

"Burden, patterns, and economic impact of multimorbidity among older adults in India: a community-based cross-sectional mixed-methods study."

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Abstract

Background:

Multimorbidity, defined as the coexistence of two or more chronic conditions, is increasingly prevalent among the elderly in India. It significantly impacts healthcare utilization and financial burden, yet remains underexplored in integrated frameworks combining epidemiology, health economics, and patient perspectives.

Objectives:

To estimate the prevalence and patterns of multimorbidity, assess healthcare utilization, evaluate out-of-pocket expenditure (OOPE), and explore patient experiences among elderly individuals in rural and urban settings.

Methods:

A community-based cross-sectional mixed-methods study was conducted among 600 elderly participants (≥ 60 years) selected through multistage stratified sampling from rural and urban field practice areas. Quantitative data included socio-demographic characteristics, morbidity profile, healthcare utilization, and expenditure. Multimorbidity patterns were analyzed using cluster analysis, while logistic regression identified predictors. Catastrophic health expenditure was defined as OOPE $\geq 10\%$ of household income. Qualitative data were obtained through in-depth interviews and analyzed thematically.

Results:

The prevalence of multimorbidity was 48.5% (95% CI: 44.5–52.5), higher in urban (54.2%) than rural areas (42.8%). The most common conditions were hypertension (58%), diabetes (42%), and osteoarthritis (37%). Three dominant clusters emerged: cardiometabolic, musculoskeletal, and respiratory. Multimorbidity was significantly associated with age ≥ 70 years (AOR 2.1), female gender (AOR 1.6), and low physical activity (AOR 1.9). Mean annual OOPE was ₹18,600, with 32% experiencing catastrophic expenditure. Qualitative findings highlighted financial distress, fragmented care, and lack of geriatric-friendly services.

Conclusion:

Multimorbidity poses a substantial clinical and economic burden among elderly individuals, with marked rural–urban disparities. Strengthening integrated primary care and financial risk protection is essential.

Recommendations:

Based on the present study, it is recommended to strengthen integrated multimorbidity care at the primary healthcare level, improve access to affordable essential medicines and geriatric services, and expand financial risk protection.

Keywords: Multimorbidity, Elderly, Out-of-pocket expenditure, Healthcare utilization, India, Community Medicine

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INTRODUCTION

Population ageing is a global phenomenon that is reshaping health systems across both developed and developing nations. India, traditionally characterized by a young demographic profile, is now undergoing a rapid demographic transition due to declining fertility rates and increasing life expectancy. According to recent

projections, the proportion of individuals aged 60 years and above is expected to rise substantially in the coming decades, transforming the population structure and increasing the dependency ratio. This shift presents significant challenges for the healthcare system, which has historically been oriented toward maternal–child

health and communicable diseases rather than chronic and age-related conditions.¹

Ageing is intrinsically associated with a higher prevalence of chronic non-communicable diseases (NCDs), including hypertension, diabetes mellitus, cardiovascular diseases, chronic respiratory diseases, and musculoskeletal disorders. Unlike younger populations, elderly individuals often experience multiple coexisting conditions, a phenomenon termed multimorbidity, typically defined as the presence of two or more chronic diseases in a single individual. Multimorbidity is not merely the sum of individual diseases but represents a complex clinical state characterized by interactions between conditions, leading to greater functional impairment, increased risk of disability, and reduced quality of life.²

The implications of multimorbidity extend beyond clinical outcomes. Individuals with multiple chronic conditions often require frequent healthcare visits, long-term medication use, and coordinated care across different specialties. This results in increased healthcare utilization, polypharmacy, and a higher likelihood of adverse drug reactions and drug-drug interactions. Furthermore, multimorbidity has been consistently associated with increased hospitalization rates and mortality, making it a critical public health concern, particularly in ageing populations.³

In low- and middle-income countries like India, the burden of multimorbidity is further exacerbated by systemic challenges. Healthcare infrastructure remains unevenly distributed, with significant disparities between rural and urban areas. While urban regions may have better access to specialized services, they are often associated with higher costs, leading to inequitable access. Rural areas, on the other hand, frequently suