, Sanitation, Electricity, Roads)

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Overcrowding & Poor Living Conditions

↕

Generational Poverty & Cycle
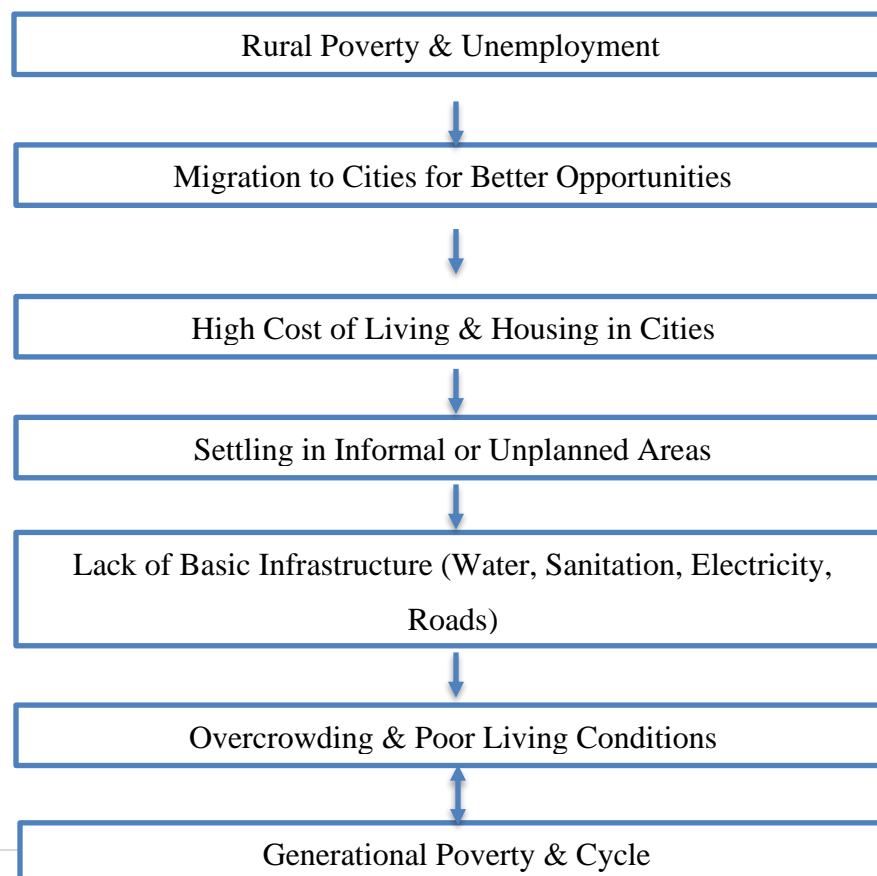
People living in slums encounter numerous difficulties that adversely affect their daily lives. A major concern is the insufficient access to essential services such as clean drinking water, sanitation facilities, electricity, and healthcare. These areas are typically overcrowded, with a high number of people living in limited space, resulting in poor living conditions. The housing in slums is often poorly built, lacking durability and safety, and is frequently constructed without official approval. Many of these settlements are situated in dangerous areas, like near polluted sites or on unstable land, exposing residents to significant health and environmental hazards. Another issue is the lack of legal ownership or formal recognition of their homes, making them susceptible to forced eviction. Slum dwellers also face extreme poverty and are often excluded from broader social and economic systems. Moreover, many of these settlements are too small or informal to qualify for government support or public infrastructure development, further isolating them from essential services and opportunities.

Slum itself has many problems with it and it get more worsen for older adults living in slums are at a higher risk of developing non-communicable diseases as they grow older. Additionally, due to poor sanitation and limited access to healthcare, they are more vulnerable to various infectious diseases. As a result, their overall health tends to be worse compared to older adults living in well-established residential area.

Challenges Faced by the Elderly in India

As India's population grows older, the struggles of senior citizens are becoming more serious. Many elderly people face financial difficulties, health issues, loneliness, and a lack of support. The shift from joint families to nuclear households, rapid urbanization, and changing lifestyles have made these challenges even harder to deal with.

Major challenge for many elderly people in India is financial insecurity. Without a steady income, they often depend on their families for basic needs. According to the United Nations Population Fund (2012), more than half of India's senior citizens rely entirely on their families for financial support. Rising living costs and limited pension schemes make it difficult for many elderly individuals to stop working, even when their health is failing.

As people age, they are more likely to suffer from health conditions like diabetes, high blood pressure, heart disease, and joint pain. However, getting proper medical care is not easy,

especially for elderly individuals in rural areas and urban slums. Many hospitals and clinics are either too far away or too expensive.

Social isolation and neglect among the elderly in India are pressing issues that significantly impact their psychological and physical well-being. The increasing aging population, projected to reach 20% by 2050, exacerbates these challenges, particularly in urban settings where traditional family structures are weakening due to migration and modernization (Khurana H et al. 2023) Approximately 48.78% of elderly individuals in urban slums experience social isolation, while 50.81% report feelings of loneliness (Das D et al, 2023).

For elderly individuals living in slums or rural areas, basic needs like clean water, proper sanitation, and safe housing remain out of reach. The Census of India (2011) reported that 26% of urban residents live in slums, where overcrowding and unhygienic conditions pose serious health risks. Many elderly people living in such conditions suffer from illnesses caused by pollution, malnutrition, and unsafe surroundings.

In today's digital world, many everyday services have moved online. However, a large number of senior citizens find it difficult to use smartphones and the internet. A study by the Age well Foundation (2021) found that only 23% of elderly people in India are comfortable using smartphones for digital transactions. This lack of digital literacy makes them dependent on younger family members for banking, communication, and accessing government services.

Although India has pension and social security schemes for the elderly, many senior citizens do not receive these benefits due to a lack of awareness or complicated application processes. According to the Ministry of Statistics and Programme Implementation (2016), only 35% of eligible elderly people receive pension benefits. Many seniors struggle with bureaucracy, long delays, and unclear procedures, making it difficult for them to access the support they need.

Public transportation in India is not designed for elderly citizens. Poor road conditions, lack of accessible transport, and unsafe public vehicles make it difficult for them to travel independently. The Centre for Science and Environment (2018) reported that very few Indian cities have transport services that consider the needs of older adults. As a result, many elderly individuals remain homebound, unable to access essential services or visit loved ones.

Challenges faced by elderly residing in slums

The study, conducted by Shubham R et al. (2020) among 200 elderly individuals (114 males and 86 females) aged 60 years and above from 10 slums in Siliguri Municipality, revealed several challenges faced by the elderly population. Health-related issues were the most prevalent, affecting 40% of the respondents. Financial difficulties were another major concern, impacting 24.5% of the elderly. Additionally, 15.5% of participants reported social challenges, such as isolation and lack of support. A smaller percentage (1.5%) faced other problems, including difficulties related to housing and access to essential services. The study also found a significant gender-based difference (p=0.01) in the types of challenges experienced, emphasizing the need for targeted interventions to address the specific needs of elderly individuals living in urban slums.

Slums are densely populated settlements where multiple families often share small, poorly built homes. These areas lack proper ventilation, clean water, and sanitation, leading to severe health risks (Census of India, 2011).

Elderly slum dwellers face significant challenges in accessing nutritious meals, leading to various health issues such as malnutrition, anemia, osteoporosis, and weakened immunity. The prevalence of malnutrition among this demographic is alarmingly high, with studies indicating that a substantial portion of elderly individuals in urban slums are at risk or already malnourished. This situation is exacerbated by socio-economic factors, dietary patterns, and the aging process itself. A study found that 33.33% of elderly participants in urban slums were malnourished, with 54.17% at risk of malnutrition (Sonawane S et al., 2019).

In the old age it is important to take the adequate amount of nutritious food to maintain a heathy life style as age increase. Many elderly slum dwellers lack financial stability, which affects their ability to afford nutritious food. A study by HelpAge India (2020) found that over 60% of elderly individuals in urban slums do not have access to a regular and balanced diet. Many survive on cheap, processed, and calorie-dense foods, which provide energy but lack essential vitamins and minerals (Gopalan, 2017). A study conducted in Delhi slums found that 72% of elderly individuals suffer from protein deficiency due to their dependence on rice, chapati, and

tea while lacking protein-rich foods like pulses, eggs, and dairy (Mishra & Singh, 2018). the poor nutrition leads to many other health issues among the elderly.

Such as mental health is a crucial aspect of overall well-being and also it is the nagligate part of the geriatric health especially for older adults. Globally, over 20% of the elderly population suffers from mental or neurological disorders, contributing significantly to disability and lost economic output. Depression, the most common mental disorder, affects around 7% of older adults and is a leading cause of non-fatal health loss. In India, with a rapidly growing elderly population of over 104 million, more than 10.9% require mental healthcare. Factors like social neglect, financial dependence, loss of loved ones, and chronic illnesses contribute to silent depressive changes, further impacting their health and access to healthcare services.

Elderly individuals living in Indian slums face numerous challenges that significantly impact their functional abilities. High rates of functional disabilities are common, with a study in urban Varanasi reporting that 53.6% of elderly individuals experienced difficulties in mobility and self-care tasks (Kumar et al., 2024). Multimorbidity is another pressing issue, as older adults often suffer from multiple chronic illnesses but have limited health literacy and financial resources, making access to healthcare difficult (Gupta et al., 2023).

JUSTIFICATION

- The elderly population is growing, leading to increased concerns about their health, nutrition, and quality of life.
- Many studies have examined these factors in elderly people living in urban areas, rural regions, and old age homes. However, there is a significant gap of research on the elderly population living in urban slums of Vadodara.
- Slums have specific challenges like overcrowding, financial instability, poor infrastructure, and limited access to basic services. These challenges make elderly residents of slums more vulnerable to issues such as: Financial instability, Poor nutrition, Limited healthcare access, social isolation, Discrimination.
- Elderly people in urban slums are more likely to suffer from: Malnutrition, Physical and mental health problems and Poor quality of life
- Despite such conditions, there is few research focused on this specific group.

- This study aims to address this gap by assessing the health, nutritional status, and quality of life of elderly individuals living in urban slums of Vadodara.

OBJECTIVES

➢ **Broad objective**

To assess the health, nutritional status and quality of life of elderly residing in slums of urban Vadodara.

➢ **Specific objective**
- To assess the socio demographic profile of urban slum elderly.
- To assess the anthropometry and nutritional status of urban slum elderly.
- To assess the mental and Physical health of urban slum elderly.
- To assess the Quality of life of urban slum elderly.
- To study the relationship between health (including disease profiles, physical health and mental well-being), nutritional status, and quality of life in urban slum elderly.

CHAPTER 2

REVIEW OF LITERATURE

By 2030, one out of every six people in the world will be 60 years or older. The number of people in this age group will grow from 1 billion in 2020 to 1.4 billion. By 2050, the global population of individuals aged 60 and above will double, reaching 2.1 billion. Additionally, the number of people aged 80 and older is expected to triple, reaching 426 million by 2050. (WHO,2019)

Although aging populations first became common in developed countries like Japan, where 30% of people are already over 60, the same trends seen in low- and middle-income countries. By 2050, about two-thirds of the world's elderly population will live in these regions.

Eating a nutritious diet is very important for older adults because it affects their overall health. Research has shown that what they eat influences their physical strength, memory, bone health, eyesight, blood circulation, and immune system. However, maintaining a healthy diet can be difficult for several reasons: (Institute of Medicine (US) Food Forum. Washington (DC): National Academies Press (US); 2010.)

- Loss of Appetite & Taste Changes: As Pelchat noted, aging can reduce appetite and cause changes in taste and smell, leading to a lower intake of healthy foods.

- Oral Health Issues: According to Jensen, many older adults experience dental problems and difficulty swallowing, which can make eating certain foods harder.

- Mobility Issues: Many elderly people have trouble moving around, making it difficult to shop for groceries, carry heavy items, or open food packages.

- Financial Constraints: Wellman and Kinsella highlighted that many older adults live on a low income, making it hard to afford nutritious foods, which are often more expensive.

A study conducted Aboderin I et al. (2017) in Nairobi's Viwandani and Korogocho slums highlights several significant health challenges faced by older residents:

- The slums are characterized by poor infrastructure, including inadequate housing and limited access to basic amenities, which hampers mobility and overall well-being of the elderly.

- Despite participation in labour markets, many older adults face financial instability due to the prevalence of low-paying, informal sector jobs.

- There is a profound lack of access to essential health services, particularly for managing chronic conditions like cardiovascular and musculoskeletal diseases.

- Psychological distress is common, often stemming from strained family relationships and concerns over younger family members' futures.

- Disparities exist within the older population along gender, socioeconomic status, and age, with women, the less affluent, and the oldest individuals typically at a disadvantage.

- Older residents have restricted opportunities to engage in local decision-making, impacting their ability to influence community improvements.

The present study was designed with a broad objective to carry out a study to understand the effect of nutrition, diet and disease profile of elderly residing in urban slums of Vadodara with their quality of life. The specific objectives included collection of the data on socio-demography, nutritional status, dietary profile, disease profile (major and minor illnesses), mental health profile, functional ability and quality of life of Elderly in the age group of 60 – 74 years and 77-85+ years residing in urban slum of Vadodara.

The review of literature to the present study is categorized under the following tittle:

- Slums and the Elderly
- Challenges Faced by the Elderly in Slums
- Nutritional Profile of the Elderly
- Disease Profile of the Elderly
- Mental Health of the Elderly
- Physical Health of the Elderly
- Quality of life

- Policy for the Welfare of Elderly by Indian Government

Slums and the Elderly

Region	Total Slum Population	Percentage of Urban Population in Slums
India	65.49 million	17.4%
Gujarat	1.55 million	7.18%
Vadodara	257,000	20%

Source Census 2011, VMC report

Elderly slum dwellers often face significant social and economic challenges. Financial instability is a major issue, with many relying on family support or informal income sources. In Bangladesh, for instance, a study found that most elderly slum residents do not receive old-age allowances, further deepening their economic vulnerability ("A Study on the Livelihood Status of Elderly People in Slum Area of Bangladesh: Evidence from Chattogram City", 2022). Social isolation and neglect are also common, with many elderly individuals feeling abandoned by their families or lacking companionship (Attafuah et al., 2023) (Balagopal, 2017).

Challenges Faced by the Elderly in Slums

In 2018, Naik et al. conducted a hospital-based cross-sectional study in Pune, Maharashtra, India, comparing the nutritional status of elderly individuals residing in urban areas and urban slums. The study included 331 participants aged over 60 years, with 209 from urban slums and 122 from urban areas. Nutritional assessments were performed using the Mini Nutritional Assessment (MNA), Malnutrition Universal Screening Tool (MUST), and Geriatric Nutritional Risk Index (GNRI), along with measurements of serum albumin levels. The results indicated that 50.7% of the elderly were either malnourished or at risk of malnutrition. Specifically, the mean Body Mass Index (BMI) was significantly lower in the slum group (22.3 ± 5.3) compared to the urban group (26.3 ± 4.5), with a p-value <0.001. Additionally, a higher proportion of elderly individuals in the slum area had MNA scores below 24, mid-arm circumference below 22 cm, and calf circumference below 31 cm, all with significant p-values <0.05.

In 2017, Prajapati B, et al. conducted a cross-sectional study in Gujarat, India, comparing socio-demographic and housing conditions between urban slum and rural households. The study involved 500 households from a rural health training center (RHTC) in Hadiyol, encompassing 2,250 members, and 500 households from an urban health training center (UHTC) in Himmatnagar, comprising 2,418 members. The researchers employed purposive sampling. The findings revealed that 93.8% of rural and 86.4% of urban slum populations resided in their own houses. Pucca houses were more prevalent in rural areas (66.2%) compared to urban slums (53.2%). Notably, only 30.4% of urban slum houses had a separate kitchen, compared to 54.4% in rural areas, highlighting significant challenges in housing conditions within urban slums. The study concluded that urban slum households face considerable challenges related to housing and sanitation.

A study by Chandwani et al. (2008) conducted a cross-sectional study in Vadodara, Gujarat, to assess the health and social challenges faced by the geriatric population in urban settings. Over a four-month period, 311 elderly individuals aged 60 and above from Gotri and Ellora Park were interviewed using a pre-tested schedule. The study found that 56% of the elderly reported unhappiness, with nearly 50% feeling neglected by family members. Social challenges were evident, with 41% feeling sad due to illness, 37.6% due to the loss of a spouse, and 55% reporting that old age negatively impacted their role in the family. Only 12.2% had accessed geriatric welfare services, highlighting a lack of awareness and utilization of government support.

Nutritional Profile of the Elderly

A study by Saikia M et al. 2013 conducted a community-based cross-sectional study in 10 randomly selected urban slums of Guwahati City, Assam, India, to assess the nutritional status of elderly individuals aged over 60 years using Body Mass Index (BMI) measurements. The findings revealed that 22.2% of the participants were undernourished (BMI <18.5), while 12.5% were overnourished, including overweight (BMI 25–29.99) and obese (BMI ≥30) individuals. A significant association was found between nutritional status and both socioeconomic statuses. The study concluded that there is a high prevalence of undernutrition among the elderly in urban slums, alongside a notable occurrence of overnutrition within this underprivileged group.

A study done by (PAWAR, et al 2015) on food consumption pattern and nutrient intake of 300 elderly from Prabhani city. It was found that a pattern of eating mixed cereal for both lunch and dinner was prevalent among the older participants in the current study. Most older people followed two meal schedules. It was also found that the majority of older people consumed seasonal vegetables and fruits. The senior men and women consumed less energy, protein, iron, fat, thiamine, niacin, and vitamin C than the recommended daily amount. The percent adequacy for various nutrients in the selected seniors ranged from 57.14 to 136 in men and 59.76 to 122 in women. Calcium provision had the highest percent adequate in both genders, whereas Riboflavin and Iron provision had the lowest percent adequacy in the elderly population.

The study of 129 senior people in Kerela found that 75.2% were female, 81.4% were unemployed, and 62% lived in rural areas. Nutritional assessment revealed that 41.9% of people had adequate nutrition, 46.5% were at risk of malnutrition, and 11.6% were malnourished. In 89.1% of cases, calorie consumption fell short of the recommended daily allowance. There was no correlation between calorie intake per day and MNA status. A significant correlation was found between MNA status and BMI ($p<0.001$, $r=0.329$). (Abraham J et al, 2017).

Charuthaet R et al. (2020) conducted a cross-sectional study in the urban slums of Kochi Corporation, Kerala, India, to determine the prevalence of anemia among the elderly population and its association with dietary patterns. The study included 165 individuals aged 60 years and above, selected through simple random sampling. Hemoglobin levels were measured using HemoCue, and dietary patterns were assessed via a structured, pretested questionnaire eliciting a 7-day dietary recall. The findings revealed that 60.6% of the participants were anemic, with a higher prevalence among females (66%) compared to males (49%). The study concluded that anemia is significantly prevalent among the elderly in urban slums of Kochi.

Chowdhury I et al. (2021) conducted a cross-sectional study in urban slums of West Benagal to identify factors influencing the health status of elderly residents. The research involved structured interviews and health assessments of individuals aged 60 and above, focusing on their socioeconomic status, living conditions, and prevalent health issues. The study found a high prevalence of chronic conditions such as hypertension and diabetes among participants,

with 68% reporting at least one chronic illness. Furthermore, 55% of the elderly were found to have inadequate health literacy, which was significantly associated with poorer health outcomes. The authors concluded that socioeconomic disadvantages and low health literacy contribute substantially to the health challenges faced by the elderly in urban slums.

Study on Assessment of nutritional status of community-dwelling older adults in rural North India using mini nutritional assessment-short form was carried out (Sahni B et al, 2023) the results said 4.9 percent of older individuals were malnourished, with 42.6 percent at risk of malnutrition. Malnutrition was more prevalent in the 60-69 age range (5.95%) and among females (6.9%), although the risk of malnutrition was highest among those over 80 years old (59.1%) and widowed (66.7%). Weight loss, decreased food intake, dementia, stress, impaired mobility, and sadness were all strongly linked to malnutrition. MNA-SF screening can play a role in identifying a notable number of the elderly who are malnourished and "at risk".

A study carried out by Chauhan and Agarwal) at the Department of Foods and Nutrition, The M.S. University, included 149 elderly subjects and among the subjects, 59% consumed energy between 75-100% of the Recommended Dietary Allowance (RDA). Regarding specific nutrients, merely 2% had an iron intake within the 75-100% RDA range, while the percentages were 14% for fats and 26% for protein. The average consumption of protein and fats stood at 42.60 grams and 44.26 grams, respectively.

Disease Profile of the Elderly

Elderly individuals in slums often experience a high burden of chronic diseases and multimorbidity. Studies in India have shown that 62.5% of older adults in urban slums suffer from multimorbidity, with conditions such as hypertension, diabetes, and arthritis being prevalent (Yogesh et al., 2024) (Yogesh et al., 2024). In Kolkata, a study revealed that 95.8% of older women in slums suffer from multiple morbidities, with back pain, dental issues, and hypertension being the most common (Ghosh et al., 2024). These health challenges are exacerbated by limited access to healthcare services and inadequate health literacy, which hinders effective disease management (Yogesh et al., 2024) (Murugan et al., 2024).

The study by Patnaik A et al. (2022) conducted in the urban slums of Cuttack, Odisha, revealed a high prevalence of morbidity among the elderly population. A significant 59.5% of

participants suffered from severe depression, while myalgia was more common in females (5.7%) and upper respiratory tract diseases were more prevalent in males (19.2%). Socioeconomic factors played a crucial role, with 49.1% of participants being illiterate, 64.5% unemployed, and 53.1% living with their children. The study also highlighted poor health-seeking behaviour, with 50.4% of participants showing inappropriate healthcare utilization.

A study by Tyagi R et al. (2010) examined the nutritional status and functional abilities of 259 elderly women aged 55-80 years in Delhi. The study found a high prevalence of obesity and hypertension, with 50% of participants being overweight or obese and 60% experiencing pre-hypertension or hypertension. Functional abilities declined with age, including reduced lung function, muscular strength, and stature. Health issues were also prevalent, with 85.5% of the women reporting vision problems, 79.3% experiencing joint pain, and 47.6% diagnosed with hypertension.

A study by Yadav A, et al. (2017) conducted a study in urban India to assess morbidity patterns among the elderly using data from the SAGE 2007 survey. The study found that hypertension (50%), depression (45%), diabetes (25%), and oral health diseases (30%) were highly prevalent in the 50–59 age group. In the 60–69 age group, cataracts (35%), asthma (20%), and stroke (15%) were more common. Smoking was highest in Assam, while alcohol consumption was most prevalent in Rajasthan. Key risk factors included age, tobacco use, and socioeconomic status as significant risk factors associated with morbidities such as diabetes, hypertension, and stroke. Additionally, the prevalence of asthma and oral health issues significantly increased with age.

Jadav A et al, (2012) conducted a cross-sectional observational study in Vadodara, Gujarat, to assess the morbidity pattern among the elderly population residing in rural areas. The study was carried out between January 2011 and January 2012 and included 600 elderly participants aged 60 years and above. Data collection was performed using face-to-face interviews with a structured questionnaire covering socio-demographic details and self-reported morbidities. cognitive evaluations using the Folstein Mini-Mental State Exam (MMSE) and the Geriatric Depression Scale (GDS-15). The study found that musculoskeletal problems were the most prevalent, affecting approximately 65% of participants. Obesity was observed in 46.2% of the

participants, with a higher prevalence in females (53%) than in males (41%). Depression was significantly more common among females (76.2%) compared to males (40%).

Departmental study conducted by Chauhan and Singh (2008) among 130 elderly revealed that the most prevalent illness among all subjects was oral problems (81.7%), followed by issues related to the locomotor system, gastrointestinal tract, and respiratory system.

Mental Health of the Elderly

A study by Ashe S (2019) conducted a cross-sectional study in Jobra, Cuttack, Odisha, to assess depression among 354 elderly individuals using random sampling and standardized questionnaires, including the Geriatric Depression Scale. The study found that 44.9% of participants suffered from severe depression, while 36.2% had mild depression, bringing the total prevalence close to 80%. Multiple logistic regression analysis revealed that female gender, low socioeconomic class, diabetes mellitus, hypertension, death in family members, family conflicts, and chronic illness in family members were significant independent risk factors for severe depression.

Park J et al, (2022) conducted a study in the Republic of Korea to examine factors related to depression and mental health affecting the quality of life among the elderly. Utilizing a cross-sectional survey methodology, they collected data from 200 older adults aged 65 and above residing in community settings. The study employed standardized questionnaires to assess depression, mental health status, and quality of life. Findings indicated that 35% of participants exhibited symptoms of depression, and 40% reported poor mental health status. A significant negative correlation was observed between depression levels and quality of life scores, suggesting that higher depression levels are associated with a lower quality of life. Additionally, mental health status was positively correlated with quality of life ($r = 0.50$, $p < 0.01$), indicating that better mental health is linked to a higher quality of life.

A study by Vishwakarma D, et al. (2023) conducted a systematic review on depression and its associated factors among the elderly in India, analysing 35 selected studies from databases like PubMed, Scopus, and Google Scholar. The study found a high prevalence of depression among older adults, with variations across regions. In rural South India, 79.5% of elderly individuals had mild depression, while 20.4% had severe depression. In Tamil Nadu, the prevalence was

67.5%, whereas in Puducherry, 56% had mild, 25% had moderate, and 19% had severe depression. Similarly, in rural Maharashtra, 26.72% reported mild and 15.17% had severe depression, while in urban Karnataka, 75.5% had severe depression and 84.97% had mild depression. The study identified key risk factors, including lack of family support, physical health deterioration, bereavement, social isolation, and generational communication gaps. The authors emphasized the need for systematic depression screening and counselling among the elderly.

Similar trend was seen in a study by Parmar V, et al. (2023) conducted a cross-sectional descriptive study in the rural area of Kheda District, Gujarat, India, to assess the prevalence of depression among elderly individuals aged 60 years and above. Utilizing a non-probability convenient sampling technique, 100 participants were evaluated using the Geriatric Depression Scale (GDS), a self-rating questionnaire designed to measure depressive levels. The findings revealed that 51% of the elderly had no depression, 33% exhibited mild depression, and 16% suffered from severe depression. The study also identified significant associations between depression levels and certain demographic variables, including previous occupation, healthy habits, disease status, and financial dependency. The authors concluded that while a majority of the elderly population were not depressed, a substantial proportion experienced mild to severe depression.

A study by Parmar P et al. (2024) conducted a community-based cross-sectional study in Ahmedabad city, Gujarat, India, to assess the prevalence of depression among the elderly population aged 60 years and above. The study involved 268 participants, with data collected through standardized, pre-tested, semi-structured questionnaires via interviews. The 30-item Geriatric Depression Scale (GDS-30) was employed to identify depression levels. The findings revealed that 19.8% of participants had severe depression, while 42.53% exhibited mild depression. Higher prevalence rates of severe and mild depression were observed among individuals from low socio-economic class V (30.2% and 38.1%, respectively), those with comorbidities (21.6% and 46.3%), widowed individuals (20.7% and 48.8%), divorcees (100% and 0%), and elderly individuals engaging in substance abuse (23.4% and 47.3%). The authors concluded that depression is prevalent among female elderly individuals, those who are lonely, economically disadvantaged, and substance abusers.

A Departmental study by Chauhan K et al. (2009) conducted a study in rural Vadodara, India, to assess the nutritional, disease, and mental health profile of elderly males. The study included 130 elderly males from villages in Padra Taluka, categorized into low-income (LIG) and middle-income groups (MIG), and further classified into younger elderly (60–74 years) and older elderly (75+ years). A pre-tested semi-structured questionnaire was used to collect socio-economic and lifestyle data, while mental health status was assessed using the Geriatric Depression Inventory (GDI), Mini-Mental State Examination (MMSE), and Cognitive Impairment Test (CIT). The findings indicated that **70.7%** of the subjects exhibited varying degrees of depression based on GDI scores. Additionally, nearly **75%** of the participants fell under the categories of depressed performance and abnormal cognitive function according to MMSE and CIT, respectively. Poor mental health was more prevalent among LIG individuals and those aged 75 and above. The study concluded that socio-economic status and advancing age significantly influenced mental and cognitive health, with older and economically disadvantaged individuals being at higher risk of depression and cognitive decline.

Physical Health of the Elderly

Tari-Selçuk et al. (2021) conducted a study in Kırklareli, Turkey, to assess how different physical disabilities impact the ability of elderly individuals (65+) to perform daily activities. The study, involving 578 participants, found that 46.1% of those with physical disabilities had limitations in at least one activity of daily living (ADL). Hearing impairments and orthopaedic disorders significantly increased dependency on others for daily tasks. However, individuals with visual impairments were less likely to be dependent. ADL limitations are more likely to occur in elderly people with disabilities. The likelihood of ADL dependency was higher in people with a hearing impairment or an orthopaedic disorder.

A departmental study by Chauhan S et al. (2022) conducted a study in India to assess the prevalence and determinants of disabilities in Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) among individuals aged 60 and above. Utilizing data from the Longitudinal Ageing Study in India (LASI, 2017–18), the researchers analysed information from 31,464 elderly participants. They developed indices for ADL and IADL disabilities on a three-level scale: no disability, moderate disability, and severe disability. The findings revealed that approximately 3% of the elderly reported severe ADL

disabilities, while 6% reported severe IADL disabilities. Notably, elderly individuals who did not engage in any physical activity were significantly more likely to report severe ADL.

Quality of life

Ganesh S et al. (2014) conducted a cross-sectional study in urban Puducherry, India, to assess the Quality of Life (QOL) among the elderly population and its associated factors. The study involved 300 participants aged 60 and above, selected through systematic random sampling. Data were collected using the World Health Organization Quality of Life BREF (WHOQOL-BREF) questionnaire and the Katz Activities of Daily Living (ADL) scale. The study found that the overall Quality of Life (QOL) score among the elderly in urban Puducherry was 49.74. Lower QOL scores were observed in individuals without formal education, those living in nuclear families, without a spouse, not receiving a pension, and those with musculoskeletal disorders, low vision, or impaired daily activities.

In a study conducted by Shah et al. (2017) in Ahmedabad, Gujarat, a community-based cross-sectional methodology was employed to assess the quality of life (QOL) among 250 elderly individuals aged 60 years and above. Utilizing the World Health Organization's QOL questionnaire, the study found that none of the participants had a poor QOL; 56% were categorized as having a "good" QOL, while 50.8% had an "excellent" QOL. Common health issues reported included joint pain (42.8%), cataract (32.8%), hypertension (22.4%), diabetes mellitus (17.2%), and dental problems (12.4%). The study also revealed that males had significantly better QOL scores across physical, environmental, and psychological domains compared to females. Furthermore, higher education levels and being married were associated with better QOL outcomes.

Attafuah A et al. (2020) conducted a cross-sectional study in two urban slums in Ghana to assess the quality of life (QoL) of older adults. The study included 400 participants aged 60 years and above who had lived in the slums for at least one month and were able to communicate verbally. QoL was assessed using the WHO Quality of Life-Brief version (WHOQOL-BREF) questionnaire. The results showed that older adults had poor physical QoL (mean score 43.3) but moderate QoL in the psychological (45.7), social (57.0), and environmental (51.6) domains. Males had significantly higher QoL scores than females in all

domains. Participants living with extended families had higher scores in environmental QoL, overall QoL, and satisfaction with health. Regression analysis indicated that QoL was primarily influenced by environmental factors (46.2%), followed by psychological (43.7%), physical (31%), and social (20.4%) factors.

Parmar M et al, (2023) conducted a comparative study in Vadodara city, Gujarat, to assess and compare the Quality of Life (QOL) among elderly individuals residing in old age homes (OAHs) and those living with their families. The study involved 80 participants, with 40 elderly individuals from each living arrangement. The World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire. Findings revealed that 67.5% of elderly individuals living with their families reported good QOL, compared to 57.5% of those residing in OAHs. Statistical analysis indicated significant differences in QOL scores between the two groups, with family-residing elderly individuals exhibiting better outcomes. The primary reasons cited for residing in OAHs included the absence of family and lack of caregivers.

Policy for the Welfare of Elderly by Indian Government

India has introduced several policies and programs to support its growing elderly population. The National Policy for Older Persons (NPOP), launched in 1999, focuses on improving the well-being of senior citizens. With the rise in the elderly population, various challenges such as limited healthcare access, weakening family support systems, and elder abuse have emerged. While the government has taken steps to tackle these issues, there is still a need for additional resources, including financial aid, caregiver support, and digital literacy programs. Proper policies and measures can help ensure that senior citizens receive adequate care and support, making India a more senior-friendly nation (Dr. K Madan Gopal, 2023 Perspective).

The Government of India, through the Ministry of Social Justice and Empowerment, has initiated various schemes for the welfare of senior citizens:

1. **Integrated Programme for Senior Citizens (IPSC)**

    This scheme provides financial assistance to different implementing agencies, including State Governments, Union Territories, local bodies, and NGOs, for running old age homes, continuous care homes, and mobile medical units to support elderly individuals.

2. **Rashtriya Vayoshri Yojana (RVY)**

Funded by the Senior Citizens Welfare Fund, this scheme provides free assistive devices to elderly individuals living below the poverty line or earning less than ₹15,000 per month. Beneficiaries receive devices such as walking aids, hearing aids, spectacles, wheelchairs, and dentures, with the Artificial Limbs Manufacturing Corporation of India (ALIMCO) managing the program.

3. **National Helpline for Senior Citizens (Elderline – 14567)**

Launched on October 1, 2021, this toll-free helpline provides support and assistance to senior citizens across the country.

The Department of Food and Public Distribution has also introduced schemes to assist elderly individuals in need:

4. **Annapurna Scheme**

This scheme provides 10 kg of food grains per month, free of cost, to impoverished senior citizens who do not receive benefits from the Indira Gandhi National Old Age Pension Scheme (IGNOAPS).

5. **Antyodaya Anna Yojana (AAY)**

Under this initiative, highly subsidized food grains (rice and wheat) are provided to elderly individuals without a stable source of income.

The Ministry of Finance has also launched schemes to support financial security for the elderly:

6. **Atal Pension Yojana (APY)**

Designed for workers in the unorganized sector, this scheme enables individuals to contribute toward their pension between the ages of 18 to 40, ensuring a guaranteed pension of ₹1,000 to ₹5,000 per month after retirement at age 60.

The Ministry of Health and Family Welfare has introduced healthcare-focused programs:

7. **National Programe for Health Care of the Elderly (NPHCE)**

This program offers specialized healthcare services to elderly individuals through a multi-tier system, covering primary, secondary, and tertiary healthcare, along with outreach services. It operates under the National Health Mission (NHM) and includes a tertiary healthcare component.

8. **Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (PMJAY)**

Launched in 2018-19, this scheme provides health insurance coverage of up to ₹5 lakh per family per year for secondary and tertiary hospital care. It merged the Rashtriya Swasthya Bima Yojana (RSBY) and Senior Citizen Health Insurance Scheme (SCHIS), extending benefits to all previously covered individuals.

These policies form the backbone of India's senior welfare initiatives. A study based on the 75th National Sample Survey (2017-18) found that only about one-third of the elderly accessed healthcare from public institutions (Ranjan & Muraleedharan, 2023). To boost utilization, the government is expanding the NPHCE program to ensure preventive, curative, and rehabilitative healthcare services for seniors. However, healthcare access is not only dependent on availability but also on various social, economic, and cultural factors like cost, distance, and service quality (Sahoo et al., 2021).

Following the review of relevant literature and study objectives, the next section discusses the applicable research methods.

CHAPTER 3

MATERIALS AND METHODOLOGY

The present study was undertaken to study the **"Assessment of Nutritional Status of Elderly Residing in Urban Slum of Vadodara."** This chapter states the study design and discusses the method and materials that are used to accomplish the stated objectives.

Sample size: 250 participants

- Required sample size was obtained using formula N=(Z)2 pq /d2

  Where;

  - ✓ $z^2 = 4$
  - ✓ p= 0.18 (prevalence rate 18.29%)
  - ✓ Sample size is calculated using the Prevalence rate of 18.29% of malnutrition among the elderly in India. From the study conducted (Kushwaha S et, al. 2020)
  - ✓ q= 1-p which is 0.82
  - ✓ d^2= 0.025 (Confidence level of 95%, assuming a margin of error of 5 %)

- Sample size 237 is obtained Considering 10% attrition, the sample size is round of to 250

Sampling Technique: The sampling method for study is purposive sampling.

Study design: This study was Cross Sectional Study, based in slums of Urban Vadodara.

Inclusion criteria for selection of subjects

- Elderly aged above 60 years.
- Elderly residing in slum areas.
- Elderly who are ready to participate willingly and provide the information as per required for the study.

Exclusion criteria

- Hospitalized elderly.
- Elderly with any form of disability and bedridden elderly.
- Elderly who are not ready to participate willingly.

A total of 250 participants were enrolled in the study.

- **Ethical Considerations**

Ethical approval for the study was obtained from the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Sciences. The clearance reference number is **IECHR/FCSc/M.Sc./10/2024/34**. Written informed consent (Annexure 1) was obtained from all participants prior to data collection, and all ethical guidelines for human research were strictly followed to ensure confidentiality, anonymity, and voluntary participation.

- **The following information was collected through the semi structured questionnaire (Annexure2)**

TOOLS AND TECHNIQUES

Socio-demographic profile	Semi Structured questionnaire
Lifestyle pattern	Semi Structured questionnaire
Weight (kg)	Bathroom scale
Height (cm)	Non stretchable Fiberglass tape
BMI (kg/m^2)	By standard formula (Asia pacific cut-offs)
Waist measurement (cm)	Non stretchable Fiberglass tape
Hip measurement (cm)	Non stretchable Fiberglass tape
MUAC (cm)	Non stretchable Fiberglass tape
Disease profile	Checklist of major and minor illnesses
Dietary profile	24hr diet recall
Nutritional status	MNA (Mini Nutritional Assessment)
Mental health	GDS (Geriatric Depression Scale) 6 CIT (Cognitive Impairment Test)
Physical health	ADL (Activities of Daily Living) IADL (Instrumental Activities of Daily Living)
Quality of life	WHO Quality of Life scale (WHOQOL-BREIF scale)

Flow Chart of study design

A cross-sectional study on elderly people residing at slums of urban Vadodara (n=Approx.250)

Purposive Selection of elderly (>60 years and above)

- Socio-economic status
- Anthropometric
- MNA (Mini Nutritional Assessment)
- GDS (Geriatric Depression Scale)

- 6 CIT (Cognitive Impairment Test)
- ADL (Activities of Daily Living)
- IADL (Instrumental Activities of Daily Living)
- WHO Quality of Life scale (WHOQOL-BREF Scale)

STATISTICAL ANALYSIS

Section 1: Socio Demographic Information

The **Socio-Demographic Status** section gathers essential background information about elderly residents in urban slums. It covers details such as the area and zone of residence, gender, age, marital status, and occupation. It also explores living conditions including type and ownership of dwelling, crowding index, and access to basic utilities like water and sanitation. Migration history and duration of stay in the slum are noted, alongside reasons for relocation. The section assesses access to government schemes, pensions, and support from NGOs. Living arrangements and primary caregivers are recorded. Lastly, the **Kuppuswami Scale (2024 update)** is used to classify socio-economic status based on education, occupation, and monthly income, offering a comprehensive overview of the individual's social and economic environment.

Section 2: Anthropometric Assessment

Anthropometric measurements were conducted to evaluate the nutritional and health status of the participants. Standardized procedures were followed to ensure accuracy and consistency in data collection.

The following parameters were assessed:

- **Weight (kg):** A portable bathroom scale was employed to measure the weight of subjects. These individuals were weighed barefoot on the scale, which was reset to zero before each measurement. The recorded weights were rounded to the nearest 0.5 kilograms.
- **Height (cm):** In a hall, a flat floor adjacent to a vertical wall was identified and marked using fibre tape with accuracy to the nearest 0.1 centimetres. The participant was instructed to stand barefoot on the flat floor, aligning their feet parallel to the wall. Their heels, buttocks, shoulders, and the back of their head were to touch the wall. To measure height, place a flat scale horizontally against the top of the subject's head, with its vertical edge flush against the wall.
- **Body Mass Index (BMI):** Computed using the formula:
  $$BMI = Weight\ (kg) / (Height\ (m)^2)$$
- The Asia-Pacific classification by the World Health Organization (WHO) was used for BMI categorization:

• BMI category	• Reference
• Underweight:	• <18.5 kg/m²
• Normal weight:	• 18.5–22.9 kg/m²
• Overweight:	• 23.0–24.9 kg/m²
• Obese:	• ≥25.0 kg/m²

- **Waist Circumference (cm):** Measured at the midpoint between the lower rib and the iliac crest. According to the International Diabetes Federation (IDF) guidelines, a waist circumference ≥90 cm was considered an indicator of central obesity for males and ≥80 cm for females.
- **Hip Circumference (cm):** Measured at the widest part of the buttocks using a non-stretchable measuring tape.
- **Waist-to-Hip Ratio (WHR):** Calculated as: WHR= waist circumference / hip circumference, Based on the American Diabetes Association (ADA), males >0.90= high risk, females >0.85 = high risk.
- **Calf circumference:**

< 31 cm indicates **risk of malnutrition and sarcopenia** in elderly.

- **Mid-Upper Arm Circumference (MUAC)**
  - ✓ < 23 cm Under-nutrition in elderly (as per MNA tool).
  - ✓ ≥ 23 cm Normal nutrition status.

Section 3: Dietary Habits and Nutritional Assessment (Food Frequency Questionnaire, 24-Hour Recall)

This section evaluates the dietary intake patterns of elderly using two key tools:

1. **Food Frequency Questionnaire (FFQ)**
   - o Assesses the consumption frequency of different food groups, including cereals, pulses, vegetables, fruits, dairy, nuts, flesh foods, fats, and processed foods.
   - o It helps to identify common dietary patterns, nutritional deficiencies, and reliance on processed foods of the participants.

2. **24-Hour Dietary Recall (3 Days)**
   - o Records detailed meal-wise intake over three non-consecutive days, capturing food types, portion sizes, and cooking methods.
   - o Enables a quantitative assessment of nutrient intake and dietary adequacy.

3. **MNA (Mini Nutritional Assessment)**
   - o According to the Nestle Nutrition Institute, the Mini Nutrition Assessment is a validated screening tool that provides a single, rapid assessment of nutritional status among the elderly. It has a sensitivity of 96%, specificity of 98%, and predictive value of 97%. It has been confirmed and translated into multiple languages in various countries, including India. The whole MNA contains 18 items. Each item's response has a numerical value that contributes to the total score, which can be up to 30.

- **Screening Section (MNA-SF) – This includes six key questions related to:**
  - ✓ Recent weight loss
  - ✓ Appetite changes
  - ✓ Mobility status
  - ✓ Psychological stress or acute illness
  - ✓ Neuropsychological issues (e.g., dementia, depression)

- ✓ Body Mass Index (BMI) or alternative measurements (MUAC, calf circumference)
- **Scoring:**
  - ✓ 12-14 points → Normal nutritional status
  - ✓ 8-11 points → At risk of malnutrition
  - ✓ 0-7 points → Malnourished

Assessment Section (Full MNA) – If the screening score is ≤ 11, a detailed assessment is conducted, covering:

- ✓ Dietary intake (protein consumption, fluid intake, number of meals)
- ✓ Living situation and self-care ability
- ✓ Medication use
- ✓ Overall health and subjective nutritional perception

- **Final Scoring:**
  - ✓ ≥ 24 points → Normal nutritional status
  - ✓ 17-23.5 points → At risk of malnutrition
  - ✓ < 17 points → Malnourished

Section 4: Morbidity Profile – Major and Minor Illnesses

The Morbidity Profile section records both major and minor illnesses among elderly individuals at the time of the interview. It helps assess the burden of diseases and their impact on daily life.

- **Major Illnesses:**

This includes oral cavity problems like missing teeth, inflammation, ulcers, or oral cancer, which can affect chewing and nutrition. Respiratory issues such as asthma, tuberculosis, and lung infections are documented, along with gastrointestinal conditions like dyspepsia, constipation, and jaundice. Psychological concerns such as tension, disturbed sleep, and cognitive impairments are also assessed. Additionally, neurological issues including speech problems, difficulty in hearing, and convulsive attacks are recorded to identify potential sensory or nervous system disorders.

- **Minor Illnesses (Last 15 Days):**

Short-term ailments such as malaria, infections (throat, skin, eyes), headaches, body aches, joint pain, dizziness, and vomiting are tracked to evaluate recent health disturbances. These minor conditions, though temporary, can indicate underlying nutritional deficiencies,

immunity issues, or chronic conditions worsening over time.This section helps in identifying both immediate health concerns and chronic conditions, ensuring timely medical interventions and support for elderly individuals in urban slums.

Section 5: Mental Health Status Assessment

Mental health assessment done by using the Geriatric Depression Scale (GDS) which was widely used screening tool designed to assess depressive symptoms in elderly individuals. It helps in identifying those experiencing psychological distress that may affect their overall well-being and quality of life.

- **Structure of GDS:**
  - ✓ It consisted of a questionnaire comprising 30 questions with yes/no responses. A score greater than 5 indicated the presence of depression, while a score exceeding 10 confirmed depressions (Yesawage et al., 1983.)

- **Key Areas Assessed:**
  - ✓ Feelings of happiness and life satisfaction
  - ✓ Energy levels and interest in activities
  - ✓ Social withdrawal and loneliness
  - ✓ Memory problems and difficulty in concentration
  - ✓ Feelings of hopelessness or worthlessness

- **Scoring Interpretation (GDI):**
  - ✓ 0-4 points → Normal (No depression)
  - ✓ 5-8 points → Mild depression (Needs monitoring)
  - ✓ 9-11 points → Moderate depression (Clinical evaluation required)
  - ✓ 12-15 points → Severe depression (Urgent intervention needed)

Six-Item Cognitive Impairment Test (6CIT)

The Six-Item Cognitive Impairment Test (6CIT) is a brief and effective screening tool used to assess cognitive impairment in elderly individuals. It helps detect early signs of dementia or cognitive decline, particularly in community and healthcare settings. (Katman et al, 1983)

- **Structure of 6CIT:**
  - ✓ It consists of six simple questions that assess orientation, attention, and memory recall. The test takes about 3-5 minutes to complete and is easy to administer.

- **Questions in 6CIT:**

1. What year is it? (0 or 4 points)

2. What month is it? (0 or 3 points)

3. Remember and repeat: "20, 14, 9" (0 or 3 points)

4. What time is it (within 1 hour)? (0 or 3 points)

5. Count backward from 20 to 1 (0, 2, 4 points based on errors)

6. Say the months of the year in reverse order (0, 2, 4 points based on errors)

- **Scoring Interpretation:**
  - ✓ 0-7 points → Normal cognitive function
  - ✓ 8-9 points → Mild cognitive impairment (needs monitoring)
  - ✓ 10-28 points → Significant cognitive impairment (dementia risk, further assessment needed)

Section 6: Physical Functioning Status

In order to collect the data on their physical health condition the following tools are used:

1). **Activities of Daily Living (ADL)**

Scale is a tool used to assess an elderly person's basic self-care abilities necessary for independent living. It helps identify individuals who may require assistance or caregiving support due to physical or cognitive decline.(Katz Index, 2007).

- **Key Areas Assessed in ADL:**
  1. Bathing – Can the person bathe independently?
  2. Dressing – Can they choose and wear appropriate clothes?
  3. Toileting – Can they use the toilet without help?
  4. Transferring – Can they move from a bed to a chair or walk independently?
  5. Continence – Can they control bladder and bowel functions?
  6. Feeding – Can they eat and drink without assistance?

- **Scoring Interpretation (Barthel Index / Katz ADL Scale):**
  - ✓ 6/6 (Full score) → Independent
  - ✓ 4-5 points → Moderate dependence
  - ✓ ≤ 3 points → Severe dependence (Needs full-time care)

The ADL score helps determine if an elderly individual requires minimal support, assisted living, or full-time caregiving.

2). **Instrumental Activities of Daily Living (IADL)**

The Instrumental Activities of Daily Living (IADL) Scale assesses more complex daily activities required for independent community living. It evaluates an individual's ability to manage their environment, finances, and social interactions. (LAWTON-BRODY, 2007)

- **Key Areas Assessed in IADL:**
  1. Using the telephone – Can they make and receive calls independently?
  2. Shopping – Can they buy groceries and other essentials?
  3. Meal preparation – Can they cook or arrange meals?
  4. Housekeeping – Can they clean and maintain their home?
  5. Laundry – Can they wash clothes?
  6. Transportation – Can they use public or private transport?
  7. Managing medications – Can they take the right medicine at the right time?
  8. Handling finances – Can they manage bills and expenses?

- Scoring Interpretation:
  - ✓ 8/8 (Full score) → Independent
  - ✓ 5-7 points → Moderate dependence
  - ✓ ≤ 4 points → Severe dependence (Needs full-time support)

The IADL score helps in assessing whether an elderly person can live independently or needs assisted living or a caregiver for daily tasks.

Section 7: Assessment of Quality of life

The WHOQOL-BREF (World Health Organization Quality of life-BREF) is a widely used tool developed by the World Health Organization (WHO) to assess an individual's quality of life across different domains. It is a shorter version of the WHOQOL-100 and is suitable for use in community and clinical settings, especially for older adults. **(WHO, 1991)**

- Structure of WHOQOL-BREF:
  - ✓ 26 questions assessing quality of life in the past two weeks
  - ✓ Covers four key domains that impact overall well-being

- **Key Domains Assessed:**
  1. Physical Health
     - o Energy levels, mobility, sleep, pain, and ability to perform daily activities
  2. Psychological Well-being
     - o Self-esteem, concentration, positive/negative feelings, and body image

3. Social Relationships

   o Personal relationships, social support, and sexual activity

4. Environmental Factors

   o Financial resources, safety, healthcare access, transportation, and living conditions

- Scoring Interpretation:
  - ✓ Each domain is scored on a scale of 0–100, where higher scores indicate better quality of life.
  - ✓ The two general questions (overall quality of life and general health) provide an overall subjective well-being score.
  - ✓ Results help identify areas where an individual may need intervention or support to improve quality of life.

- **Statistical analysis**

Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to summarize the background characteristics and outcomes of interest. For inferential analysis, the Chi-square test was employed to examine associations between categorical variables, while the independent samples t-test was used to compare mean differences between two groups. Additionally, correlation analysis (e.g., Pearson or Spearman correlation, depending on the data distribution) was conducted to explore known relationships between continuous variables such as Body Mass Index (BMI), Mini Nutritional Assessment (MNA), Geriatric Depression Scale (GDS), 6-Item Cognitive Impairment Test (6CIT), Activities of Daily Living (ADL), and Instrumental Activities of Daily Living (IADL). A p-value of less than 0.05 was considered statistically significant, with thresholds of <0.05, <0.01 and <0.001 indicating increasing levels of significance. Confidence intervals (95%) were also calculated, where appropriate, to enhance interpretation and precision of the results.

The data collected through the described methodology were analyzed, and the findings are presented and discussed in the following chapter.

CHAPTER- 4
RESULTS AND DISCUSSION

Urbanization is rapidly increasing as people migrate from rural areas to cities in search of better opportunities, improved living standards, and a brighter future. However, this large-scale migration puts immense pressure on urban infrastructure, leading to overcrowding and the expansion of slum areas. In these slums, people face numerous challenges, including poor sanitation, inadequate housing, lack of clean water, and limited access to healthcare and nutritious food. For the slum elderly, these challenges become even more severe. Aging is a stage of life where love, care, and support are essential, yet in slums, such support systems are often lacking. Elderly staying in slums also struggle with malnutrition, chronic illnesses, financial insecurity, and social isolation. Without proper care, their physical and mental well-being deteriorates, making their lives even more difficult in such environment.

Elderly individuals residing in urban slums often face a multitude of health-related challenges due to poor living conditions, limited access to healthcare services, and socioeconomic constraints. The slum environment, typically characterized by overcrowding, inadequate sanitation, and poor nutrition, significantly impacts the physical and psychological well-being of the elderly. These conditions contribute to the high prevalence of chronic illnesses, mobility issues, mental health concerns such as depression and anxiety, and reduced overall quality of life. Furthermore, lack of social support and financial insecurity exacerbate their vulnerability. Addressing the health needs of the slum elderly requires a comprehensive and inclusive approach that considers both medical and social determinants of health to improve their well-being and quality of life.

The current study examines the factors influencing the lives of elderly individuals in urban slums. It assesses their socio-demographic profile, nutritional status, physical and mental health, and overall quality of life. By analyzing the link between their health, nutrition, and well-being, the results of the present study were discussed below.

Section 4.1: Socio Demographic Information

Section 4.2: Anthropometric Assessment

Section 4.3: Dietary and Nutritional Assessment

Section 4.4: Morbidity Profile Assessment

Section 4.5: Mental Health Status Assessment

Section 4.6: Physical functioning status

Section 4.7: Quality of life Assessment

Section 4.8: Relationship Between BMI, MNA, IADL, GDS, 6CIT and ADL.

Section 4.1: Socio-Demographic profile of Slums Elderly

A semi-structured questionnaire was used to obtain socio-demographic information on elderly individuals residing in the urban slums of Vadodara. This assessment included details on age, gender, marital status, occupation, and current sources of income. Additionally, it covered housing conditions (type of dwelling), water accessibility (source and storage practices), current living arrangements, and utilization of government welfare schemes. It also examines pension benefits, socioeconomic status, and financial dependency.

Table 4.1.1 Percent frequency distribution of the sociodemographic profile of participants (n, %)

Variables	Male (n=62)		Female (n=188)		Total (n=250)
	(60-74 yr)	(60-74 yr)	(60-74 yr)	(75-85 yr)	
Marital Status					
Married	30(12)	9(3.6)	67(26.8)	37(14.8)	143(57)
Separated	0 (0.0)	0 (0.0)	1(0.4)	0 (0.0)	1(0.4)
Unmarried	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0(0.0)
Widow/Widower	14 (5.6)	10 (4.0)	83 (33.2)	65 (26.0)	106(42.6)
Type of Dwelling					
Permanent House	24(9.6)	11(4.4)	77(30.8)	32(12.8)	144(57.6)
Temporary Shelter	21(8.4)	6(2.4)	41(16.4)	38(15.2)	106(42.4)
Current Occupation					
Housewife	0 (0.0)	0 (0.0)	48 (19.3)	14 (5.6)	62(24.9)
Nothing	9 (3.6)	6 (2.4)	35 (14.1)	33 (13.3)	83(33.3)
Retired	6 (2.4)	9 (3.6)	0 (0.0)	6 (2.4)	21(8.4)
Self-employed	27 (10.8)	2 (0.8)	35 (14.1)	16 (6.4)	80(32.1)
Service	4 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.3)
Source of Drinking Water					
Municipality Taps	44 (17.6)	16 (6.4)	116 (46.4)	62 (24.8)	238(95.2)
RO Purifier Water	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	2(0.8)

Tap Water	1 (0.4)	1 (0.4)	2 (0.8)	6 (2.4)	10(4.0)
Storage of Water					
Plastic Drum	27 (10.8)	9 (3.6)	75 (30.0)	48 (19.2)	159(63.6)
Overhead Water Tank	15 (6.0)	4 (1.6)	31 (12.4)	19 (7.6)	69(27.6)
Underground Water Tank	3 (1.2)	4 (1.6)	12 (4.8)	3 (1.2)	22(8.8)
Current Living Status					
Alone	4(1.6)	0 (0.0)	10(4.0)	7(2.8)	21(8.4)
With Spouse	11(4.4)	2 (0.8)	11(4.4)	4(1.6)	28(11.2)
With Family	30(12.0)	15 (6.0)	97(38.8)	59(23.6)	201(80.4)
Utilization of Government Schemes					
Food assistance	36 (14.4)	9 (3.6)	86 (34.4)	40 (16.0)	171(68.4)
Housing support	1 (0.4)	2 (0.8)	10 (4.0)	5 (2.0)	18(7.2)
Receiving Pension					
Receiving pension	24 (9.6)	12 (4.8)	93 (37.2)	53 (21.2)	182(72.8)
Socioeconomic Status (SES)					
Lower Class	13 (5.2)	1 (0.4)	33 (13.2)	25 (10.0)	72(28.8)
Upper Lower Class	21 (8.4)	9 (3.6)	65 (26.0)	38 (15.2)	133(53.2)
Lower Middle Class	11 (4.4)	7 (2.8)	19 (7.6)	7 (2.8)	44(17.6)
Upper Middle Class	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	1(0.4)
Figures in parenthesis denotes the percentage					

Table 4.1.1 shows the socio-demographic profile of 250 participants from slum areas, of whom 188 (75.2%) were females and 62 (24.8%) were males. Marital status data indicated that 42%

of participants were widowed, primarily women, highlighting their vulnerability, with 57% being widows. Housing conditions showed that 57.6% of participants lived in permanent dwellings, while 42.4% resided in temporary shelters, including 31.6% females and 10.8% males. Employment data revealed that 56.4% of participants were unemployed, with women primarily engaged as housewives, while 32.1% were self-employed, comprising 11.6% males and 20.5% females. Although 95.2% of participants had access to municipal tap water, concerns about safe drinking water persisted due to poor storage practices, with 63.6% relying on plastic drums. Living arrangements showed that 80.4% of participants resided with their families, including 18% males and 62.4% females. Regarding government aid, 22.8% of participants had not applied for welfare schemes, while 92.8% received food assistance, of whom only 18% were men and 50.4% were women. Additionally, 64.4% of participants received pensions, with 14.4% being males and 58.4% females. Socioeconomic data indicated that 53.2% of participants belonged to the lower or upper-lower-class categories, including 12% males and 41.2% females in the upper-lower class. Furthermore, 28.8% of participants belonged to the lower class, of whom 5.4% were females.

HIGHLIGHTS

- Notable minority of participants were widowed, with well over half of those being women.
- Large majority of participants received food assistance and majority of received pensions.
- Slightly over half of the participants belonged to the lower or upper-lower-class.
- Majority of participants used municipal tap water, but storage in plastic drums by a majority raised concerns about water safety.

Section 4.2: Anthropometric profile of slum elderly

Nutritional Status of slum elderly was assessed using BMI (Asia-Pacific cut-offs) to categorize elderly individuals into undernutrition, normal weight, overweight, and obese. This helped in identifying their nutritional status which based on current weight and height as represented in table 4.2.1

Table 4.2.1 Gender wise mean of anthropometric profile of participants

Variable	Male (n = 62)	Female (n= 188)	Total (N= 250)	t value of subjects
Weight (Kg)	60.2 ± 12.3	53.3 ± 11.1	55 ± 11.7	4.16***
Height (cm)	158 ± 7.40	149 ± 5.51	151 ± 7.29	10.76***
BMI(Kg/m²)	24.0 ± 3.92	24.1 ± 4.56	24.1 ± 4.40	0.122^{NS}
Hip circumference	93.0 ±10.6	101.6 ± 13.0	99.4 ± 12.9	4.72***
Waist circumference(cm)	86.7 ± 11.7	86.2 ± 11.4	86.3 ± 11.5	0.31^{NS}
Calf circumference(cm)	30.0 ± 3.11	28.9 ± 3.35	29.1 ± 3.32	2.33**
Mid-Upper Arm circumference (cm)	24.7 ± 2.38	24.7 ± 2.88	24.7 ± 2.76	0.099^{NS}
***$p<0.001$, **$p<0.01$, ^{NS} -Not Significant				

Table 4.2.2 Gender wise mean of waist circumference and waist hip ratio of participants

Variables	Cut-off	Mean ± SD	N (%)	Cut-off	Mean ± SD	N (%)
	Male (n=62)			Female (n=188)		
Waist Circumference						
Normal	≤ 85	76.0 ± 5.52	28(45.16)	≤ 80	73.4 ± 7.12	59(31.38)
High	> 85	95.6 ± 7.01	34(54.84)	> 80	92.1 ± 7.59	129(68.61)
Waist-Hip Ratio						
Normal	≤ 0.88	0.849 ± 0.031	10(16.12)	≤ 0.81	0.812 ± 0.0935	46(24.46)
High	> 0.88	0.948 ± 0.0518	52(83.87)	> 0.88	0.871 ± 0.089	142(75.53)

Figures in parenthesis denote the percentage of subjects

Figure 4.2.1 WHR and gender wise of participants
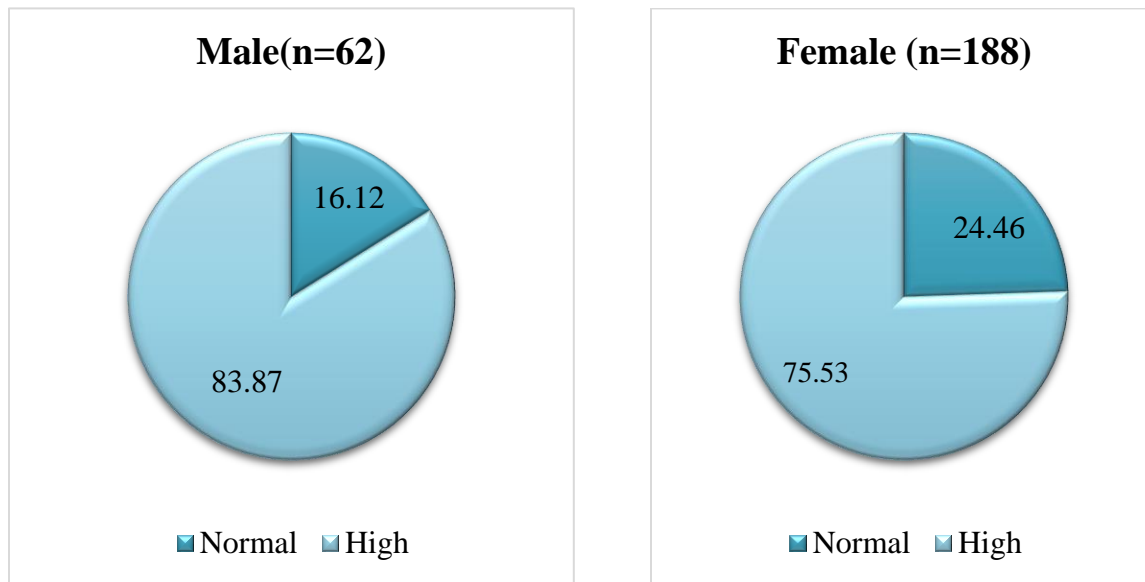
The table 4.2.1 and 4.2.2 showed the mean anthropometric measurements of participants categorized by gender. The mean weight of males was 60.2 ± 12.3 kg, Were females (53.3 ± 11.1 kg) with a t-value of 4.16. Similarly, the mean height of males (158 ± 7.40 cm) was greater than that of females (149 ± 5.51 cm) with a t-value of -10.76, showing a significant gender difference in height. Despite differences in weight and height, the BMI (Body Mass Index) was almost similar between both genders, with males having a mean BMI of 24.0 ± 3.92 kg/m² and females 24.1 ± 4.56 kg/m², resulting in a non-significant t-value of 0.12 The waist circumference, an important indicator of central obesity, was nearly the same for both groups, with males at 86.7 ± 11.7 cm and females at 86.2 ± 11.4 cm. The t-value of -0.31 indicates no significant gender-based difference in waist circumference. The waist-hip ratio higher in males was (83.87%) where females had (75.53%), indicating a higher prevalence of abdominal obesity among the elderly, which may contribute to the development of metabolic syndrome further.

Table 4.2.3 Age wise mean of anthropometric profile of Participates (N=250)

Variable	60-74 yr (n = 163)	75-85 yr (n= 87)	Total (N= 250)	t value of subjects

Weight (Kg)	56.7 ± 10.5	51.8 ± 13.3	55 ± 11.7	3.26***
Height (cm)	1.52 ± 0.069	1.49 ± 0.076	151 ± 7.29	3.07**
BMI(Kg/m²)	24.5 ± 3.83	23.2 ± 3.83	24.1 ± 4.40	2.32*
***p<0.001.**p <0.01, *p <0.05				

The table 4.2.3 showed mean anthropometric measurement of participants. The mean weight of age 60-74 yr was (56.7 ± 10.5) which was significantly higher than the age group 75-85 yr (51.8 ± 13.3) with a t- value 3.07. similarly mean height of age group 60-74 yr was (1.52 ± 0.069) which was significantly higher than age group 75-85 yr (1.49 ± 0.076) with a t- vale 3.26. The mean BMI in age group 60-74yr was 24.5 ± 3.83 which was also significantly higher than age group of 75-85 yr with a t- value of 2.32. A study by Mehta P et al, (2008) conducted at rural settings of Vadodara reviled that Underweight was more common in the 75+ years age group (32.9%) compared to the 60–74 years group (11.7%)

Table 4.2.4 Gender wise percentage Frequency of BMI classification of participants

Variables		Males (N= 62)	Females (N=188)	Total (N=250)	Chi-square test
Under-Nutrition (BMI<18.5)		6(9.7)	18(9.6)	24(9.6)	
Normal (BMI 18.5 to ≤ 22.9)		20 (32.3)	66(35.1)	86(34.4)	
Overweight (BMI 23 to < 24.9)		5(8.1)	28(14.9)	33(13.2)	0.137NS
Obesity	**Grade 1 (BMI ≥25 to < 29)**	29(46.8)	59(31.4)	88(35.2)	
	Grade 2 (BMI ≥30)	2(3.2)	17(9)	19(7.6)	
Figures in parenthesis denotes the percentage of subjects [NS-] Not significant					

The nutritional status of participants, based on the WHO Asia-Pacific BMI classification, was presented in Table 4.2.4. This classification categorized individuals as underweight (BMI <18.5), normal weight (BMI 18.5 to ≤22.9), overweight (BMI 23 to <24.9), obesity Grade 1 (BMI ≥25 to <29), and obesity Grade 2 (BMI ≥30). It was observed that 9.6% of the total participants were underweight, with 9.7% of males and 9.6% of females having a BMI below 18.5. The majority of participants (34.4%) had a normal BMI, with a slightly higher proportion of females (35.1%) compared to males (32.3%). Overweight individuals accounted for 13.2% of the sample, with a higher prevalence among females (14.9%) than males (8.1%). Grade 1 obesity (BMI ≥25 to <29) was found in 35.2% of the participants, with a significantly higher proportion of males (46.8%) compared to females (31.4%). Grade 2 obesity (BMI ≥30) was observed in 7.6% of the total sample, with a higher percentage of females (9%) than males (3.2%) which was shown in (figure 4.2.2) The results indicated no significant association between BMI classification and gender among the participants. "Mehta et al. (2008) found that in the Low-Income Group (LIG), 78% of subjects aged 75+ years were underweight, whereas in the Middle-Income Group (MIG), 52% of subjects aged 60-74 years were underweight".

Figure 4.2.2 BMI and gender wise distribution of participants
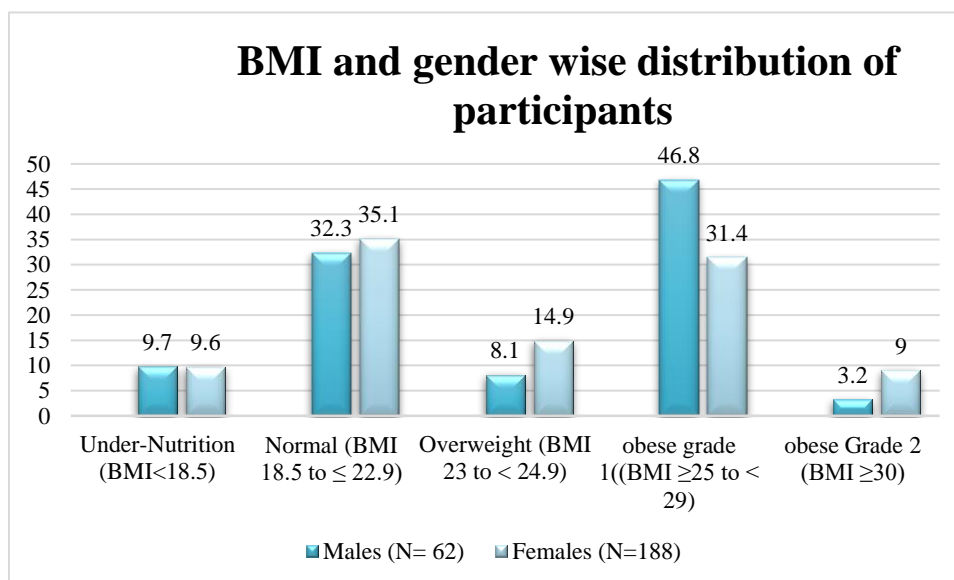
Table 4.2.5 Age wise percentage Frequency of BMI classification of participants

Variables		60-74 yr(n=163)	75-85 yr(n=87)	Total (N=250)	Chi-square test
Under-Nutrition (BMI<18.5)		8(3.2)	16(6.4)	24(9.6)	
Normal (BMI 18.5 to ≤ 22.9)		51(20.4)	35(14.0)	86(34.4)	
Overweight (BMI 23 to < 24.9)		26(10.4)	7(2.8)	33(13.2)	19.8 ***
Obesity	Grade 1 (BMI ≥25 to < 29)	67(26.8)	21(8.4)	88(35.2)	
	Grade 2 (BMI ≥30)	11(4.4)	8(3.2)	19(7.6)	
Figures in parenthesis denotes the percentage of subjects					
***p value <0.001					

Figure 4.2.3 BMI and age wise distribution of participants
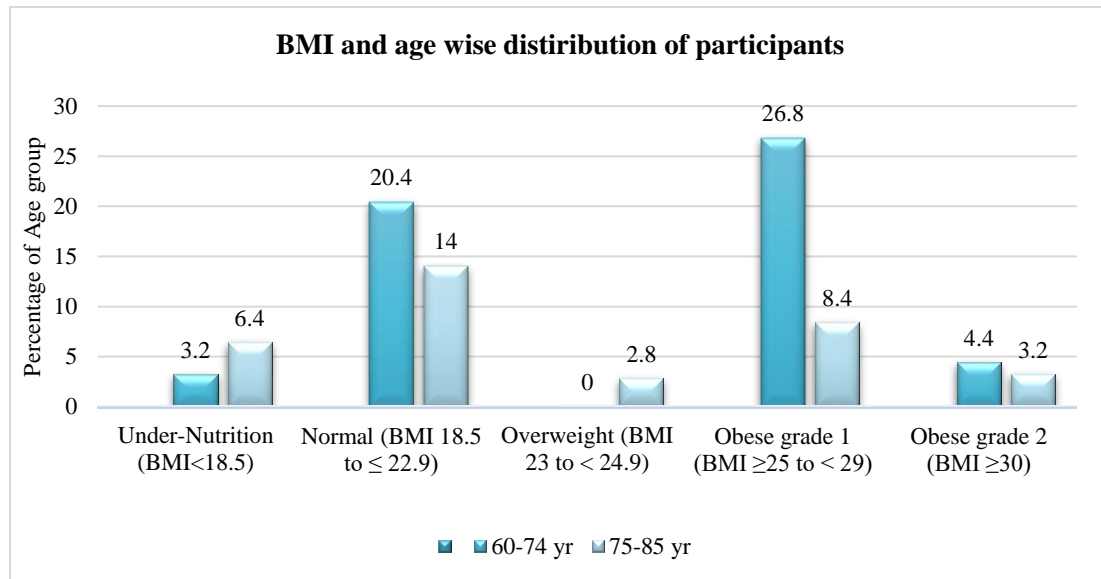
The table 4.2.5 showed that under-nutrition (BMI < 18.5) was 8 individuals (3.2%) from the 60–74-yr age group and 16 individuals (6.4%) from the 75-85 yr age group, making a total of 24 individuals (9.6%). "This is lower than the 19.7% undernutrition, normal status 37.9%, overweight 24.9%, obesity 17.5% with Mean BMI was BMI 24.7 ± 5.3, reported by Gustave

et al. (2021) in their cross-sectional study of 599 elderly individuals (aged ≥ 60 years) in urban and rural areas in the country of Cameroon" Among the participants, 86 individuals (34.4%) had a normal BMI (18.5 to ≤ 22.9), with 51 (20.4%) from the 60-74 yr group and 35 (14.0%) from the 75-85 yr group. Overweight (BMI 23 to < 24.9) was observed in 33 individuals (13.2%), with 26 (10.4%) from the younger group and 7 (2.8%) from the older group. For obesity, Grade 1 (BMI ≥25 to < 29) was found in 88 individuals (35.2%), including 67 (26.8%) from the 60-74 yr group and 21 (8.4%) from the 75-85 yr group. Grade 2 obesity (BMI ≥30) was observed in 19 individuals (7.6%), with 11 (4.4%) in the 60-74 yr group and 8 (3.2%) in the 75-85 yr group. There was significant association between BMI classification and age group. If we compare the BMI of the slum elderly with rural elderly then the study conducted by Mehta P et al. (2008) showed that Prevalence of underweight 68.42% in 70+ age group whereas 61.73 % in 60-70 yrs age group.

Thus Highlights are as follow:

- There was no significant difference in average BMI between males and females; both groups had similar BMI values.
- Older participants (75-85 years) tended to weigh less than younger participants (60-74 years).
- The largest proportion of participants had a normal weight.
- A higher percentage of older participants were underweight compared to younger participants.
- Younger participants had higher percentages of overweight and obese individuals.

Section 4.3: Dietary and Nutritional Assessment

The dietary intake of the subjects was assessed using a combination of methods to ensure a comprehensive evaluation. The Food Frequency Questionnaire (FFQ), a semi-structured tool, was utilized to determine the frequency and pattern of food consumption. Additionally, the 24-hour dietary recall method was employed to assess dietary intake, wherein an average was

calculated based on three days—two working days and one weekend—to account for variations in dietary habits. Furthermore, nutritional status was evaluated using the Mini Nutritional Assessment (MNA), a structured tool designed to identify potential risks of malnutrition.

A) Food Frequency consumption of different food groups among participants

Table 4.3.1 Percentage frequency of food frequency among participants Male(n=62) and Female(n=188)

Food Item	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Rice (puffed)	17 (6.8)	28 (11.2)	81 (32.4)	56 (22.4)	14 (5.6)	14 (5.6)	40 (16.0)
Rice flakes	4 (1.6)	5 (2.0)	65 (26.0)	85 (34.0)	10 (4.0)	27 (10.8)	54 (21.6)
Rice parboiled	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	250 (100.0)
Rice raw milled	196 (78.4)	32 (12.8)	14 (5.6)	5 (2.0)	0 (0.0)	3 (1.2)	0 (0.0)
Wheat flour (whole)	196 (78.4)	44 (17.6)	4 (1.6)	4 (1.6)	0 (0.0)	2 (0.8)	0 (0.0)
Wheat flour (refined)	0 (0.0)	4 (1.6)	8 (3.2)	73 (29.2)	44 (17.6)	51 (20.4)	70 (28.0)
White bread	4 (1.6)	4 (1.6)	29 (11.6)	85 (34.0)	30 (12.0)	30 (12.0)	68 (27.2)
Brown bread	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	250 (100.0)

Semolina	0 (0.0)	0 (0.0)	2 (0.8)	17 (6.8)	51 (20.4)	120 (48.0)	60 (24.0)
Jowar	4 (1.6)	0 (0.0)	10 (4.0)	22 (8.8)	37 (14.8)	29 (11.6)	148 (59.2)
Maize	1 (0.4)	0 (0.0)	1 (0.4)	11 (4.4)	16 (6.4)	29 (11.6)	192 (76.8)
Bajra	2 (0.8)	0 (0.0)	10 (4.0)	33 (13.2)	57 (22.8)	50 (20.0)	98 (39.2)

Table 4.3.2 Percentage frequency of pulses consumption among participants Male(n=62) and Female(n=188)

Pulse Item	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Bengal gram dal	0 (0.0)	3 (1.2)	22 (8.8)	122 (48.8)	13 (5.2)	22 (8.8)	68 (27.2)
Bengal gram whole	0 (0.0)	0 (0.0)	3 (1.2)	25 (10.0)	86 (34.4)	27 (10.8)	109 (43.6)
Black gram (dal)	0 (0.0)	0 (0.0)	11 (4.4)	33 (13.2)	7 (2.8)	29 (11.6)	168 (67.2)
Black gram whole	0 (0.0)	0 (0.0)	0 (0.0)	10 (4.0)	11 (4.4)	22 (8.8)	207 (82.8)
Cowpea	0 (0.0)	0 (0.0)	0 (0.0)	12 (4.8)	37 (14.8)	118 (47.2)	83 (33.2)
Green gram	2 (0.8)	47 (18.8)	134 (53.6)	55 (22.0)	7 (2.8)	5 (2.0)	0 (0.0)
Peas (dry)	0 (0.0)	0 (0.0)	2 (0.8)	24 (9.6)	28 (11.2)	125 (50.0)	70 (28.0)

Horse gram	0 (0.0)	0 (0.0)	2 (0.8)	2 (0.8)	2 (0.8)	4 (1.6)	240 (96.0)
Red gram (whole)	2 (0.8)	0 (0.0)	24 (9.6)	69 (27.6)	10 (4.0)	13 (5.2)	132 (52.8)
Pigeon pea	26 (10.4)	134 (53.6)	59 (23.6)	29 (11.6)	0 (0.0)	2 (0.8)	0 (0.0)
Rajmah	0 (0.0)	0 (0.0)	2 (0.8)	15 (6.0)	45 (18.0)	122 (48.8)	66 (26.4)
Soyabean	0 (0.0)	0 (0.0)	4 (1.6)	8 (3.2)	15 (6.0)	51 (20.4)	172 (68.8)

Table 4.3.3 Percentage frequency of green leafy vegetables consumption among participants Male(n=62) and Female(n=188)

Green leafy Vegetable	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Amaranth	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10 (4.0)	240 (96.0)
Cabbage	0 (0.0)	0 (0.0)	16 (6.4)	195 (78.0)	8 (3.2)	15 (6.0)	14 (5.6)
Colocasia	0 (0.0)	0 (0.0)	4 (1.6)	2 (0.8)	2 (0.8)	16 (6.4)	226 (90.4)
Fenugreek leaves	2 (0.8)	4 (1.6)	44 (17.6)	162 (64.8)	10 (4.0)	21 (8.4)	7 (2.8)
Mustard leaves	0 (0.0)	0 (0.0)	2 (0.8)	3 (1.2)	2 (0.8)	9 (3.6)	234 (93.6)
Spinach	2 (0.8)	0 (0.0)	62 (24.8)	142 (56.8)	16 (6.4)	22 (8.8)	6 (2.4)

Vegetable	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Mint	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.6)	33 (13.2)	209 (83.6)

Table 4.3.4 Percentage frequency of other vegetables consumption among participants Male(n=62) and Female(n=188)

Vegetable	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Bitter guard	0 (0.0)	0 (0.0)	19 (7.6)	89 (35.6)	81 (32.4)	42 (16.8)	19 (7.6)
Cauliflower	0 (0.0)	0 (0.0)	17 (6.8)	171 (68.4)	18 (7.2)	30 (12.0)	14 (5.6)
Brinjal	0 (0.0)	11 (4.4)	169 (67.6)	55 (22.0)	0 (0.0)	8 (3.2)	7 (2.8)
Ladies finger	0 (0.0)	0 (0.0)	17 (6.8)	78 (31.2)	56 (22.4)	72 (28.8)	27 (10.8)
Capsicum	0 (0.0)	0 (0.0)	1 (0.4)	2 (0.8)	6 (2.4)	95 (38.0)	144 (57.6)
Bottle gourd	0 (0.0)	0 (0.0)	23 (9.2)	124 (49.6)	32 (12.8)	25 (10.0)	46 (18.4)
Kankoda	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.2)	1 (0.4)	114 (45.6)	132 (52.8)
Peas green	0 (0.0)	0 (0.0)	2 (0.8)	6 (2.4)	4 (1.6)	106 (42.4)	132 (52.8)
Cucumber	0 (0.0)	0 (0.0)	2 (0.8)	2 (0.8)	9 (3.6)	72 (28.8)	165 (66.0)
Drumstick	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	7 (2.8)	196 (78.4)	45 (18.0)

French beans	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	18 (7.2)	232 (92.8)

Table 4.3.5 Percentage frequency of root and tubers consumption among participants Male(n=62) and Female(n=188)

Roots and tubers	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Potato	218 (87.2)	18 (7.2)	13 (5.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)
Carrot	0 (0.0)	0 (0.0)	0 (0.0)	6 (2.4)	15 (6.0)	84 (33.6)	145 (58.0)
Onion	237 (94.8)	8 (3.2)	4 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)
Radish	2 (0.8)	0 (0.0)	4 (1.6)	7 (2.8)	8 (3.2)	96 (38.4)	133 (53.2)
Beet root	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	3 (1.2)	48 (19.2)	197 (78.8)
Yam	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.6)	246 (98.4)
Sweet potato	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	0 (0.0)	163 (65.2)	85 (34.0)
Tapioca	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	22 (8.8)	175 (70.0)	51 (20.4)

Table 4.3.6 Percentage frequency of milk and milk products consumption among participants Male(n=62) and Female(n=188)

Milk and milk product	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Toned milk	6 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	244 (97.6)
Whole milk	149 (59.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)	100 (40.0)
Low-fat milk	86 (34.4)	5 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	159 (63.6)
Curd	12 (4.8)	3 (1.2)	20 (8.0)	47 (18.8)	46 (18.4)	70 (28.0)	52 (20.8)
Paneer	0 (0.0)	0 (0.0)	0 (0.0)	6 (2.4)	39 (15.6)	112 (44.8)	93 (37.2)
Khoya	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	113 (45.2)	137 (54.8)

Table 4.3.7 Percentage frequency of nuts consumption among participants Male(n=62) and Female(n=188)

Nuts	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Groundnut	0 (0.0)	0 (0.0)	4 (1.6)	31 (12.4)	30 (12.0)	107 (42.8)	78 (31.2)
Sesame seeds	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	131 (52.4)	117 (46.8)
Coconut	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10 (4.0)	37 (14.8)	201 (80.4)
Cashew	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.6)	63 (25.2)	181 (72.4)

Almonds	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.6)	67 (26.8)	179 (71.6)
Pistachio	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (2.4)	244 (97.6)
Walnut	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (2.4)	242 (96.8)

Table 4.3.8 Percentage frequency of fruits consumption among participants Male(n=62) and Female(n=188)

Fruits	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Apple	0 (0.0)	0 (0.0)	4 (1.6)	29 (11.6)	17 (6.8)	84 (33.6)	116 (46.4)
Banana	16 (6.4)	18 (7.2)	55 (22.0)	60 (24.0)	7 (2.8)	35 (14.0)	59 (23.6)
Orange	0 (0.0)	0 (0.0)	2 (0.8)	13 (5.2)	5 (2.0)	123 (49.2)	107 (42.8)
Mango	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	198 (79.2)	52 (20.8)
Papaya	0 (0.0)	0 (0.0)	0 (0.0)	8 (3.2)	6 (2.4)	126 (50.4)	110 (44.0)
Grapes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	54 (21.6)	194 (77.6)
Musk melon	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	74 (29.6)	174 (69.6)

	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Custard apple	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	64 (25.6)	184 (73.6)
Jamun	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	13 (5.2)	237 (94.8)
Sapota (Chiku)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	155 (62.0)	93 (37.2)
Amla	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	14 (5.6)	236 (94.4)
Dried Fruits	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	12 (4.8)	238 (95.2)

Table 4.3.9 Percentage frequency of flesh food consumption among participants Male(n=62) and Female(n=188)

Flesh Foods	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Egg	0 (0.0)	2 (0.8)	31 (12.4)	105 (42.0)	15 (6.0)	13 (5.2)	84 (33.6)
Chicken	0 (0.0)	2 (0.8)	2 (0.8)	70 (28.0)	63 (25.2)	23 (9.2)	90 (36.0)
Fish	4 (1.6)	0 (0.0)	6 (2.4)	40 (16.0)	32 (12.8)	55 (22.0)	113 (45.2)

Table 4.3.10 Percentage frequency of fats and oil consumption among participants Male(n=62) and Female(n=188)

Fats and oil	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never

Oil (single)	247 (98.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.2)
Oil (blend)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	250 (100.0)
Ghee	2 (0.8)	4 (1.6)	10 (4.0)	17 (6.8)	4 (1.6)	47 (18.8)	166 (66.4)

Table 4.3.11 Percentage frequency of sugar and jaggery consumption among participants Male(n=62) and Female(n=188)

Sugar and jaggery	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Sugar	250 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Jaggery	2 (0.8)	0 (0.0)	2 (0.8)	35 (14.0)	43 (17.2)	50 (20.0)	116 (46.4)
Honey	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	250 (100.0)

Table 4.3.12 Percentage frequency of ready to eat food (RTE) consumption among participants Male(n=62) and Female(n=188)

RTE	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Biscuits	36 (14.4)	100 (40.0)	53 (21.2)	15 (6.0)	6 (2.4)	9 (3.6)	31 (12.4)
Jam/Bread	8 (3.2)	6 (2.4)	36 (14.4)	123 (49.2)	7 (2.8)	23 (9.2)	47 (18.8)

Pickle	2 (0.8)	20 (8.0)	35 (14.0)	4 (1.6)	9 (3.6)	45 (18.0)	135 (54.0)
Sweets	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	19 (7.6)	181 (72.4)	48 (19.2)
Instant Noodles	0 (0.0)	0 (0.0)	12 (4.8)	48 (19.2)	0 (0.0)	30 (12.0)	160 (64.0)
Chivda	2 (0.8)	53 (21.2)	111 (44.4)	9 (3.6)	2 (0.8)	22 (8.8)	51 (20.4)
Gathiya	7 (2.8)	38 (15.2)	123 (49.2)	18 (7.2)	5 (2.0)	7 (2.8)	50 (20.0)
Ice Cream	0 (0.0)	0 (0.0)	2 (0.8)	3 (1.2)	49 (19.6)	131 (52.4)	63 (25.2)
Soft Drinks	0 (0.0)	0 (0.0)	3 (1.2)	8 (3.2)	43 (17.2)	119 (47.6)	77 (30.8)
Cornflakes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	250 (100.0)
Muesli	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	250 (100.0)

Tables 4.3.1 to 4.3.12 revealed the participants' dietary patterns, which demonstrated a dependence on staple cereals, particularly rice and whole wheat flour, consumed daily by a majority of the participants. Refined wheat products and rice flakes were also frequently consumed, though to a lesser extent. Notably, traditional grains like jowar, maize, and bajra, along with brown bread, cornflakes, and muesli, were rarely or never consumed. In terms of pulses, pigeon pea and green gram were the most common choices of the participants, while other varieties, such as horse gram and soyabean, were consumed irregularly. The consumption of green leafy vegetables was irregular, with spinach and fenugreek being relatively common, but amaranth and mustard leaves were rarely eaten. Potatoes and onions were daily staples within the vegetable category, and other vegetables like brinjal, bottle gourd, and ladies' finger were also consumed frequently. However, root vegetables beyond potatoes and onions were

largely not consumed by the participates. Milk consumption was primarily in the form of whole or low-fat milk, with curd also being a regular consume. Nuts were consumed irregularly, with groundnuts being the most common choice, while pistachio and walnut were never eaten. Fruit consumption was dominated by bananas, with other fruits consumed only occasionally. Fish was the most frequently consumed flesh food, while the consumption of eggs and chicken was also frequent but though not as much as fish. Single oils were common fats, with sugar being a daily staple where due to financial burden ghee were not consume frequent by the participants. Ready-to-eat snacks like biscuits, chivda, and gathiya were frequently consumed, while sweets and soft drinks were consumed rarly by the participants. Based on these consumption patterns, the participants were potentially at risk for several nutrient deficiencies, including vitamins A, C, D, calcium, iron, fibre, B vitamins, omega-3 fatty acids, and potassium, due to the limited variety and frequency of consumption of certain food groups. A study by Kumar R et al, (2020) conducted in urban slums in Kochi reviled that high prevalence of anaemia (60%), closely linked to poor dietary intake. Anaemic individuals often consumed monotonous diets cantered around rice, with low intake of green leafy vegetables, fruits, and protein-rich foods which affects the Haemoglobin levels of elderly.

The study by Senee Vet al. (2022) conducted in India among 120 elderly participants highlighted key dietary concerns. A majority (67.5%) followed a monotonous, cereal-based diet, while only 32.5% had diverse food intake. Nutritional deficiencies were observed in 58.3%, with low intake of iron, calcium, and protein. Among low-income individuals, 71.6% consumed nutrient-poor foods. Additionally, 42.5% reported skipping meals, and 65% of those with chronic illnesses followed restrictive diets, further reducing nutrient intake.

B) Nutrition Intake

The nutritional intake of the participants was analysed by conduct the 24-hr dietary recall method by taking average of 3 days.

Table 4.3.13 Mean and Comparison of Nutrient Intake Among Elderly with Recommended EAR Values.

	Male (N= 62)			Female (N=188)			Total (N=250)
	EAR	Mean ± SD	t value	EAR	Mean ± SD	t value	
Energy (Kcal)	1700	1311 ± 211	48.9***	1500	1334 ± 201	91.0***	1328 ± 203
Protein (g)	54	35.1 ± 6.40	43.7***	45.7	37.1 ± 7.08	71.9***	36.7 ± 6.94
Carbohydrate (g)	130	114 ± 35.9	44.4***	130	112 ± 34.7	44.4***	113 ± 34.9
Fat (g)	20	54.2 ± 41.1	25.0***	20	52.1 ± 21.6	33.1***	52.6 ± 27.6
Calcium (mg)	1200	339 ± 121	22.0***	1200	407 ± 336	16.6***	390 ± 299
Iron(mg)	19	9.83 ± 4.16	18.6***	19	12.4 ± 4.66	36.4***	11.8 ± 4.67

*RDA2020

The table 4.3.13 Show the nutrient intake of participants and checks if there is a significant difference between them. It also compares their intake with the Estimated Average Requirements (EAR) to see if they are getting enough energy. Both men and women had similar energy intake, with men consuming 1311 ± 211 kcal and women 1334 ± 201 kcal. The small difference ($t = 0.745$) was not significant. Protein intake was slightly lower in men (35.1 ± 6.40 g) than in women (37.1 ± 7.08 g), but the difference ($t = 1.603$) was not significant. Carbohydrate intake was also quite similar, with men consuming 114 ± 35.9 g and women 112 ± 34.7 g, showing no major difference ($t = -0.516$). Fat intake was almost the same between men (54.2 ± 41.1 g) and women (52.1 ± 21.6 g), with no significant difference ($t = -0.319$). Calcium intake was higher in women (407 ± 336 mg) than in men (339 ± 121 mg), but the difference ($t = 1.569$) was not significant. However, iron intake was noticeably higher in women (12.4 ± 4.66 mg) compared to men (9.83 ± 4.16 mg), and this difference was statistically significant ($t = 3.844$). So, most of the nutrient intake values did not show major

differences between men and women, except for iron, which was significantly higher in women.

Table 4.3.14 Nutrient Intake Distribution by Category (n=62) and Female(n=188)

Consumption (%)	Energy (kcal)		Protein		Carbohydrate (g)		Fat (g)		Calcium (mg)		Iron (mg)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<25%	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	21 (33.9%)	31 (16.5%)	8 (12.9%)	3 (1.6%)
26-50%	3 (4.8%)	1 (0.5%)	6 (9.7%)	8 (4.3%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	41 (66.1%)	153 (81.4%)	23 (37.1%)	55 (29.3%)
51-75%	21 (33.9%)	27 (14.4%)	40 (64.5%)	41 (21.8%)	15 (24.2%)	52 (27.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (1.6%)	23 (37.1%)	61 (32.4%)
76-100%	37 (59.7%)	121 (64.4%)	16 (25.8%)	131 (69.7%)	38 (61.3%)	110 (58.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (11.3%)	52 (27.7%)
>100%	1 (1.6%)	39 (20.7%)	0 (0.0%)	7 (3.7%)	9 (14.5%)	25 (13.3%)	62 (100.0%)	188 (100.0%)	0 (0.0%)	1 (0.5%)	1 (1.6%)	17 (9.0%)

Table 4.3.14 showed the analysis of nutrient intake among elderly males and females reveals differences in consumption patterns. For energy intake, the majority of both males (59.7) and females (64.4) consumed between 76-100 of the EAR, with a higher proportion of females meeting this requirement. However, low energy intake ($\leq$50) was observed in 4.8 of males and 14.9 of females (as showed in Figure 4.1), indicating that females had a slightly higher

prevalence of inadequate energy intake. While protein intake, 69.7 of females met or exceeded their EAR, compared to 25.8 of males, suggesting that females had better protein intake. A significantly higher percentage of males (64.5) had moderate protein intake (51-75), while only 21.8 (as showed in Figure 4.2) of females fell within this range. This highlights that protein deficiency was more common among males. For carbohydrate intake, both elderly showed similar trends, with most individuals consuming 76-100 of the EAR (61.3 males, 58.5 females). However, 14.5 of males and 13.3 of females exceeded 100 of the EAR (as showed in Figure 4.3), indicating slightly higher carbohydrate consumption among males. Regarding fat intake, 100 of both males and females consumed more than the recommended EAR, showing that fat intake was excessive across both genders. Calcium intake was notably poor among both groups, with all males (100) consuming ≤50 of the EAR, whereas only 1.6 of females met 51-75 (as showed in Figure 4.4) of the requirements. This suggests that males had a significantly higher deficiency in calcium intake compared to females. For iron intake, only 1.6 of males and 9 of females exceeded their requirement, while a substantial proportion of both groups fell in the 26-50 category (37.1 males, 29.3 females) (as showed in Figure 4.5). This indicates that iron deficiency was more prevalent in males, whereas females had slightly better iron intake.

Figure 4.3.1 Nutrient Intake Distribution by Category
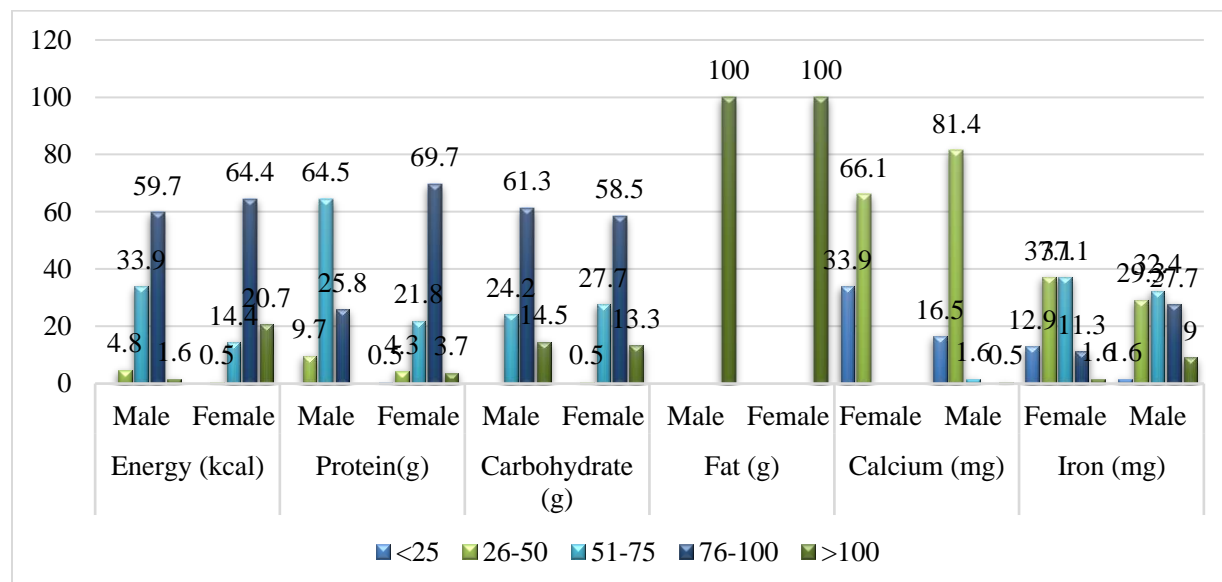
Figure 4.3.2 Percent distribution of calories from macronutrients of Participants

Energy distribution from micronutrients of male

- 10.71, 13%
- 37.21, 45%
- 34.78, 42%

Protein | Carbohydrate | Fat

Energy distribution from micronutrients of Female

- 14%
- 44%
- 42%

Protein | Carbohydrate | Fat
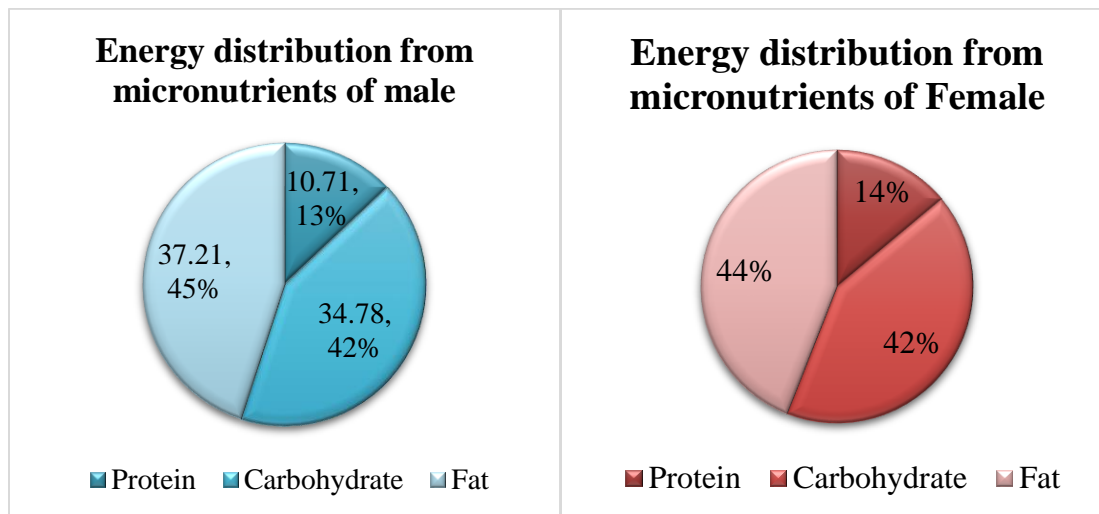
The figure 4.3.1 showed percent distribution of calories from macronutrients for both males and females deviated from the Indian Recommended Dietary Allowances (RDA, ICMR 2020). Protein contributed 10.71% for males and 11.12% for females, which was on the lower end of the recommended 10-15% of total energy intake from protein. This suggested a moderate protein intake, though it could have been slightly improved to meet optimal requirements. Carbohydrates accounted for 34.78% for males and 33.58% for females, which was significantly lower than the RDA-recommended 55-60% of total energy, indicating insufficient carbohydrate intake, due to lower consumption of whole grains, fruits, and starchy vegetables which we can see in FFQ. Meanwhile, fat contributed 37.21% for males and 35.15% for females, exceeding the RDA-recommended 20-30% range, suggesting a higher reliance on fat-rich foods, which may have included oils, fried foods, and processed items. This dietary pattern reflected imbalanced macronutrient intake, where carbohydrate consumption was inadequate, while fat intake was higher than recommended, potentially increasing the risk of metabolic disorders if sustained over time. The study carried out by Chauhan K et al. at the Department of Foods and Nutrition, The M.S. University, included !49 subjects and among them 59% consumed energy between 75-100% of Recommended Dietary Allowance (RDA). Some specific nutrients like iron intake were 2 % within the 75-100% RDA range, while the percentage were 14% for fats and 26% for protein. The average consumption of protein and fats stood at 42.60 g and 44.26 g, respectively.

C) Mini Nutritional Assessment (MNA)

The Mini Nutritional Assessment (MNA) categorizes elderly individuals into three groups: well-nourished, at risk of malnutrition, and malnourished.

Table: 4.3.15: Gender wise percentage frequency of elderly falling under different category of malnutrition with help of MNA tool.

Variables	Nutrition status of slum elderly			Chi square value
Gender	Males (n= 62)	Females (n=188)	Total (n=250)	
MNA category				
At risk of malnutrition (17 to 23.5 points)	33(13.2)	90(36)	123 (49.2)	7.74*
Malnourished (<17 points)	24(9.6)	95(38)	119(47.6)	
Well nourished (≥24 points)	5(2)	3(1.2)	8(3.2)	
*p<0.05				

Figure 4.3.3: Gender wise participates fall under MNA category
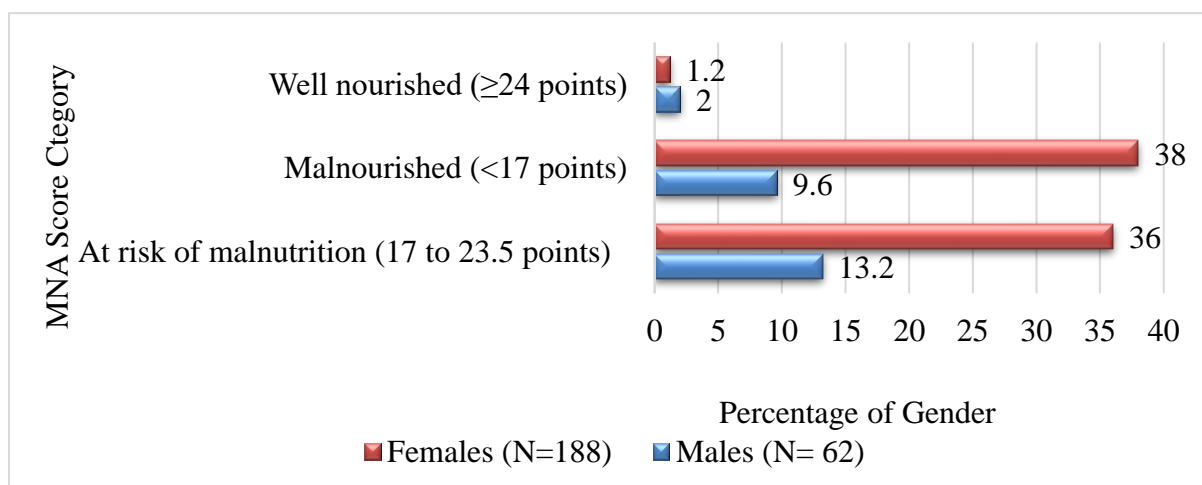
The table 4.3.15 shows the nutritional status of participates categorized by gender. Nearly half of the participants (49.2) were at risk of malnutrition, with a higher proportion of females (36) compared to males (13.2). Malnourishment was observed in 47.6 of the total sample, with a greater percentage among females (38) than males (9.6). Only a small proportion of participants (3.2) were well-nourished, with slightly more males (2) than females (1.2). There is significant difference in the MNA status with both genders.

Table 4.3.16 Age-wise percentage frequency of participates falling under different category of malnutrition with help of MNA tool.

Age(yr)	60-74 (n=163)	75-85 (n=87)	Total (n=250)	Chi-square value
At risk of malnutrition (17 to 23.5 points)	25(10)	8(3.2)	123 (49.2)	25.5***
Malnourished (<17 points)	15(6)	9(3.6)	119(47.6)	
Well nourished (≥24 points)	5(2)	0	8(3.2)	
***p<0.001				

The table 4.3.16 shows the distribution of MNA category with the age group of participants, there was higher prevalence of younger individuals (10) were at risk of malnutrition compared to older individuals (3.2), contributing to a total of 49.2. Malnourishment was more prevalent among younger participants (6) than among older ones (3.6), making up 47.6 of the total sample. Only 3.2 of participants were well-nourished, with all cases found in the younger age group (2), while none of the older individuals fell into this category.

Table:4.3.17 Mean and Comparison of Mini Nutritional Assessment (MNA) Scores by Gender and Age Group of the participants

Variable	N	Mean ± SD	t value
Male	62	17.9 ± 4.61	2.91**
Female	188	16.1 ± 3.89	

60-74yr	163	17.5 ± 3.49		5.33***	
75-85 yr	87	14.7 ± 4.64			
Total	250	16.5 ± 4.14			
***p < 0.001, **p value <0.01					

The table 4.3.17 showed the comparison of MNA scores between males and females, as well as between different age groups. The mean MNA score for males (17.9 ± 4.61) was significantly higher than that for females (16.1 ± 3.89), with a t-value of -2.91 and a p-value of 0.004, indicating that males had a better nutritional status than females.

Similarly, when comparing age groups, individuals aged 60-74 years had a significantly higher mean MNA score (17.5 ± 3.49) compared to those aged 75-85 years (14.7 ± 4.64). The t-value of 5.33 and a p-value of <0.001 suggest that nutritional status declines significantly with age.

Agarwalla, R, et al, (2015) conducted a study on assessment of the nutritional status of the elderly among the 360 elderly individuals, 15% were identified as malnourished, while 55% were considered at risk of malnutrition. Inadequate calorie intake was found to be correlated with MNA tool.

Table 4.3.18: Association between BMI and MNA of slum elderly(n=250)

	BMI categories						Chi-square value
MNA status	**Under Nutrition**	**Normal**	**Overweight**	**Obesity Grade 1**	**Obesity Grade 2**	**Total**	
(17 to 23.5 points) at risk of malnutrition	3	26	20	60	14	123	**64.7****

(<17 points) malnourished	21	60	13	22	3	119	
(>= 24 points) well nourished	0	0	0	6	2	8	
Total	24	86	33	88	19	250	
**p<0.01							

Table 4.3.18 showed that many malnourished individuals (MNA < 17) fell into the underweight category; however, malnutrition was also present among those who were overweight or obese, demonstrating that poor nutrition was not solely associated with low BMI. Likewise, individuals who were at risk of malnutrition (MNA 17–23.5) were primarily classified as overweight or obese, suggesting that having a higher BMI did not necessarily indicate good nutrition. Similarly well-nourished individuals (MNA ≥ 24) were found only in the obesity categories, with none appearing in the underweight, normal, or overweight groups. These findings highlighted the complex relationship between BMI and nutritional status by major proportion of individuals with normal BMI and overweight are either malnourished or at risk of malnutrition.

Figure 4.3.4 Association Between BMI Categories and MNA Status Among Slum Elderly
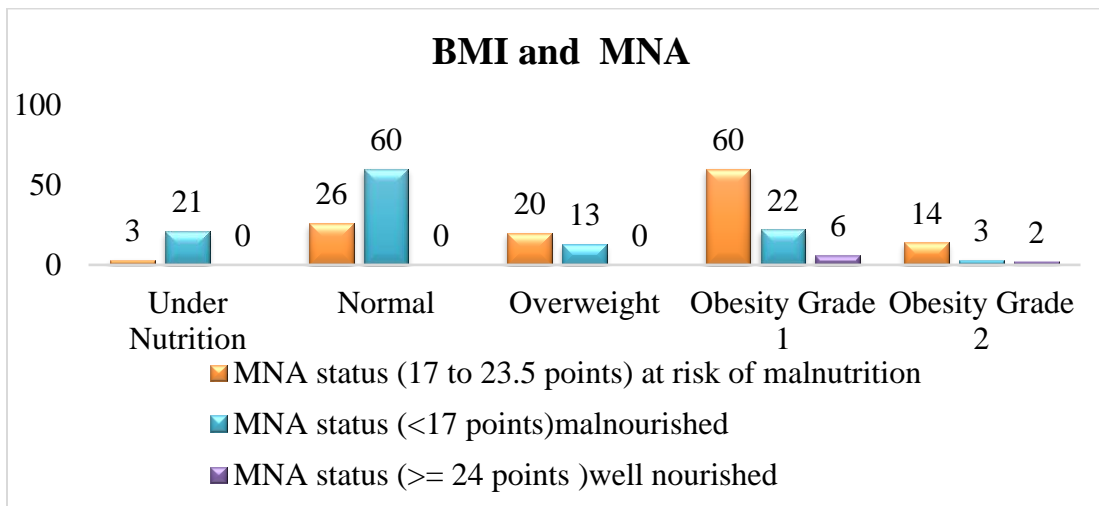
Table 4.3.19: Association between MNA status and GDI Levels of the participants (n=250)

MNA Status	GDI Categories			Chi-square value
	Mild depression	**Normal**	**Severe depression**	
At risk of malnutrition (17-23.5 points)	50	5	68	82.8**
Malnourished (<17 points)	18	2	99	
Well-nourished (≥24 points)	2	5	1	
Total (N=250)	70	12	168	
**p<0.01				

Figure 4.3.5 Association between MNA and GDI categories
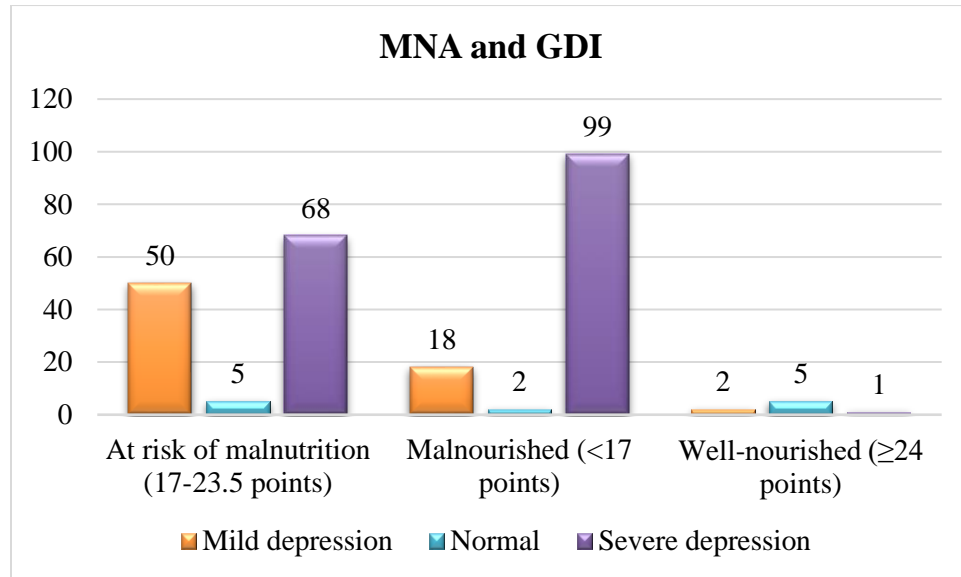
Table:4.3.19 showed the association between nutritional status, measured using the Mini Nutritional Assessment (MNA), and depression levels, classified using the Geriatric Depression Inventory scale (GDI). The results indicate that among 123 elderly individuals at risk of malnutrition, 68 (55.3) had severe depression, while 50 (40.7) had mild depression. Similarly, 99 (83.2) of the 119 malnourished individuals had severe depression. Only 8 individuals were categorized as well-nourished, and the majority of them had normal or mild depression. The results showed that there is significant association between MNA and GDI among the participants.

Table 4.3.20: Association between MNA status and 6 CIT Levels of the slum elderly (n=250)

	6CIT				Chi-square value
MNA status	**Mild Cognitive Impairment**	**Normal**	**Significant Cognitive impairment**	**Total**	**5.11^{NS}**

(17 to 23.5 points) at risk of malnutrition	4	4	115	123
(<17 points) malnourished	0	2	117	119
(>= 24 points) well nourished	0	0	8	8
Total	4	6	240	250
NS- Not significant				

The table 4.3.20 showed the relationship between nutritional status (MNA score) and cognitive function (6CIT score), indicates that this association is not significant between MNA and 6 CIT. While more cognitively impaired individuals tend to be malnourished or at risk, the lack of statistical significance suggests that other factors may also contribute to cognitive decline beyond nutrition alone.

Table 4.3.21: Association between MNA status and ADL categories of slum elderly (n=250)

	Scoring ADL			Chi-square value
MNA status	Independent living	Need assistance	Total	
(17 to 23.5 points) at risk of malnutrition	117	6	123	5.83[NS]
(<17 points) malnourished	106	13	119	
(>= 24 points) well nourished	6	2	8	
Total	229	21	250	
NS- Not significant				

The table 4.3.21 showed association between MNA status and functional independence, with measured of ADL. This suggests that other factors (age, physical health, chronic illness) may play a role in functional independence beyond nutritional status alone.

Table 4.3.22: Association between MNA status and IADL categories of slum elderly Male(n=62) Female(n=188)

MNA status	Categories of the IADL			Chi-square value
	Full Function	**Moderate Impairment**	**Total**	
(17 to 23.5 points) at risk of malnutrition	21	102	123	2.16^{NS}
(<17 points) malnourished	24	95	119	
(>= 24 points) well nourished	3	5	8	
Total	48	202	250	
$^{NS-}$ Not significant				

The table 4.3.22 showed association between MNA status and IADL categories among 250 elderly participants was found to be not statistically significant (Chi-square = 2.16). While a greater number of malnourished and at-risk individuals showed moderate impairment in IADL compared to well-nourished individuals, the difference was not strong enough to establish a significant relationship. This suggests that nutritional status may influence functional ability, but no clear association was observed in this study.

Thus, Highlights are as follows:

- Elderly in urban slums heavily relied on rice and wheat, with infrequent consumption of other grains, vegetables, and fruits.
- Many elderly had inadequate intakes of energy, protein, calcium and iron while fat intake often exceeded recommendations.
- A large proportion of participants were at risk of malnutrition or malnourished, with females more affected.
- Older age was associated with lower weight, height, and BMI, as well as poorer nutritional status.
- Depression was common, especially among malnourished individuals, and nutritional status was linked to both BMI and depression levels.
- Older elderly faced more health issues and had poorer mental health.

Section 4.4: Major and Minor Illness

The semi structure tool is use to check the major illness and minor illness among the participants in community.

Table 4.4.1 Percentage frequency of Major illness of participants

Variables	Male (N=62)	Female (N=188)
Problems of oral cavity		
Inflammation of tongue	1(0.4)	0
Ulcer	0	0
Excess salivation	5(2.0)	16(6.4)
Lack of salivation	2(0.8)	9(3.6)
Altered salivation	0	0
Missing or broken teeth	53(21.2)	179(71.6)

Full/partial denture	31(12.4)	90(36)
Caries/toothache	62(24.8)	173(69.2)
Swollen /sore gums	6(2.4)	23(9.2)
Problems of chewing	41(16.4)	102(40.8)
Oral cancer	0	0
Gastrointestinal Tract		
Heartburn	49(19.6)	119(47.6)
Fullness/ gaseous distention	35(14)	92(36.8)
flatulence	22(8.8)	76(30.4)
Abdominal pain	2(0.8)	33(13.2)
Diarrhoea	4(1.6)	17(6.8)
Constipation	13(5.2)	32(12.8)
Altered stools	0	0
Drop attacks	7(2.8)	17(6.8)
Convulsive attacks	0(0.0)	2(0.8)
Difficulty in hearing	36(14.4)	115(46.0)
Dyspepsia(indigestion)	15(6.0)	54(21.6)
Peptic ulcer	0	0
Appendicitis	0	0
Problems of respiratory tract		
Recurrent cold	2(0.8)	4(1.6)
Peptic ulcer	0	0
Appendicitis	0	0
Laryngitis / cough	4(1.6)	9(3.6)
Hoarse voice/pain in swallowing	2(0.8)	0(0.0)
Irritating dry cough with pain and discomfort	2(0.8)	0(0.0)
Asthma	0	0
Lower respiratory tract problems	0	0
Lung cancer	0	0
Tuberculosis	0	0

Psychological problems		
Tension	41(16.4)	156(62.4)
Disturbed sleep	35(14.0)	141(56.4)
Sudden/gradual onset of vision	30(12.0)	155(62.0)
Double vision	2(0.8)	13(5.2)
Dysphagia	2(0.8)	19(7.6)
Speech problem	16(6.4)	49(19.6)
Jaundice	0	0

The table 4.4.1 showed that oral health problems were common, with missing or broken teeth affecting 71.6% of females and 21.2% of males. Tooth decay or toothache was also widespread, affecting 69.2% of females and 24.8% of males. Problems with chewing were more frequent among females (40.8%) compared to males (16.4%). Issues like excess salivation and lack of salivation were less common but still present in both groups. Gastrointestinal problems were frequently reported. Heartburn affected 47.6% of females and 19.6% of males, while fullness and gas were common in 36.8% of females and 14% of males. Constipation and diarrhoea were also noted, though at lower rates. Respiratory issues were less frequent, with only a small number of participants reporting recurrent colds, laryngitis, or cough. Hoarseness and difficulty swallowing were rare but present in some cases. Psychological issues were significant among participants. Tension was reported by 62.4% of females and 16.4% of males, while disturbed sleep affected 56.4% of females and 14% of males. Vision problems were common, with 62% of females and 12% of males experiencing sudden or gradual vision loss. Speech difficulties and dysphagia (difficulty swallowing) were present in a smaller percentage of participants. Overall, the data showed that females experienced a higher prevalence of health issues across most categories, particularly oral, gastrointestinal, and psychological problems, while males reported fewer health concerns in comparison.

Table 4.4.2 Percentage frequency of minor illness of slum elderly (n=250)

Variables	Male	Female

	(n=62)	(n=188)
Malaria	-	-
Skin infection	-	-
Eye infection	-	-
Throat infection	-	-
Vomiting	0	0
Diarrhoea	4(1.6)	17(6.8)
Constipation	13(5.2)	32(12.8)
Indigestion	15(6.0)	54(21.6)
Gas /flatulence	22(8.8)	76(30.4)
Chest pain	0(0.0)	24(9.6)
Body aches	55(22)	178(71.2)
Back pain	31(12.4)	163(65.2)
Head ache	31(12.4)	115(46.0)
Muscle pain	52(20.8)	161(64.4)
Pain in joints	57(22.8)	182(72.8)
Dizziness	49(19.6)	170(68.0)
Dryness of skin	56(22.4)	179(71.6)
Trembling of limbs	39(15.6)	157(62.8)
Sleep disturbance	34(13.6)	145(58.0)
Low mood	41(16.4)	167(66.8)
Lethargy	39(15.6)	157(62.8)
Lack of appetite	37(14.8)	163(65.2)

The table 4.4.2 showed that various health problems were more common in females than males. Gastrointestinal issues, such as diarrhea (6.8% in females, 1.6% in males), constipation (12.8% in females, 5.2% in males), indigestion (21.6% in females, 6% in males), and gas/flatulence (30.4% in females, 8.8% in males), were frequently reported. Body aches (71.2% in females, 22% in males), back pain (65.2% in females, 12.4% in males), and joint pain (72.8% in females, 22.8% in males) were highly prevalent, suggesting that musculoskeletal discomfort

was a major concern, especially among females. Headaches, muscle pain, and dizziness also affected a large number of participants, with females experiencing these issues more often than males. Skin dryness (71.6% in females, 22.4% in males), trembling of limbs (62.8% in females, 15.6% in males), and sleep disturbances (58% in females, 13.6% in males) were common complaints, indicating that age-related changes or underlying health conditions may have contributed to these symptoms. Psychological issues such as low mood (66.8% in females, 16.4% in males), lethargy (62.8% in females, 15.6% in males), and lack of appetite (65.2% in females, 14.8% in males) were significantly higher among females, suggesting a greater burden of mental and emotional distress.

Thus, the Highlights are:

- Oral health problems were common; however, a considerably higher percentage of females reported missing/broken teeth, tooth decay/toothache, and chewing difficulties compared to males.

- Gastrointestinal problems like heartburn, fullness/gas, constipation, and diarrhoea were frequently reported. Again, females showed substantially higher percentages.

- Respiratory issues were less frequent in general.

- Psychological issues were notably more prevalent among females, who reported much higher rates of tension, disturbed sleep, and vision problems.

- Musculoskeletal issues such as body aches, back pain, and joint pain were highly prevalent, with a much larger proportion of females affected.

- Other complaints, including headaches, muscle pain, dizziness, skin dryness, trembling limbs, low mood, lethargy, and lack of appetite, were all more frequent among females.

Section 4.5: Mental Health Status

Mental health status of the elderly subjects from both genders were assisted through structured questioner for the geriatric Depression Inventory (GDI) scale, six Cognitive Impairment Test (6CIT).

Table: 4.5.1 Gender wise Percent frequency of Geriatric depression Inventory (GDS) Scores of the participants

GDS category	Male (n=62)	Female (n=188)	Total
Normal	6(2.4)	6(2.4)	12(4.8)
Mild depressive	30(12.0)	40(16)	70(28)
Severe depressive	26(10.4)	142(56.8)	168(67.2)

The table 4.5.1 shows the distribution of GDI categories among males and females. It showed that only a small percentage (4.8) of participants had normal scores, with equal proportions among males and females (2.4 each). Mild depression was observed in 28 of the total sample, with a slightly higher prevalence in females (16) compared to males (12). Severe depression was the most common, affecting 67.2 of participants, with a higher prevalence among females (56.8) compared to males (10.4).

Figure 4.5.1: Gender wise percentage frequency distribution of GDS category
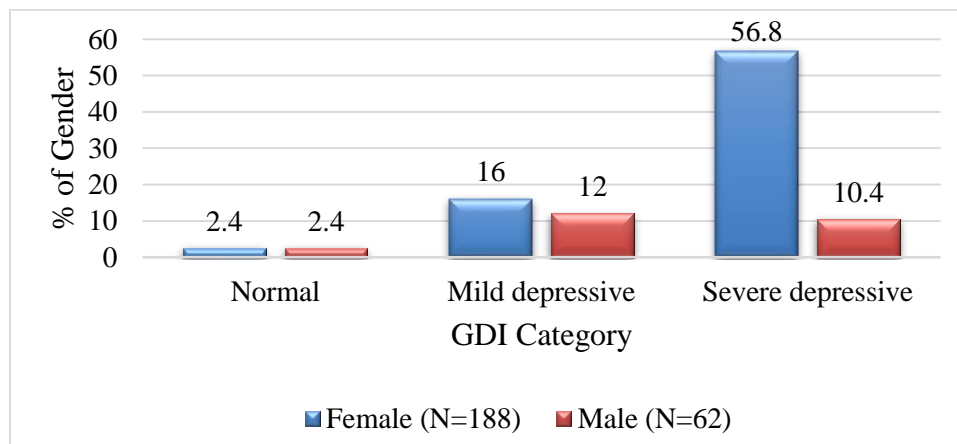
Table: 4.5.2 Age wise Percent frequency of Geriatric depression Inventory (GDI) Scores of participants

GDS category	60-74yr (n=163)	75-85yr (n=87)	Total (n=250)
Normal	7(2.8)	5(2)	12(4.8)
Mild depressive	52(20.8)	18(7.2)	70(28)
Severe depressive	104(41.6)	64(25.6)	168(67.2)

The table 4.5.2 shows the distribution of GDS categories based on age groups (60-74 years vs. 75-85 years). It showed that normal scores were slightly more common among younger individuals (2.8) compared to older ones (2.0). Mild depression was observed in 28 of the total sample, with a higher proportion in the younger group (20.8) compared to the older group (7.2). Severe depression was the most prevalent, affecting **67.2** of participants, with a higher occurrence in the younger group (41.6) than in the older group (25.6).

Figure 4.5.2: Age wise percent frequency of participants of GDS category
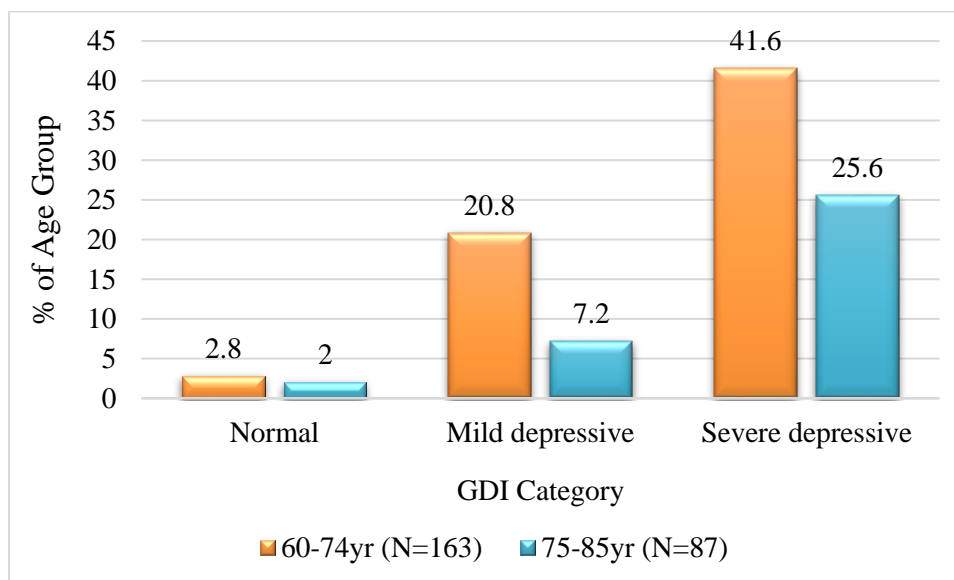
Table: 4.5.3 Mean and Comparison of Geriatric depression Scale (GDS) Scores by Gender and Age Group of participants

Variable	n	Mean ± SD	t value
Male	62	17.7 ± 7.32	5.30***
Female	188	23.1± 5.50	
60-74yr	163	21.2 ± 6.14	-2.08*
75-85 yr	87	22.9 ± 6.18	
Total	250	21.8 ± 6.42	
***p value<0.00, *p value <0.05			

The table 4.5.3 compares Geriatric Depression Scale (GDS) scores based on gender and age. The results show that females (23.1 ± 5.50) have significantly higher depression scores than males (17.7 ± 7.32), with a p-value of <0.001, indicating a strong statistical difference. When looking at age groups, individuals aged 75-85 years (22.9 ± 6.18) have slightly higher depression scores than those aged 60-74 years (21.2 ± 6.14). The t-value of -2.08 and p-value of 0.038 suggest that this age-related difference is statistically significant. Overall, the findings indicate that females and older individuals tend to have higher depression scores.

Table: 4.5.4 Association between GDI categories and BMI categories of slum elderly (n=250)

GDS Categories	BMI categories							Chi-square value
	Invalid BMI	Normal	Obesity Grade 1	Obesity Grade 2	Overweight	Under Nutrition	Total	
Mild depressives	0	24	29	3	7	7	70	27.2**
Normal	0	2	5	5	0	0	12	

Severe depressives	4	60	54	11	22	17	168	
Total	4	86	88	19	29	24	250	
**p value<0.01								

The table 4.5.4 showed a significant relationship between BMI and depression levels. Severe depression is the most common (67.2), especially among those with a normal BMI, Obesity Grade 1, and overweight categories. Mild depression (28) is more frequent in people with Obesity Grade 1 and normal BMI. Only 12 individuals (4.8) have normal mental health, mostly from the normal BMI and Obesity Grade 2 groups. There was significantly linked between BMI and GDS.

Figure 4.5.3: Association between GDS and BMI category of participants
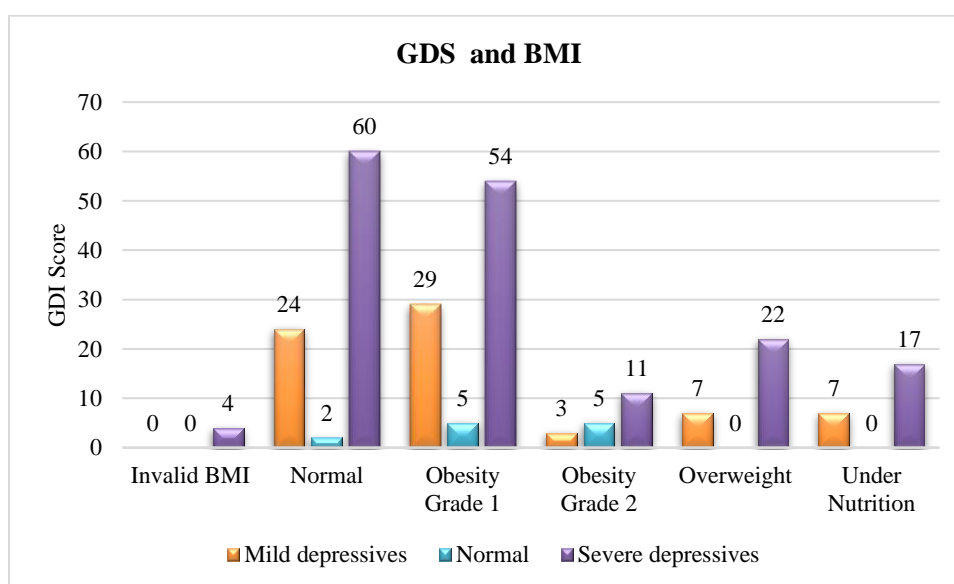
Table: 4.5.5 Association between GDS categories and 6CIT categories slum elderly (n=250)

GDS Categories	6CIT			Total	Chi-square value
	Mild Cognitive Impairment	**Normal**	**Significant Cognitive Impairment**	**Total**	
Mild depressives	2	4	64	70	**19.0*****
Normal	0	2	10	12	
Severe depressives	2	0	166	168	
Total	4	6	240	250	
***p<0.001					

The table 4.5.5 showed a strong link between cognitive impairment and depression. Most cases of severe (166) and mild depression (64) occur in individuals with significant cognitive impairment, while those with normal cognitive function have the lowest depression rates. The Chi-square test (p < 0.001) confirms this relationship, suggesting that as cognitive function declines, depression increases.

Figure 4.5.4 Association between GDS and 6 CIT of the Participants
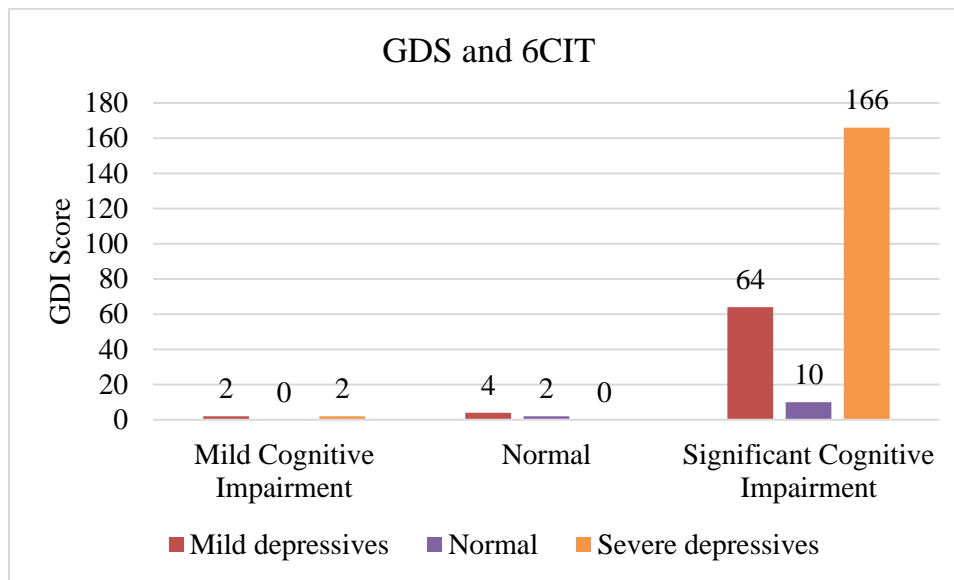
Table: 4.5.6 Association between GDS categories and ADL categories slum elderly (n=250)

	scoring ADL			Chi-square value
GDS Categories	**Independent living**	**Need assistance**	**Total**	
Mild depressives	66	4	70	
Normal	11	1	12	0.932^{NS}
Severe depressives	152	16	168	
Total	229	21	250	
$^{NS-}$ Non significant				

The table 4.5.6 showed the relationship between Activities of Daily Living (ADL) and depression levels. Most individuals with mild (66) and severe depression (152) are able to live independently. The Chi-square test (p = 0.627) showed no significant association between ADL and depression, meaning that a person's ability to live independently does not strongly affect their depression levels.

Table: 4.5.7 Association between GDS categories and IADL categories of participants (n=250)

| GDI Categories | Categories of the IADL | | | Chi-square value |
	Full Function	Moderate Impairment	Total	
Mild depressives	6	64	70	
Normal	4	8	12	7.91*
Severe depressives	38	130	168	
Total	48	202	250	
*p value <0.05 is considered to be significant				

The table 4.5.7 shows there was a significant association between depression levels (GDS) and IADL performance (Chi-square = 7.91, $p < 0.05$). Elderly individuals with mild and severe depressive symptoms were more likely to experience moderate impairment in instrumental daily activities, while those with normal mood status showed better functional independence. This highlights how depressive symptoms can negatively affect an individual's ability to manage complex day-to-day tasks, emphasizing the importance of addressing mental health in the elderly.

Figure 5.5: Association between GDS and IADL category of the participants (n=250)
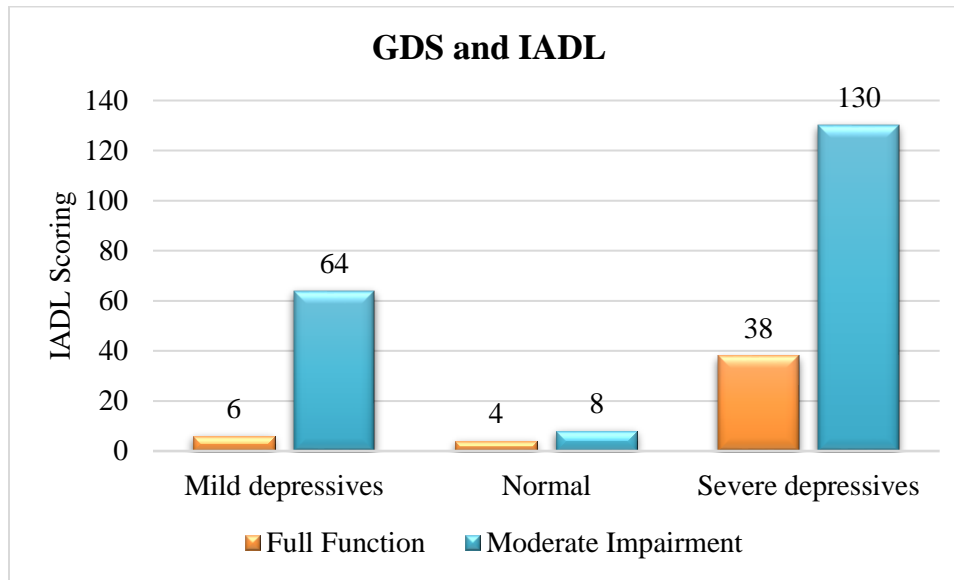
Table 4.5.8 Percent Frequency of 6 CIT by Gender and Age Group of participants (n=250)

6CIT category	Males (n= 62)		Females (n=188)		Total (n=250)
	60-74 yr	75-85 yr	60-74 yr	75-85 yr	
Normal	2(0.8)	0	2(0.8)	2(0.8)	6(2.4)
Mild cognitive impairment	4(1.6)	0	0	0	4(1.6)
Significant cognitive impairment	39(15.6)	17(6.8)	116(46.4)	68(27.2)	240(96)

The table 4.5.8 showed the 6CIT cognitive impairment categories by gender and age group. Significant cognitive impairment is the most common (96 of the total sample), especially among females aged 60-74 years (46.4) and 75-85 years (27.2). Mild cognitive impairment is rare (1.6), found only in males aged 60-74 years. Normal cognitive function is the least common (2.4), with very few individuals across all groups. These results suggest that cognitive impairment is more frequent in females and increases with age.

Figure 4.5.6 Percent Frequency of 6 CIT by Gender and Age Group of participants.

6CIT Category	Males		Females		Total
	60-74 yr	**75-85 yr**	**60-74 yr**	**75-85 yr**	
Normal	(0.8%)	(0%)	(0.8%)	(0.8%)	(2.4%)
Mild Impairment	(1.6%)	(0%)	(0%)	(0%)	(1.6%)
Severe Impairment	(15.6%)	(6.8%)	(46.4%)	(27.2%)	

Table 4.5.9 Mean and Comparison of 6 CIT by Gender and Age Group of participants (N=250)

Variable	N	Mean ± SD	t value
Male	62	17.7 ± 7.32	5.30***
Female	188	23.1 ± 5.50	
60-74yr	163	21.2 ± 6.14	-2.08*
75-85 yr	87	22.9 ± 6.81	
Total	250	21.8 ± 6.42	
***p<0.001, *p<0.5			

The table 4.5.9 presents 6CIT cognitive impairment scores based on gender and age. Males (17.7 ± 7.32) have significantly lower scores than females (23.1 ± 5.50), with a p-value <0.001, indicating a strong difference in cognitive function between genders. When comparing age groups, individuals aged 75-85 years (22.9 ± 6.81) have higher scores than those aged 60-74 years (21.2 ± 6.14), with a p-value of 0.038, suggesting that cognitive impairment increases

with age. Overall, women and older individuals show greater cognitive impairment based on the 6CIT scores.

Table: 4.5.10 Association between 6CIT categories and BMI categories among the participants Male(n=62) and Female (n=188)

6CIT	BMI categories						Chi square value
	Under Nutrition	Normal	Obesity Grade 2	Obesity Grade 1	Obesity Grade 2	Total	
Mild Cognitive Impairment	0	4	0	0	0	4	**11.7***
Normal	0	4	0	2	0	6	
Significant Cognitive impairment	24	78	19	86	19	240	
Total	24	86	19	88	19	250	
*p<0.5							

The table 4.5.10 shows, only a small percentage of individuals had normal cognitive function. Specifically, 0.8% of males aged 60-74, no males aged 75-85, and 0.8% of females in both age groups were classified as normal, making up a total of 2.4%. Mild cognitive impairment was rare, with only 1.6% of males aged 60-74 affected, while no other group had cases. The total prevalence was 1.6%. The majority of individuals had significant cognitive impairment. Among males, 15.6% of those aged 60-74 and 6.8% of those aged 75-85 were affected. Among females, 46.4% of those aged 60-74 and 27.2% of those aged 75-85 had significant cognitive impairment. Overall, 96% of the total sample experienced significant cognitive impairment.

Figure 4.5.7: Association between 6CIT and BMI of the participants
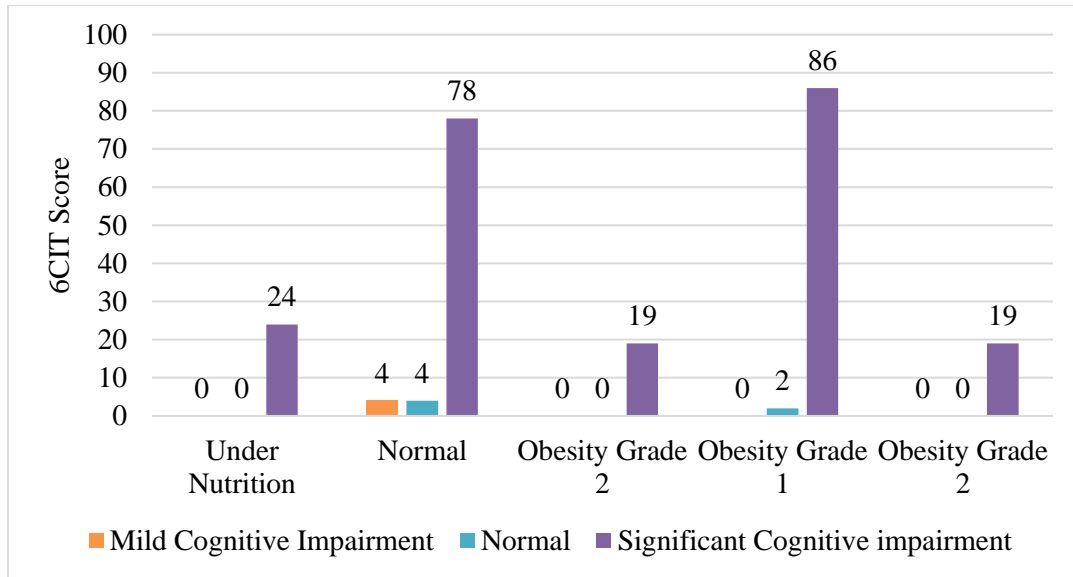
Table: 4.5.11 Association between 6CIT categories and ADL categories among the participants Male(n=62) and Female(n=188)

	Scoring ADL			Chi square value
6CIT	**Independent living**	**Need assistance**	**Total**	
Mild Cognitive Impairment	4	0	4	
Normal	6	0	6	**0.955**[NS]
Significant Cognitive impairment	219	21	240	
Total	229	21	250	
[NS] -Not significant				

The table 4.5.11 represent the relationship between Activities of Daily Living (ADL) and cognitive impairment (6CIT scores). Most individuals with significant cognitive impairment

(219 out of 240) can live independently, while 21 need assistance. All individuals with mild cognitive impairment and normal cognition live independently. The Chi-square test (p = 0.620) showed no significant association between ADL and cognitive impairment, meaning that cognitive function does not strongly impact a person's ability to live independently in this sample.

Table 4.5.12 Association between 6CIT categories and IADL categories among the participants Male(n=62) and Female(n=188)

| 6CIT | Categories of the IADL | | | Chi square value |
	Full Function	Moderate Impairment	Total	
Mild Cognitive Impairment	0	4	4	9.71**
Normal	4	2	6	
Significant Cognitive Impairment	44	196	240	
Total	48	202	250	
**p<0.01				

The table 4.5.12 showed the relationship between Instrumental Activities of Daily Living (IADL) and cognitive impairment (6CIT scores). Most individuals with significant cognitive impairment (196 out of 240) have moderate IADL impairment, while only 44 maintain full function. Mild cognitive impairment cases (4) are found only in those with moderate IADL impairment, while normal cognition (6 cases) is more evenly distributed. It was significant association between IADL and cognitive impairment, meaning that as cognitive function declines, individuals are more likely to experience difficulty with daily activities.

Figure 4.5.7: Association between 6CIT and IADL of the participants Male(n=62) Female (188)

6CIT and IADL
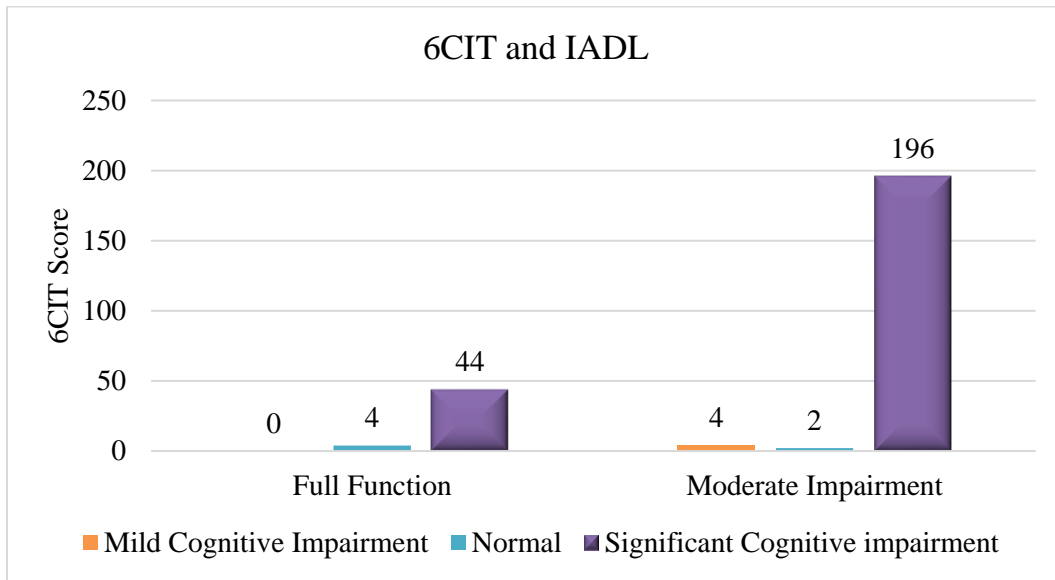
Thus, Highlights are as follow:

- Severe depression affected a large portion of participants, with females having much higher rates than males.
- Individuals aged 75-85 years had slightly higher depression levels than those aged 60-74 years.
- Severe depression was more frequent in those with a normal BMI or Obesity Grade 1 and was strongly associated with cognitive decline.
- Most individuals, even with severe cognitive issues, could still live independently.
- Those with moderate impairment in daily instrumental activities were more likely to have depression or cognitive impairment.

Section 4.6 Physical functioning status

Physical health status of the participants was assessed using structured questionnaires for Activities of daily living (ADL) scale and Instrumental Activity of Daily living (IADL) scale.

Table 4.6.1 Percentage frequency of ADL by Gender and Age Group of Participants

ADL category	Males (n= 62)		Females (n=188)		Total (N=250)
	60-74 yr	75-85 yr	60-74 yr	75-85 yr	
Independent Living	42(16.8)	13(5.2)	117(46.8)	57(22.8)	229(91.6)
Need Assistance	3(1.2)	4(1.6)	1(0.4)	13(5.2)	21(8.4)
Dependent Living	0	0	0	0	0

The table4.6.1 showed the relationship between age, gender, and Activities of Daily Living (ADL) categories. Most individuals (91.6) live independently, with the majority being females aged 60-74 years (46.8). A small portion (8.4) requires assistance, mostly females aged 75-85 years (5.2). No individuals are completely dependent on others for daily activities.

Figure 4.6.1: Distribution of ADL category by Gender and Age Group of Participants Male(n=62) Female(n=188)
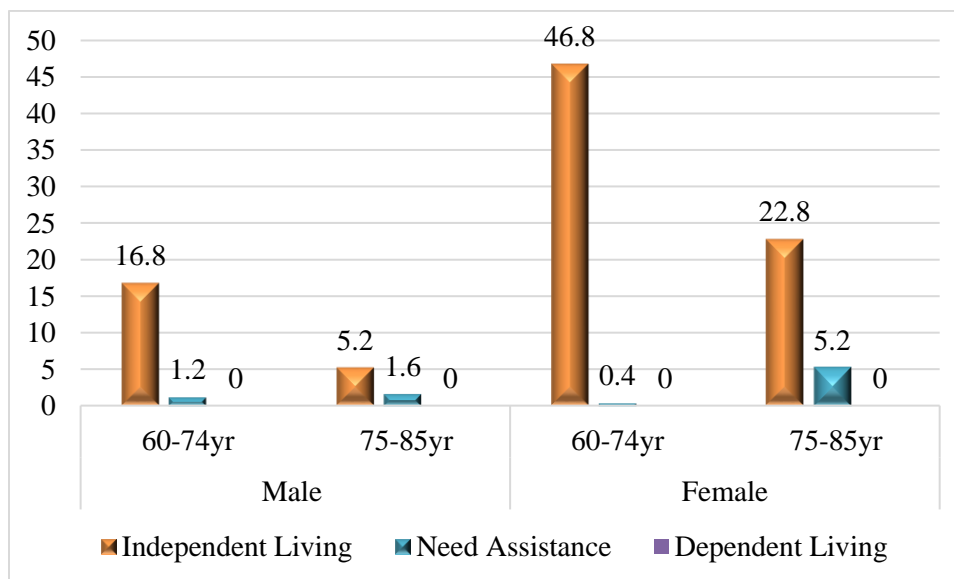
Table 4.6.2 Mean and Comparison of ADL by Gender and Age Group of participants (N=250)

Variable	N	Mean ± SD	t value
Male	62	5.82 ± 0.52	0.98*
Female	188	5.89 ± 0.43	
60-74yr	163	5.96 ± 0.280	3.37**
75-85 yr	87	5.71 ± 0.645	
Total	250	5.87 ± 0.45	
**p<0.001, *p<0.5			

The table4.6.2 compares mean scores based on gender and age. There is no significant difference between males (5.82 ± 0.52) and females (5.89 ± 0.43), as shown by the p-value of 0.327. However, there is a significant difference between age groups, with individuals aged 60-74 years (5.96 ± 0.28) scoring higher than those 75-85 years (5.71 ± 0.645) with a t value 3.37

Table 4.6.3 Percentage frequency of IADL by Gender and Age Group of participants

IADL category	Males (N= 62)		Females (N=188)		Total (N=250)
	60-74 yr	75-85 yr	60-74 yr	75-85 yr	
Full function	6(2.4)	0(0)	30(12)	12(4.8)	48(19.2)
Moderate impairment	39(15.6)	17(6.8)	88(35.2)	58(23.2)	202(80.8)
Severe functional impairment	0	0	0	0	0

The table4.6.3 showed Instrumental Activities of Daily Living (IADL) categories based on gender and age. Most individuals (80.8) have moderate impairment, with the highest percentage seen in females aged 60-74 years (35.2) and 75-85 years (23.2). Only 19.2 have full function, mostly among females aged 60-74 years (12). No individuals have severe functional impairment.

Figure 4.6.2: Distribution of IADL by Gender and Age wise of the participants
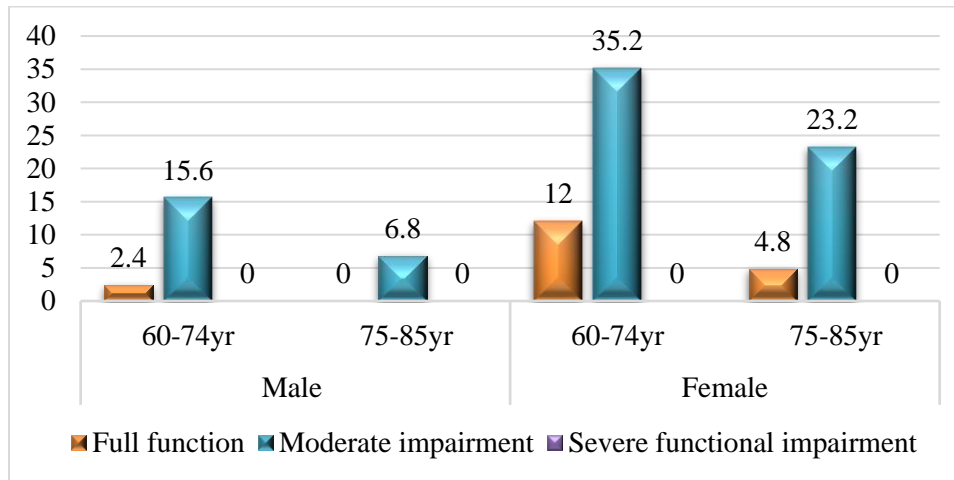
Table 4.6.4 Mean and Comparison of IADL by Gender and Age Group of participants (N=250)

Variable	N	Mean ± SD	t value
Male	62	6.06 ± 1.35	0.0283[NS]
Female	188	6.06 ± 1.71	
60-74yr	163	6.31 ± 1.59	3.43***
75-85 yr	87	5.59 ± 1.60	
Total	250	6.06 ± 1.63	
***p<0.001, [NS] -Not significant			

The table 4.6.4 compares mean scores based on gender and age. There is no significant difference between males (6.06 ± 1.35) and females (6.06 ± 1.71), (p = 0.977). However, there is a significant difference between age groups, with younger individuals (60-74 years) scoring higher (6.31 ± 1.59) than older individuals (75-85 years, 5.59 ± 1.60), confirmed by a p-value of <0.001. This suggests that age was showed a significant impact on the measured function, with older individuals showing lower scores, while gender does not play a major role.

Thus, Highlights are as follow:

- Age impacted physical functioning, with younger individuals (60-74 years) scoring better on both ADL and IADL scales compared to older adults (75-85 years).
- No participants were fully dependent on others for daily activities.
- Many participants had moderate IADL impairment, especially among females aged 60-74 years.
- Gender did not significantly affect IADL scores, but age showed a clear impact on both ADL and IADL scores.

Section 4.7: Relationship Between BMI, MNA, IADL,6CIT and ADL

Table 4.7.1 Correlation between the BMI and MNA, GDI,6CIT, ADL, IADL Among the participants

	MNA	GDI	6CIT	ADL	IADL
BMI	r=0.572*** p=< .001	r=-0.119 p=0.061	r=-0.119 p=0.061	r=0.018 p=0.773	r=0.018 p=0.773

The table 4.7.1 showed relationship between BMI and various health indicators, including nutritional status (MNA), depression levels (GDI), cognitive function (6CIT), and daily living activities (ADL and IADL). There was positive correlation between BMI and MNA ($r = 0.572$, $p < 0.001$) as showed in figure, as the BMI improves the Nutritional status of participants improves, However, BMI had no significant relationship with depression (GDI), cognitive function (6CIT), or daily living activities (ADL and IADL), as their correlation values were low and not statistically significant ($p > 0.05$).

Figure 4.7.1: Correlation between BMI and MNA score
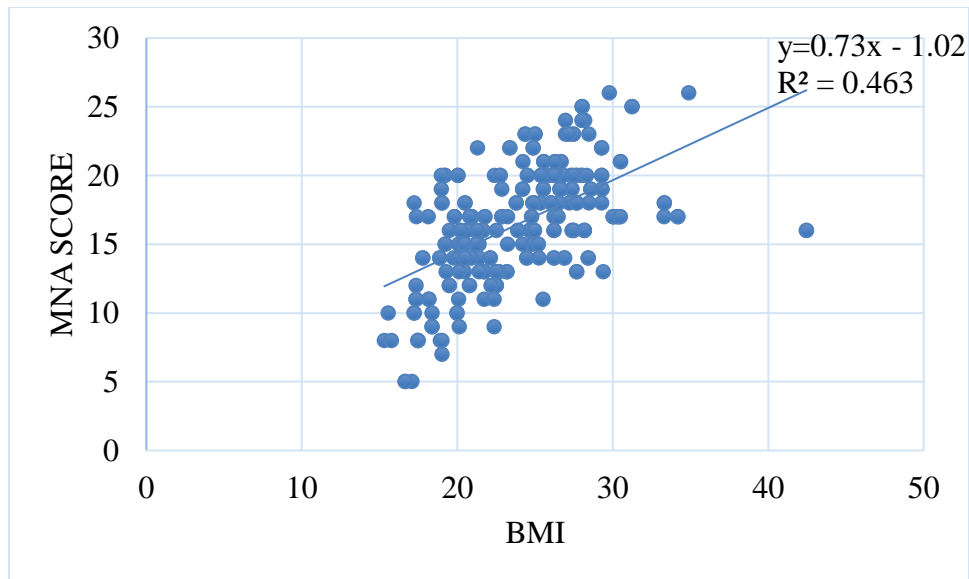
The figure 4.7.1 scatter plot illustrates the relationship between Body Mass Index (BMI) and Mini Nutritional Assessment (MNA) scores among the study participants. A positive linear trend is observed, indicating that as BMI increases, MNA scores also tend to rise. The regression equation derived from the data is y = 0.73x - 1.02, suggesting a moderate upward trend between the two variables. The coefficient of determination ($R^2 = 0.463$) implies that approximately 46.3% of the variation in MNA scores can be explained by BMI. This finding suggests a moderate positive correlation between BMI and nutritional status, where individuals with higher BMI values generally have better nutritional scores.

Table 4.7.2 Correlation between the MNA and various Factor Among the Elderly

	GDI	6CIT	ADL	IADL
MNA	r=-452*** p=<.001	r=-452 p=<.001	r=0.074 p=0.246	r=0.200** p=0.001

The table 4.7.2 showed correlation was a negatively significant relationship between MNA and GDI, with r=-0.452 (p < 0.001). Similarly, MNA had a significant negative correlation

with 6CIT (r = -0.452, p < 0.001), However, MNA showed correlation with ADL (r = 0.074, p = 0.246), which was not significant. In contrast, a significant positive correlation was found between MNA and IADL (r = 0.200, p = 0.001). so, as the MNA score decrease there is increase in the GDI score.

Figure 4.7.2: Correlation between MNA score GDS
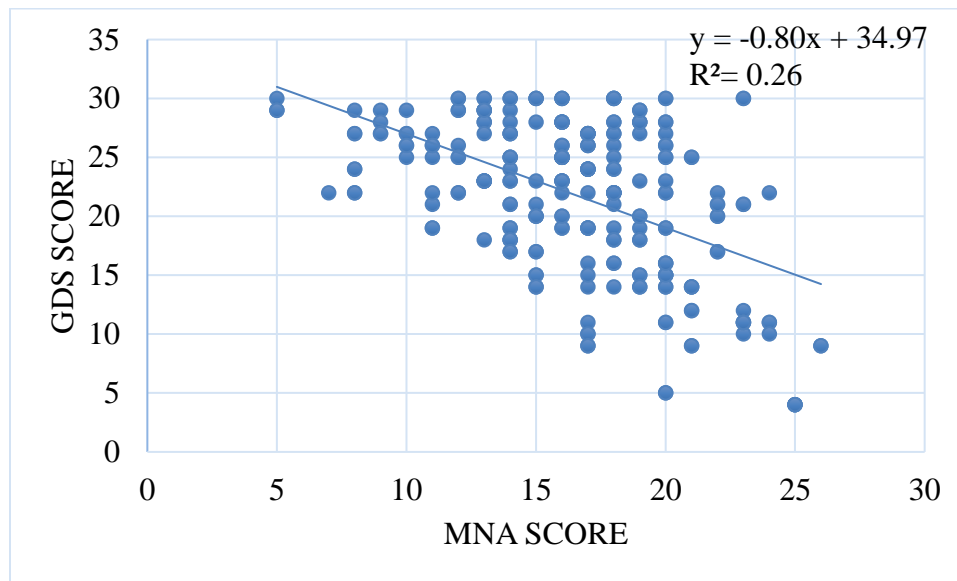
Figure 4.7.2 the scatter plot illustrates the relationship between Mini Nutritional Assessment (MNA) scores and Geriatric Depression Scale (GDS) scores among the study participants. A negative linear trend is observed, indicating that as MNA scores increase (indicating better nutritional status), GDS scores tend to decrease (indicating lower levels of depression). The regression equation is y = -0.80x + 34.97, which suggests that for every unit increase in MNA score, the GDS score decreases by approximately 0.80 points. The coefficient of determination (R^2 = 0.26) indicates that 26% of the variation in GDS scores can be explained by the MNA score. This suggests a moderate inverse correlation between nutritional status and depression levels, where better nutrition is generally associated with lower depressive symptoms.

Figure 4.7.4: Correlation between MNA score and IADL
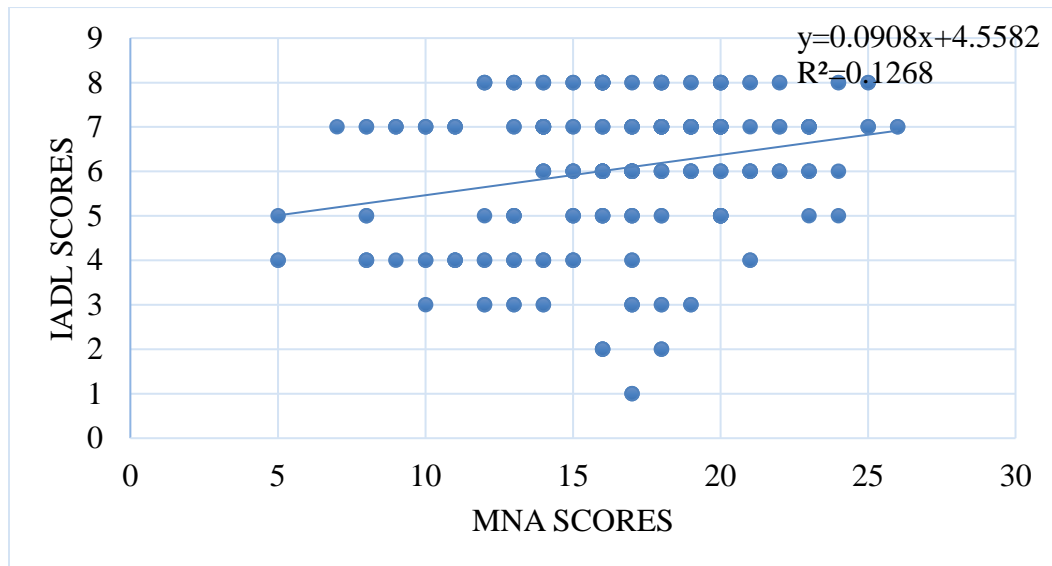
Figure 4.7.4: showed a significant positive correlation was found between MNA and IADL, the graph highlights that better nutritional status was associated with greater independence in daily activities.

Table 4.7.3 Correlation between the and GDS various Factor Among the participants

	6CIT	ADL	IADL
GDS	r=1.000***	r=-0.039	r=-0.062
	p=<.001	p=0.536	p=0.329

The table 4.7.3 showed a significant positive correlation between GDI and 6 CIT (r = 1.000, p < 0.001). However, there was non-significant negative correlation between GDI and ADL (r = -0.039, p = 0.536) as well as between GDI and IADL (r = -0.062, p = 0.329).

Figure 4.7.5 Correlation between 6 CIT AND GDS
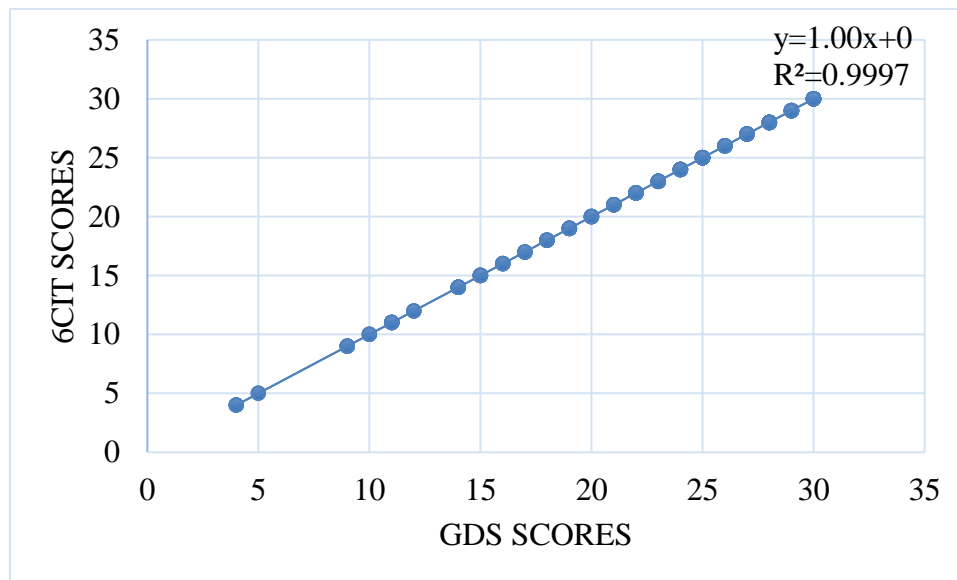
Figure 4.7.5 showed a strong and significant positive relationship between GDS and 6CIT, it interprets that as depression levels increase there is increase in cognitive impairment in the participants. Each point on the graph represents an individual's score on both scales, and the near-perfect alignment of these points along the regression line signifies a high degree of association. The regression equation, $y=1.00x+0y = 1.00x + 0y=1.00x+0$, indicates that for every unit increase in the GDS score, there is an exact corresponding unit increase in the 6CIT score. Furthermore, the coefficient of determination (R^2) is 0.9997, which means that 99.97% of the variation in 6CIT scores is explained by the variation in GDS scores. This level of correlation is exceptionally high and suggests that the two assessment tools are measuring very similar constructs, likely related to cognitive functioning. The findings imply excellent concurrent or convergent validity between the two instruments.

Table 4.7.4 Correlation between the 6CIT and various Factor Among the participates

	ADL	IADL
6 CIT	r=-0.039 p=0.536	r=-0.062 p=0.329

The table 4.7.4 shows that there was no significant relationship between 6CIT and ADL (r = -0.039, p = 0.536) or between 6CIT and IADL (r = -0.062, p = 0.329).

Thus, Highlights are as follow:

- BMI and MNA was showed Positive correlation: higher BMI is linked to better nutritional status.
- MNA and GDI was showed Negative correlation: poorer nutrition is associated with higher depression levels.
- MNA and IADL was showed Positive correlation: better nutrition is associated with greater independence in daily activities.
- GDI and 6CIT was showed Strong positive correlation; higher depression levels are linked to greater cognitive impairment.

Section 4.8 Quality of Life Assessment

Table 4.8.1 Gender wise mean of the WHO QOL BREF of Participants (n=250)

Domains	Male (n=62)	Female (n=188)	p value	Total
Physical health	45.1 ± 17.5	42.9 ± 17.1	0.382	43.4 ±17.2
Psychological health	34.0 ± 16.5	33.6 ± 16.6	0.867	33.7 ± 16.6
Social relations	47.0 ± 13.1	45.4 ± 15.2	0.444	45.8 ± 14.7
Environment	40.0 ± 14.3	39.2 ±12.4	0.669	39.4 ± 12.9

The table 4.8.1 revealed that there were no significant gender differences across the various health domains. In terms of physical health, females scored an average of 42.9, while males scored 45.1, with a p-value of 0.382, indicating no statistical difference. For psychological health, females had a mean score of 33.6 and males 34.0, with a p-value of 0.867, also showing no significant difference. In the social relations domain, females scored 45.4 and males 47.0, with a p-value of 0.444, again indicating no statistically significant difference. Finally, for the environment domain, females scored 39.2 and males 40.0, with a p-value of 0.669, suggesting no significant difference. Overall, the results suggested that gender did not play a significant role in the variations observed across these health domains.

Table 4.8.2 Age wise mean of the WHO QOL BRIEF of participants (n=250)

Domains	60-74 Yr	75-85 Yr	p Value
Physical health	44.0 ± 17.5	42.5 ± 16.7	0.522
Psychological health	33.2 ± 15.9	34.7 ± 17.8	0.498
Social relations	45.3 ± 14.1	46.6 ± 15.8	0.507
Environment	39.5 ± 12.8	39.3 ± 13.0	0.943

The table 4.8.2 revealed that there were no significant differences between the two age groups across the various health domains. In terms of physical health, individuals aged 60-74 years scored an average of 44.0, while those aged 75-85 years scored 42.5, with a p-value of 0.522, indicating no statistical difference. For psychological health, the 60-74 age group had a mean score of 33.2 and the 75-85 age group scored 34.7, with a p-value of 0.498, also showing no significant difference. In the social relations domain, the younger group scored 45.3, while the older group scored 46.6, with a p-value of 0.507, indicating no statistically significant difference. Finally, for the environment domain, the 60-74 age group scored 39.5, and the 75-85 age group scored 39.3, with a p-value of 0.943, suggesting no significant difference. Overall the quality of life, the results suggested that age did not play a significant role in the variations observed across these health domains.

Figure 4.8.1 Correlation between Physical and Psychological domain(n=250)
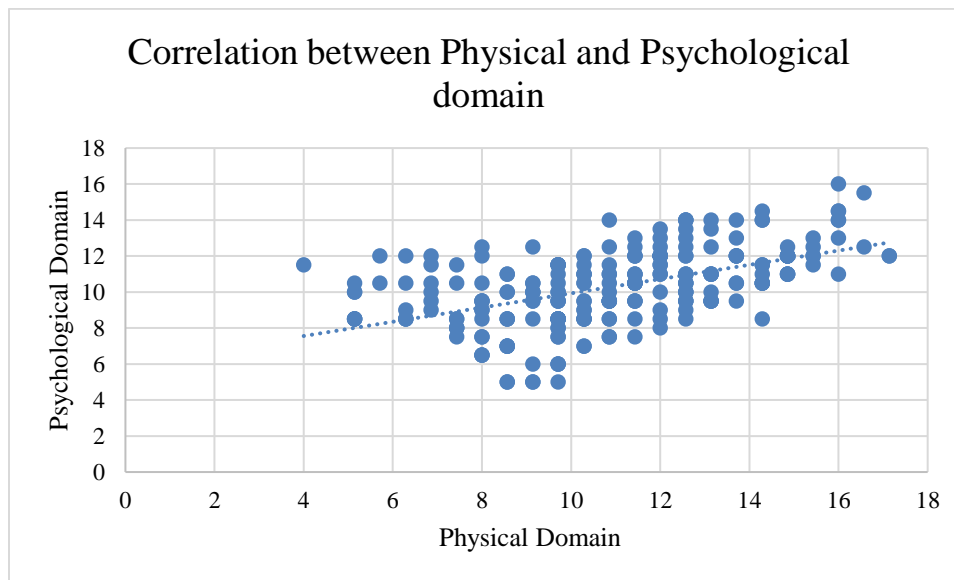
Figure 4.8.1 shows correlation analysis was conducted to examine the relationship between Physical Health and Psychological Health scores of the WHOQOL-BREF. The results revealed a moderately strong positive correlation between the two domains ($r = 0.637$, $p < 0.001$), indicating that individuals who reported higher physical health scores also tended to report better psychological well-being. The correlation was statistically significant at the 0.001 level, suggesting a meaningful association between physical and psychological health in the studied elderly population. This implies that improvements in physical health may be linked to enhanced psychological status, highlighting the interconnected nature of overall well-being among older adults.

CHAPTER 5

SUMMARY AND CONCLUSION

The ageing population is a global phenomenon affecting countries worldwide. According to the UN Report on World Population Ageing 2017, by 2030, the number of people aged 60 and above is expected to exceed that of children under 10, with nearly two-thirds of older adults living in developing regions. As the elderly population grows, it brings significant changes to a country's demographic profile, impacting both its economic and political structure. Older individuals require constant care and support, but beyond physical needs, they often long for emotional and mental well-being. Ageing comes with its own set of challenges, such as declining energy levels and cognitive functions. These difficulties are even greater for elderly people living in slums, where resources and basic amenities are already scarce. In such conditions, ageing becomes even more difficult, making it crucial to

Hence the lack of data on slum elderly the current was conducted to assess the nutritional status, diet, health and quality of life of elderly residing in urban slums of Vadodara. The results of the study give insight on the socio demographic profile, service utilization, dietary pattern, nutritional status, depression level, cognitive impairment, functional ability and quality of life of the participants. The study was based on the following objectives:

Broad objective:

o   To assess the health, nutritional status and quality of life of elderly residing in slums of urban Vadodara.

Specific objective:

o   To assess the socio demographic profile of urban slum elderly.
o   To assess the anthropometry and nutritional status of urban slum elderly.
o   To assess the mental and Physical health of urban slum elderly.
o   To assess the Quality of life of urban slum elderly.
o   To study the relationship between health (including disease profiles, physical health and mental well-being), nutritional status, and quality of life in urban slum elderly.

The insight on the findings of objectives are summarized as follow:

Sociodemographic Profile

- The study encompassed 250 elderly residing in urban slums of Vadodara. Where the Male are 62 and female are 188.

- The major participants (53.2%) belonged to upper lower income group while (28.8%) were lower income group, this indicates financial instability among the population.

- The majority of elderly individuals (57.2%) are married, with a noticeable gender difference. Among men, 67% of those aged 60-74 and 37% of those aged 75-85 are married, whereas only 26.8% of women in the younger age group and 14.8% in the older age group are married. A significant proportion (42.4%) are widowed. Among females, 33.2% of those aged 60-74 and 26% of those aged 75-85 are widows.

- In terms of their living arrangements, 80.4% of elderly individuals reside with their families, ensuring social and emotional support. A smaller portion (11.2%) live only with their spouse, while 8.4% live alone. Gender-wise, 38.8% of elderly women aged 60-74 and 23.6% aged 75-85 live with their families, while among men, 12% of those aged 60-74 and 6% of those aged 75-85 have family support. Notably, a small percentage of women (4%) and men (1.6%) live alone, potentially facing isolation and challenges in their daily lives.

- Regarding occupation, 33.3% of elderly individuals are not engaged in any work, with gender differences apparent. Among females, 19.3% of those aged 60-74 and 5.6% of those aged 75-85 are housewives. Self-employment (32.1%) is common among elderly men, with 10.8% of men aged 60-74 and 0.8% of men aged 75-85 engaged in it, compared to 14.1% of women aged 60-74 and 6.4% of women aged 75-85.

- When it comes to housing, 57.6% of the elderly live in permanent houses, with more men (9.6% aged 60-74 and 4.4% aged 75-85) residing in stable dwellings compared to women (30.8% aged 60-74 and 12.8% aged 75-85). However, 42.4% live in temporary shelters, with more women (16.4% aged 60-74 and 15.2% aged 75-85) residing in unstable housing than men (8.4% aged 60-74 and 2.4% aged 75-85).

- Water storage methods among the elderly population vary, with the majority (63.6%) storing water in plastic drums. Another 27.6% rely on overhead water tanks, this

indicates that many elderly individuals may not have access to modern water storage facilities, potentially affecting their hygiene and daily water usage.

- Many elderly individuals benefit from government welfare schemes, with food assistance being the most widely utilized (68.4%).

- Financial security among the elderly is somewhat ensured, as 72.8% receive a pension. This provides a crucial source of income, particularly for those who are unemployed or widowed.

- Overall, gender plays a crucial role in determining the living conditions, financial security, and overall well-being of the elderly population. Women are more likely to be widowed, live in unstable housing, and rely on food assistance, while men have slightly better financial security through pensions and employment opportunities. These findings suggest there was need for targeted policies to address the specific challenges faced by elderly women and ensure their well-being in later years.

Anthropometric Profile:

- The body measurements and nutritional status across gender and age groups where males had significantly higher weight (60.2 kg vs. 53.3 kg) and height (158 cm vs. 149 cm) compared to females. However, BMI and waist circumference showed no major differences between genders. When categorized by BMI, under-nutrition was almost equal in both males (9.7%) and females (9.6%). A slightly higher percentage of females (35.1%) had a normal BMI compared to males (32.3%), while obesity (Grade 1 and 2 combined) was more prevalent among males (50%) than females (40.4%).

- Age-wise, individuals in the 75-85 years group had lower weight, height, and BMI compared to those aged 60-74. Under-nutrition was more common in the older group (6.4%) than in the younger group (3.2%). Overweight and obesity were more frequent in the 60-74 age group, whereas the older group had a higher prevalence of under-nutrition. These findings indicate that while males generally have greater body measurements, BMI distribution remains similar between genders. Additionally, aging is associated with a decline in body weight and BMI, increasing the risk of under-nutrition in older adults.

Food Patterns:

- The dietary pattern of the urban slum elderly reveals high consumption of raw milled rice and whole wheat flour, with 78.4% consuming them daily. Pulses like pigeon pea and green gram are regularly consumed, while others such as rajmah, soybean, and black gram are rarely eaten, potentially leading to protein deficiency. Whole milk is commonly consumed (59.6% daily), especially among those living with families, but intake of milk products like paneer and khoya is low, which may affect calcium and protein intake.

- Fruit consumption is notably low, with only 6.4% consuming bananas daily and other fruits like apples, oranges, and mangoes consumed rarely. This indicates a potential risk of micronutrient deficiencies, particularly vitamins A and C. In terms of flesh foods, eggs are the most frequently consumed, while chicken and fish are eaten occasionally, which could contribute to lower intake of high biological value proteins and essential fatty acids.

- Nearly all participants (98.8%) use single oil daily, while ghee is consumed occasionally. Ready-to-eat foods like biscuits and chivda are consumed frequently, which may increase the risk of obesity due to high intake of refined carbohydrates and fats. The low and infrequent intake of nutrient-dense foods like fruits, milk products, and pulses highlights the potential for deficiencies in proteins, calcium, iron, and essential vitamins, impacting overall health and quality of life in this population.

- The nutrient intake analysis of 250 individuals (62 males and 188 females) shows that the average energy intake is around 1328 Kcal, which is lower than the Estimated Average Requirement (EAR) for both males (1700 Kcal) and females (1500 Kcal).

- Protein intake is also below the recommended levels, with males consuming 35.1g (EAR: 54g) and females consuming 37.1g (EAR: 45.7g). Carbohydrate intake is slightly lower than the recommended 130g, averaging 113g for both genders.

- Fat intake is significantly higher than the EAR of 20g, with males consuming 54.2g and females 52.1g on average.

- Calcium intake is much lower than the recommended 1200 mg, with males consuming 339 mg and females 407 mg.

- Iron intake is also inadequate, especially in males (9.83 mg vs. EAR of 19 mg), while females have a slightly higher intake (12.4 mg) but still below the recommended level.

- The nutritional status of elderly individuals in slum areas showed significant differences based on gender and age. and more females (36%) were at risk of malnutrition than males (13.2%). When analysed by age, older individuals (75-85 years) were more vulnerable, with none classified as well-nourished and only 3.2% at risk of malnutrition. In contrast, the younger group (60-74 years) had 10% at risk and 2% well-nourished. Thus, finding indicates that older individuals face a greater risk of malnutrition.

Disease profile

Major and minor illness

- Major finding suggests, Oral health issues are common, with 71.6% of females and 21.2% of males having missing or broken teeth, and 69.2% of females and 24.8% of males experiencing toothache or cavities. Problems with chewing are also more frequent in females (40.8%) than in males (16.4%).

- Gastrointestinal issues such as heartburn (47.6% females vs. 19.6% males), bloating (36.8% females vs. 14% males), and indigestion (21.6% females vs. 6% males) are significantly more common in females.

- Hearing and vision problems are also more frequent among females, with 46% having difficulty hearing compared to 14.4% of males, and 62% experiencing vision problems, while only 12% of males report the same issue.

- Mental health concerns such as tension (62.4%) and disturbed sleep (56.4%) are much higher in females compared to 16.4% and 14% in males, respectively.

  - Pain-related issues are higher in females, with 72.8% suffering from joint pain compared to 22.8% of males, 71.2% experiencing body aches vs. 22% of males, and 65.2% reporting back pain vs. 12.4% of males. Headaches (46% vs. 12.4%) and muscle pain (64.4% vs. 20.8%) are also more frequent in females.

- Other health concerns, such as dizziness (68% females vs. 19.6% males), trembling of limbs (62.8% vs. 15.6%), and dry skin (71.6% vs. 22.4%), show a clear gender disparity.

- Mental health symptoms like low mood (66.8% females vs. 16.4% males), sleep disturbances (58% vs. 13.6%), lethargy (62.8% vs. 15.6%), and loss of appetite (65.2% vs. 14.8%) are also significantly higher in females.

Mental Health Status

Geriatric Depression Inventory Scale (GDI)

- Depression is a major concern among the elderly, with 67.2% experiencing severe depression and 28% having mild depression, leaving only 4.8% with normal mental health. Females are more affected, with 56.8% suffering from severe depression. The comparison of Age-wise, older individuals (75-85 years) have a higher rate of severe depression (25.6%) compared to those aged 60-74 (41.6%).

6 Cognitive Impairment Test (6CIT)

- Cognitive impairment is highly prevalent among the elderly, with 96% experiencing significant cognitive impairment and only 2.4% having normal cognitive function. Among those with significant cognitive impairment, females (73.6%) are more affected than males (22.4%). Age also plays a role, as cognitive decline is more common in the 75-85 age group compared to the 60-74 age group.

Physical Functioning Status

Activity of daily living (ADL) and Instrumental Activity of Daily Living (IADL) scale:

- The majority of elderly individuals (91.6%) are able to live independently, while a small percentage (8.4%) require assistance with daily activities. Notably, no individuals were classified as fully dependent.

- When looking at instrumental activities of daily living (IADL), which involve more complex tasks like managing finances and cooking, 19.2% had full function, while a significant 80.8% experienced moderate impairment. However, no one had severe functional impairment

Major Conclusion

- The majority of the elderly belonged to lower-income groups, indicating financial instability.
- A significant portion of elderly individuals were widowed, with more widows among females than males.
- Government welfare schemes, particularly food assistance, were widely utilized.
- Under-nutrition levels were nearly equal in both genders, while obesity was more common among males. Older individuals had lower weight, height, and BMI than younger elderly, with under-nutrition increasing with age.
- Pigeon pea and green gram were the most frequently eaten pulses, while other pulses were consumed less frequently. Processed foods like biscuits, chivda, and gathiya were commonly consumed.
- Average energy and protein intake were below recommended levels of EAR (Estimate Average Requirement). Fat intake was higher than recommended levels of RDA. Calcium and iron intake were significantly lower than the recommended requirements.
- More females were at risk of malnutrition than males, with older individuals being the most vulnerable.
- Prevalence of major and minor illness varies slightly among males and female.
- Better nutritional status (higher MNA score) is associated with higher BMI, lower depression (GDI), and better functional independence (IADL).
- Higher depression (GDI) is significantly linked to lower nutritional status (MNA), but not to cognitive function, ADL, or IADL.
- Cognitive impairment (6CIT) does not show strong associations with other factors in this dataset.

- Basic daily activities (ADL) do not show significant correlations with any other measured factors.
- Instrumental daily activities (IADL) are positively associated with better nutritional status (MNA), indicating that better-nourished elderly individuals are more independent in managing complex tasks.

Recommendations

- Factors such as poor quality of diet (low in essential nutrients like proteins, vitamins, and minerals), inadequate quantity of food intake, and the presence of comorbid conditions (such as diabetes, hypertension, or infections) can significantly influence nutritional status and should be explored in greater depth.
- Overnutrition can be addressed seriously by the health community worker
- Set up regular health check-ups for elderly individuals, focusing on oral health, vision, gastrointestinal issues, joint pain, and mental health.
- Improve housing conditions by providing awareness on government housing schemes or financial aid for better living conditions in turn to supports healthy wellbeing.
- Strengthen social welfare programs targeting elderly women, who are more vulnerable to widowhood and financial instability.
- Advocate for policy changes to improve healthcare, social security, and nutritional support for the elderly in urban slums.

Limitation

- Participants are hesitant to share personal or health-related information due to mistrust of outsiders or fear of misuse of data thus may have led to underestimated information.
- Many slum residents do not maintain medical records so it was difficult to validate self-reported health conditions or treatments.

Future Scope for Studies

- Health risk determinants can be further assessed to understand their impact on nutritional and overall health outcomes.

- Biochemical parameters affecting their overall raise in non-communicable diseases (NCDs) can be studied.
- Intervention strategies focusing on improving food habits, physical activity, and mental health can be developed and evaluated.

CHAPTER 6

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Estd. 1949

FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

Ethical Compliance Certificate 2024-2025

This is to certify Ms. Riddhi Tarsariya study titled; "Assessment of the Health and Nutritional Status of elderly residing in slums of urban Vadodara." from Department of Foods and Nutrition has been approved by the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The study has been allotted the ethical approval number IECHR/FCSc/M.Sc./10/2024/34.

Prof. Komal Chauhan
Member Secretary
IECHR

Prof. Mini Sheth
Chairperson
IECHR

Chair Person
IECHR
Faculty of Family & Community Sciences
The Maharaja Sayajirao University of Baroda

- Consent form (Gujarati)

સહમતિને ફોર્મ

અધ્યયન શીર્ષક: વડોદરાના શહેરની સ્લમોમાં રહેતા વૃદ્ધ પુરુષ અને મહિલા ના આરોગ્ય અને પોષણની સ્થિતિનું મૂલ્યાંકન

વિદ્યાર્થી: રિદ્ધિ તરસારીયા, MSc વિદ્યાર્થી, Family and Community Sciences, મહારાજા સયાજી રાવ યુનિવર્સિટી ઓફ વડોદરા.
માર્ગદર્શન: ડો. કોમલ ચૌહાણ, Family and Community Sciences, મહારાજા સયાજી રાવ યુનિવર્સિટી ઓફ વડોદરા

પરિચય:
હું, રિદ્ધિ તરસારીયા, મહારાજા સયાજી રાવ યુનિવર્સિટી ઓફ વડોદરા માં વિદ્યાર્થી છું, "વડોદરાના શહેરની સ્લમોમાં રહેતા વૃદ્ધ પુરુષ અને મહિલાના આરોગ્ય અને પોષણની સ્થિતિનું મૂલ્યાંકન" શીર્ષકની સંશોધન નોંધ લખી રહી છું. આ સંશોધનનો હેતુ શહેરના સ્લમોમાં રહેતા વૃદ્ધોના આરોગ્ય, પોષણની સ્થિતિ અને ગુણવત્તા જીવનનું મૂલ્યાંકન કરવું છે, અને આ વસ્તીના આરોગ્ય, પોષણની સ્થિતિ અને ગુણવત્તા જીવન વચ્ચેના સંબંધોને અન્વેષણ કરવો છે. આ સંશોધન ડો. કોમલ ચૌહાણના માર્ગદર્શન હેઠળ ચલાવવામાં આવી રહ્યું છે.

અધ્યયનનો હેતુ:
આ સંશોધનનું ઉદ્દેશ્ય 60 વર્ષ અથવા તેથી વધુ વયના વૃદ્ધો માટે શહેરી વડોદરાના સ્લમોમાં રહેતા લોકોના આરોગ્ય, પોષણની સ્થિતિ અને ગુણવત્તા જીવનનું મૂલ્યાંકન કરવાનું છે. નિર્ધારિત ઉદ્દેશ્ય છે:
- શહેરી સ્લમના વૃદ્ધોની સામાજિક-આર્થિક. સ્થિતિ નું મૂલ્યાંકન કરવું.
- શહેરી સ્લમમાં રહેતા વૃદ્ધોની પોષણની સ્થિતિનું મૂલ્યાંકન કરવું.
- વૃદ્ધોના માનસિક અને શારીરિક આરોગ્યનું મૂલ્યાંકન કરવું.
- વૃદ્ધ સ્લમ નિવાસીઓની ગુણવત્તા જીવનનું મૂલ્યાંકન કરવું.
- શહેરી સ્લમના વૃદ્ધો માટે આરોગ્ય (જેમ કે રોગના આંકડા, શારીરિક આરોગ્ય અને માનસિક સુખ), પોષણની સ્થિતિ અને ગુણવત્તા જીવન વચ્ચેના સંબંધોનું અભ્યાસ કરવું.

ભાગીદારીની પ્રક્રિયા:

જો તમે આ સંશોધનમાં ભાગ લેવા માટે સહમત છો:

- તમને વય, સામાજિક-આર્થિક પૃષ્ઠભૂમિ, આરોગ્યનો ઈતિહાસ અને આહારની પરંપરાના વ્યક્તિગત વિગતો પૂરી પાડવાની માંગ કરવામાં આવશે.
- આંકડાકીય માપ (ઊંચાઈ, વજન, BMI) નો સમાવેશ થશે.
- તમારા માનસિક અને શારીરિક આરોગ્ય, તેમજ તમારી ગુણવત્તા જીવન વિશે માહિતી પ્રશ્નાવલીઓ અને વ્યક્તિગત ઈન્ટરવ્યૂ દ્વારા સંકલિત કરવામાં આવશે.

ગોપનીયતા:

તમારી વ્યક્તિગત માહિતી સંપૂર્ણપણે ગોપનીય રાખવામાં આવશે. તમે રેસ્પોન્ડન્ટ કોડ મેળવો છો જેથી અંન્યતા જાળવી શકાય, અને એકત્રિત ડેટા આ કોડ હેઠળ જ સંગ્રહિત કરવામાં આવશે. આ સંશોધનમાંથી ઉપજીવન અને પ્રસ્તુતિઓમાં તમારું નામ અથવા ઓળખાણ પ્રકાશિત નથી કરવામાં આવતી.

જોખમ અને લાભ:

આ સંશોધનમાં ભાગ લેવા સાથે કોઈ જાણીતા જોખમો નથી, અને કોઈ આક્રમક પ્રક્રિયાઓનો ઉપયોગ કરવામાં આવશે.

લાભ: તમે તમારા આરોગ્ય અને પોષણની સ્થિતિમાં મૂલ્યવાન સમજણ મેળવો છો. આ સંશોધનના પરિણામો શહેરના સ્લમોમાં વૃદ્ધોની જાળવણીમાં સુધારો લાવવા માટે સહાયરૂપ બની શકે છે.

સ્વૈચ્છિક ભાગીદારી:

આ સંશોધનમાં ભાગ લેવો સંપૂર્ણપણે સ્વૈચ્છિક છે. તમે કોઈપણ સમયે સંશોધનમાંથી પીછો કરવા માટે સ્વતંત્ર છો, કોઈ પણ નકારાત્મક પરિણામ વિના. ભાગ લેવાનો ઇનકાર અથવા પાછી ખેંચી લેવાથી મહારાજા સયાજીરાવ યુનિવર્સિટી ઓફ બરોડા સાથેના તમારા સંબંધોને અસર થશે નહીં. જો કોઈ વૃદ્ધ ભાગીદારે સંશોધન દરમિયાન આરોગ્ય મૂલ્યાંકન જરૂરિયાત પાઈ હોય, તો તેમને નજીકના આરોગ્યસંભાળ સુવિધા માટે વધુ મૂલ્યાંકન અને કાળજી માટે સંકેત કરવામાં આવશે.

સંપર્ક માહિતી:

જો તમને આ સંશોધન વિશે કોઈ પ્રશ્નો કે ચિંતા હોય, તો તમે સંપર્ક કરી શકો છો:

રિદ્ધિ તરસારીયા	ડૉ. કોમલ ચૌહાન
ફોન: [9054023142]	ફોન: [9898790340]
ઈમેલ: [riddhitarsariya@example.com]	ઈમેલ: [komal.chauhan-fn@msubaroda.ac.in]

સહમતી નિવેદન:

આ સહમતિને ફોર્મ પર સાઇન કરીને, હું આ સંશોધન વિશે આપવામાં આવેલી માહિતી વાંચી અને સમજી છે,

એવી પુષ્ટિ કરું છું. હું સ્વૈચ્છિક રીતે ભાગ લેવા અને સંશોધનના હેતુઓ માટે જરૂરી માહિતી આપવા માટે સંમતિ આપું છું. હું સમજું છું કે હું કોઈપણ સમયે અભ્યાસમાંથી ખસી જઈ શકું છું.

ભાગીદારનું નામ:	વિદ્યાર્થી સાઇન:
સહી:	તારીખ:
તારીખ:	

- Consent form (English)

Study Title:
ASSESSMENT OF THE HEALTH AND NUTRITIONAL STATUS OF ELDERLY MALE AND FEMALE RESIDING IN SLUMS OF URBAN VADODARA

Researcher:
Riddhi Tarsariya, MSc Student, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda
Guide: Dr. Komal Chauhan, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda

Introduction:
I, Riddhi Tarsariya, a student at The Maharaja Sayajirao University of Baroda, am conducting a research study titled "ASSESSMENT OF THE HEALTH AND NUTRITIONAL STATUS OF ELDERLY MALE AND FEMALE RESIDING IN SLUMS OF URBAN VADODARA." This study aims to assess the health, nutritional status, and quality of life of elderly residents living in urban slums and to explore the relationship between health, nutritional status, and quality of life in this population. The study is being conducted under the guidance of Dr. Komal Chauhan.

Purpose of the Study:
This study seeks to evaluate the health, nutritional status, and quality of life of elderly individuals aged 60 years and above residing in slums of urban Vadodara. The specific objectives are:

- To assess the socio-demographic profile of urban slum elderly.

- To assess the nutritional status of elderly residing in urban slums.

- To evaluate the mental and physical health of elderly individuals.

- To examine the quality of life of elderly slum residents.

- To study the relationship between health (including disease profiles, physical health, and mental well-being), nutritional status, and quality of life in urban slum elderly.

Participation Procedures:
If you agree to participate in this study:

- You will be asked to provide personal details including age, socio-economic background, health history, and dietary habits.

- Assessments will include anthropometric measurements such as height, weight and BMI.

- Information about your mental and physical health, as well as your quality of life, will be collected through questionnaires and personal interviews.

Confidentiality:
Your personal information will be kept strictly confidential. A participant code will be assigned to ensure anonymity, and all collected data will be stored under this code. Your name or any identifying information will not appear in any publications or presentations arising from this research.

Risks and Benefits:
There are no known risks associated with participating in this study, and no invasive procedures will be used.
Benefits: You will gain valuable insights into your health and nutritional status. The findings from this study may contribute to further improvements in elderly care within urban slums.

Voluntary Participation:
Participation in this study is entirely voluntary. You are free to withdraw from the study at any time, without any negative consequences. Refusal to participate or withdrawal will not affect your relationship with The Maharaja Sayajirao University of Baroda.

If any elderly participant is found to require a healthcare assessment during the study, they will be referred to the nearest healthcare facility for further evaluation and care.

Contact Information:
If you have any questions or concerns regarding the study, feel free to contact:
Riddhi Tarsariya
Phone: [9054023142]
Email: [riddhitarsariya@example.com]
Dr. Komal Chauhan
Phone: [9898790340]
Email: [komal.chauhan-fn@msubaroda.ac.in]

Consent Statement:
By signing this consent form, I confirm that I have read and understood the information provided about the study. I voluntarily agree to participate and to provide the required information for research purposes. I understand that I may withdraw from the study at any time.

Participant's Name: _____

Signature: _____

Date: _____

Researcher's Signature: _____

Date: _____

Section 1: SOCIO DEMOGRAPHIC STATUS

1. Area of slum: Date:
2. Zone of the slums:
3. Contact Number:
4. Gender of elderly:
5. Name of respondent:
   - Address:
   - Phone No:
   - Date of Birth:
   - Age:
6. Marital Status of elderly:
A. Unmarried
B. Married
C. Widow / widower
D. Separated
E. Anyother

7. You are the head of the family?
A. Yes
B. No

8. Current Occupations of elderly:
A. Service
B. Professional
C. Business
D. Self employed
E. Retired
F. Housewife
G. Other

9. Ethnic group:
A. Gujarati
B. Non-Gujarati

10. Type of Dwelling:
A. Temporary shelter (e.g., shack)
B. Permanent house
C. Apartment

11. Ownership of Residence:
A. Owned
B. Rented
C. Occupied without formal ownership (squatting)

12.   Crowding Index:
A.   Number of people per room: _____

13.   Where were you born?
A.   City
B.   Village
C.   Region (specify): _____
D.   Country: _____

14.   How long have you lived in this slum area?
A.   Less than 1 year
B.   1–5 years
C.   5–10 years
D.   More than 10 years

15.   Where did you live before moving to this slum?
A.   Rural area
B.   Urban area
C.   Not applicable (I have always lived here)

16.   What was the main reason for moving to this slum?
A.   Economic opportunity
B.   Displacement (e.g., due to natural disaster or conflict)
C.   Family reasons
D.   Other (please specify): _____

Access to Government and Social Services
17.   Are you utilizing any of the following government welfare schemes?
A.   Yes, I receive food assistance (e.g., ration or free meals).
B.   Yes, I receive housing support (e.g., subsidized housing or rent assistance).
C.   Yes, I receive medical subsidies (e.g., free or reduced-cost healthcare).
D.   Yes, I receive senior citizen benefits (e.g., special allowances or support for the elderly).
E.   No, I do not receive any of these benefits, but I have applied.
F.   No, I do not receive any benefits and have not applied.
G.   I am not aware of these schemes.

18.   Are you currently receiving any social security benefits, such as a pension or disability allowance?
A.   Yes, I receive a pension.
B.   Yes, I receive a disability allowance.
C.   Yes, I receive both a pension and a disability allowance.
D.   No, I do not receive any benefits, but I have applied.
E.   No, I do not receive any benefits and I have not applied.
F.   I am not aware of these benefits.

19.   Do you receive support from any non-governmental organizations (NGOs) or charitable groups?
A.   Yes, I receive food assistance.
B.   Yes, I receive healthcare support.
C.   Yes, I receive shelter or housing assistance.
D.   Yes, I receive multiple types of support (food, healthcare, shelter).
E.   No, I do not receive any support from NGOs.
F.   I am not aware of any NGO or charitable support available.

20.   If yes then specify: _____

21.   Resident in Gujarat since:
A.   <10 years
B.   >10 years

22.   Storage of water:
A.   Overhead water tank
B.   Underground water tank

23.   Source of drinking water and filtration technique
A.   RO purifier water
B.   Aqua guard
C.   Municipality taps
D.   Own tape

24.   Drainage facility
A.   Open defecations
B.   Closed defecation

25.   Current Living status:
A.   Alone
B.   With spouse
C.   With family

26.   Caretaker of the Elderly
A.   Family member
B.   Spouse
C.   Self
D.   Other

27.   Socio economic status (Kuppuswami scale, 2024)

Education of the head	Score
Profession or honors	7

Graduate	6
Intermediate or diploma	5
High school certificate	4
Middle school certificate	3
Primary school certificate	2
Illiterate	1

1. Occupational of the head

Occupation of the head	Score
Legislatore, senior officials and managers	10
Professionals	9
Technicians and associate professionals	8
Clerks	7
Skilled workers and shop and market sales workers	6
Skilled agricultural and fishery workers	5
Craft and related trade workers	4
Plant and machine operators and assemblers	3
Elementary occupation	2
Unemployed	1

2.   Socio-economic class.

Socioeconomic Status Classification	Score
Upper Class	26–29
Upper Middle Class	16–25
Lower Middle Class	11–15

Upper Lower Class	5–10
Lower Class	<5

3.   Family monthly income.

Updates monthly daily income in rupees (2024)	score
2,13,814 and above	12
1,06,850-2,13,813	10
80,110-1,06,849	6
53,361-80,109	4
31,978-53,360	3
10,703-31,977	2
<10,702	1

Section 2: Anthropometric Assessment

- Height: _____
- Weight: _____
- BMI: _____
- Waist circumference: _____
- Hip circumference: _____
- WHR: _____
- Calf Circumference (CC): _____
- MUAC: _____

Section 3: Dietary and Nutritional Assessment

- **Dietary habits (food frequency questionnaire)**

Food item	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Cereals and millets							
Rice (puffed)							
Rice (flakes)							
Rice (parboiled)							
Rice (raw milled)							
Wheat flour (whole)							
Wheat flour(refined)							
White bread							
Brown bread							
Semolina							
Jowar							
Maize							
Bajra							
Others (specify)							
Pulses and legumes							
Bengal gram (dal)							
Bengal gram(whole)							
Black gram(dal)							

Black gram(whole)						
Cowpea						
Green gram (dal)						
Peas dry						
Horse gram						
Lentil dal						
Red gram (whole)						
Rajmah						
Soyabeen						
Others(specify)						
Leafy vegetables						
Amaranth						
Cabbage						
Colocasia						
Fenugreek leaves						
Mustard leaves						
Spinach						
Mint						
Others(specify)						
Other vegetables						
Bitter gourd						
Cauliflower						
Brinjal						
Ladies finger						
Capsicum						
Bottle gourd						
Kankoda						
Kovai						
Peas green						
Cucumber						
Drumstick						
French beans						
Others						
Roots and tubers						
Potato						
Carrot						
Onion						
Radish						
Beet root						
Yam						
Sweet potato						

Tapioca						
Others						
Milk and milk products						
Toned milk						
Whole milk						
Low fat milk						
Curd						
Panner						
Koya						
Other						
Nuts and oil seed						
Ground nut						
Sesame seeds						
Coconut						
Cashew						
Almonds						
Pistachio						
Walnut						
Others						
Fruits						
Apple						
Banana						
Orange						
Mango						
Papaya						
Grapes						
Musk melon						
Custard apple						
Jamun						
Sapota						
Amla						
Dried fruits (raisins)						
Flesh food						
Egg						
Chicken						
Fish						
Fats and oils						
Oil-single						
Oil-blend						
Ghee						
Others						
Sugar and jaggery						
Sugar						
Jaggery						

Honey						
Other(specify)						
RTE						
Biscuits (specify)						
Jam/bread						
Pickle						
Sweets						
Instant noodles						
Chivda, Gathiya						
Ice-cream(specify)						
Soft drinks						
Cornflakes						
Muesli						
Others						

- 24Hr dietary recall

Day	Meal time	Name of the food stuff	Ingredients	Raw weight(g)	Cooked weight
Day 1	Breakfast				
	Mid-morning				
	Lunch				
	Evening tea				
	Dinner				
Day 2	Breakfast				
	Mid-morning				
	Lunch				
	Evening tea				
	Dinner				
Day 3	Breakfast				
	Mid-morning				
	Lunch				
	Evening tea				
	Dinner				

- **Mini Nutritional Assessment**

Mini Nutritional Assessment
MNA®

Nestlé NutritionInstitute

Last name:		First name:	
Sex:	Age:	Weight, kg:	Height, cm:	Date:

Complete the screen by filling in the boxes with the appropriate numbers.
Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake ☐

B Weight loss during the last 3 months
0 = weight loss greater than 3kg (6.6lbs)
1 = does not know
2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs)
3 = no weight loss ☐

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out ☐

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes   2 = no ☐

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems ☐

F Body Mass Index (BMI) (weight in kg) / (height in m^2)
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater ☐

Screening score (subtotal max. 14 points) ☐☐
12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished
For a more in-depth assessment, continue with questions G-R

Assessment

G Lives independently (not in nursing home or hospital)
1 = yes   0 = no ☐

H Takes more than 3 prescription drugs per day
0 = yes   1 = no ☐

I Pressure sores or skin ulcers
0 = yes   1 = no ☐

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals ☐

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yoghurt) per day   yes ☐ no ☐
- Two or more servings of legumes or eggs per week   yes ☐ no ☐
- Meat, fish or poultry every day   yes ☐ no ☐
0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes ☐.☐

L Consumes two or more servings of fruit or vegetables per day?
0 = no   1 = yes ☐

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups ☐.☐

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem ☐

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem ☐

P In comparison with other people of the same age, how does the patient consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better ☐.☐

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC 22 or greater ☐.☐

R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater ☐

Assessment (max. 16 points) ☐☐.☐
Screening score ☐☐.☐
Total Assessment (max. 30 points) ☐☐☐.☐

Malnutrition Indicator Score
24 to 30 points ☐   Normal nutritional status
17 to 23.5 points ☐   At risk of malnutrition
Less than 17 points ☐   Malnourished

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For more information: www.mna-elderly.com

Section 4: Morbidity profile

- **MAJOR ILLNESSES (Checklist for major illnesses at the time of interview)**

PROBLEMS OF ORAL CAVITY	Y	N	Dyspepsia (indigestion)	Y	N
Ulcers			Peptic ulcer		
Inflammation of tongue			Appendicitis		
Excess salivation			**PROBLEMS OF RESPIRATORY TRACT**		
Lack of salivation			Recurrent cold		
Altered salivation			Spells of sneezing		
Missing or broken teeth			Running nose		
Full/partial denture			Laryngitis/ cough		
Caries/ toothache			Hoarse voice / pain in swallowing		
Swollen/ sore gums			Irritating dry cough with pain & discomfort		
Problems of chewing			Asthma		
Oral cancer			Lower respiratory tract problems		
GASTROINTESTINAL TRACT			Lung cancer		
Heartburn			Tuberculosis		
Fullness/ gaseous distention			**PSYCHOLOGICAL PROBLEMS**		
Flatulence			Tension		
Abdominal pain			Disturbed sleep		
Diarrhea			Sudden/gradual onset dimness of vision		
Constipation			Double vision		
Altered stools			Dysphagia		
Drop attacks			Speech problem		
Convulsive attacks			Jaundice		
Difficulty in hearing					

- **MINOR ILLNESSES Checklist for minor illnesses (Reference period – 15 days**

Minor Health Problem	Yes	No		Yes	No
Malaria			Body aches		
Infections			a) back pain		
a) throat			b) head ache		
b) skin			c) muscle pain		
c) eyes			Pain in joints		
Vomiting			Dizziness		
Diarrhea			Dryness of skin		
Constipation			Trembling of limbs		
Indigestion			Sleep disturbance		

Gas/flatulence			Low mood		
Chest pain			Lethargy		
Other			Lack of appetite		

Section 5: Mental Health Assessment

- ## Geriatric Depression Scale

1. Are you basically satisfied with your life?   Yes / No

2. Have you dropped out of many of your interests & activities?   Yes / No

3. Do you feel that your life is empty?   Yes / No

4. Do you often get bored?   Yes / No

5. Are you hopeful about the future?   Yes / No

6. Are you bothered by thoughts you can't get out of your head?   Yes / No

7. Are you in good spirits most of the time?   Yes / No

8. Are you afraid that something bad is going to happen to you?   Yes / No

9. Do you feel happy most of the time?   Yes / No

10. Do you often feel helpless?   Yes / No

11. Do you often get restless and fidgety?   Yes / No

12. Do you prefer to stay home rather than going out & doing new things?   Yes /No

13. Do you frequently worry about the future?   Yes / No

14. Do you feel you have more problems with memory than other people?   Yes / No

15. Do you think it is wonderful to be alive now?   Yes / No

16. Do you often feel downhearted and blue?   Yes / No

17. Do you feel pretty worthless the way you are now?   Yes / No

18. Do you worry a lot about the past?   Yes / No

19. Do you find life very exciting?   Yes / No

20. Is it hard for you to get started on new projects?   Yes / No

21. Do you feel full of energy?   Yes / No

22. Do you feel that your situation is hopeless?   Yes / No

23. Do you think that most people are better off than you are?   Yes / No

24. Do you frequently get upset over little things?   Yes / No

25. Do you frequently feel like crying?   Yes / No

26. Do you have trouble concentrating?   Yes / No

27. Do you enjoy getting up in the morning?   Yes / No

28. Do you prefer to avoid social gatherings?   Yes / No

29. Is it easy for you to make decisions?   Yes / No

30. Is your mind as clear as it used to be?   Yes / No

KEY:

Categories	Score
Normal	1-10
Mild	11-15
Moderate	16 – 20
Severe	≥ 21

Source: Yesavage et al, 1983

- ## 6-items Cognitive Impairment Test (6 CIT)

ITEM	MAX ERROR	SCORE	WEIGHT
1. What year is it now?	1	------x4=	--------
2. What month is it now?	1	-------x3=	---------
MEMORY PHASE Repeat this after me, sudhaben patel 24, sardarnagar soc. Nizampura , baroda.			

3. What time is it? Within 1 hr	1	-------x3=	---------
4. Count backwards 20 to 1	2	-------x2=	-------
5. Say the months in reverse order	2	-------x2=	--------
6. Repeat the memory phase	5	-------x2=	_____
		Total=---------	_____

KEY:

Categories	**Scores**
Normal	0-10
Abnormal	11-28

Source: Katzman et.al, 1983

Section 6: Physical Functioning Assessment

- **Activities of Daily living (ADL)**

Table 1. Katz Index of Independence in Activities of Daily Living

Activities (1 or 0 points)	Independence (1 point)*	Dependence (0 points)†
Bathing Points: _____	Bathes self completely or needs help in bathing only a single part of the body, such as the back, genital area, or disabled extremity	Needs help with bathing more than one part of the body, getting in or out of the bathtub or shower; requires total bathing
Dressing Points: _____	Gets clothes from closets and drawers, and puts on clothes and outer garments complete with fasteners; may need help tying shoes	Needs help with dressing self or needs to be completely dressed
Toileting Points: _____	Goes to toilet, gets on and off, arranges clothes, cleans genital area without help	Needs help transferring to the toilet and cleaning self, or uses bedpan or commode
Transferring Points: _____	Moves in and out of bed or chair unassisted; mechanical transfer aids are acceptable	Needs help in moving from bed to chair or requires a complete transfer
Fecal and urinary continence Points: _____	Exercises complete self-control over urination and defecation	Is partially or totally incontinent of bowel or bladder
Feeding Points: _____	Gets food from plate into mouth without help; preparation of food may be done by another person	Needs partial or total help with feeding or requires parenteral feeding

Total points‡: _____

*—No supervision, direction, or personal assistance.

†—With supervision, direction, personal assistance, or total care.

‡—Score of 6 = high (patient is independent); score of 0 = low (patient is very dependent).

Adapted with permission from Katz S, Downs TD, Cash HR, Grotz RC. Progress in development of the index of ADL. Gerontologist. 1970;10(1):23.

- **Instrumental Activity of Daily Living**

Table 2. Lawton Instrumental Activities of Daily Living Scale (Self-Rated Version)

For each question, circle the points for the answer that best applies to your situation.

1. Can you use the telephone?
   - Without help — 3
   - With some help — 2
   - Completely unable to use the telephone — 1
2. Can you get to places that are out of walking distance?
   - Without help — 3
   - With some help — 2
   - Completely unable to travel unless special arrangements are made — 1
3. Can you go shopping for groceries?
   - Without help — 3
   - With some help — 2
   - Completely unable to do any shopping — 1
4. Can you prepare your own meals?
   - Without help — 3
   - With some help — 2
   - Completely unable to prepare any meals — 1
5. Can you do your own housework?
   - Without help — 3
   - With some help — 2
   - Completely unable to do any housework — 1
6. Can you do your own handyman work?
   - Without help — 3
   - With some help — 2
   - Completely unable to do any handyman work — 1
7. Can you do your own laundry?
   - Without help — 3
   - With some help — 2
   - Completely unable to do any laundry — 1

8a. Do you use any medications?
   - Yes (If "yes," answer question 8b) — 1
   - No (If "no," answer question 8c) — 2

8b. Do you take your own medication?
   - Without help (in the right doses at the right time) — 3
   - With some help (take medication if someone prepares it for you or reminds you to take it) — 2
   - Completely unable to take own medication — 1

8c. If you had to take medication, could you do it?
   - Without help (in the right doses at the right time) — 3
   - With some help (take medication if someone prepares it for you or reminds you to take it) — 2
   - Completely unable to take own medication — 1

9. Can you manage your own money?
   - Without help — 3
   - With some help — 2
   - Completely unable to handle money — 1

NOTE: *Scores have meaning only for a particular patient (e.g., declining scores over time reveal deterioration). Some questions may be sex-specific and can be modified by the interviewer.*

Adapted with permission from Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. Gerontologist. 1969;9(3):181.

Section 7: WHOQOL-BREF

ABOUT YOU

I.D. number ☐☐☐☐

Before you begin we would like to ask you to answer a few general questions about yourself: by circling the correct answer or by filling in the space provided.

What is your **gender**?	Male Female	
What is your **date of birth**?	_____ / _____	/ _____
	Day / Month	/ Year
What is the highest **education** you received?	None at all	
	Primary school	
	Secondary school	
	Tertiary	
What is your **marital status**?	Single	Separated
	Married	Divorced
	Living as married	Widowed

Are you currently **ill**? Yes   No

If something is wrong with your health what do you think it is?_____

Instructions

This assessment asks how you feel about your quality of life, health, or other areas of your life. **Please answer all the questions.** If you are unsure about which response to give to a question, **please choose the one** that appears most appropriate. This can often be your first response.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life **in the last two weeks.** For example, thinking about the last two weeks, a question might ask:

		Not at all	Not much	Moderately	A great deal	Completely
	Do you get the kind of support from others that you need?	1	2	3	4	5

You should circle the number those best fits how much support you got from others over the last two weeks. So, you would circle the number 4 if you got a great deal of support from others as follows.

		Not at all 1	Not much 2	Moderately 3	A great deal	Completely 5
	Do you get the kind of support from others that you need?				(4)	

You would circle number 1 if you did not get any of the support that you needed from others in the last two weeks. Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

THE WHOQOL-BREF

		Very poor	Poor	Neither poor nor good	Good	Very good
1 (G1)	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2 (G4)	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last two weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3 (F1.4)	To what extent do you feel that (physical) pain prevents you from doing what you need to do?	1	2	3	4	5
4 (F11.3)	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
5 (F4.1)	How much do you enjoy life?	1	2	3	4	5
6 (F24.2)	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
7 (F5.3)	How well are you able to concentrate?	1	2	3	4	5
8 (F16.1)	How safe do you feel in your daily life?	1	2	3	4	5
9 (F22.1)	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last two weeks.

		Not at all	A little	Moderately	Mostly	Completely
10 (F2.1)	Do you have enough energy for everyday life?	1	2	3	4	5
11 (F7.1)	Are you able to accept your bodily appearance?	1	2	3	4	5
12 (F18.1)	Have you enough money to meet your needs?	1	2	3	4	5
13 (F20.1)	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14 (F21.1)	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
15 (F9.1)	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last two weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16 (F3.3)	How satisfied are you with your sleep?	1	2	3	4	5

17 (F10.3)	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18 (F12.4)	How satisfied are you with your capacity for work?	1	2	3	4	5
19 (F6.3)	How satisfied are you with yourself?	1	2	3	4	5
20 (F13.3)	How satisfied are you with your personal relationships?	1	2	3	4	5
21 (F15.3)	How satisfied are you with your sex life?	1	2	3	4	5
22 (F14.4)	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23 (F17.3)	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24 (F19.3)	How satisfied are you with your access to health services?	1	2	3	4	5
25 (F23.3)	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last two weeks.

		Never	Seldom	Quite often	Very often	Always
26 (F8.1)	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Did someone help you to fill out this form?.. How long did it take to fill this form out?..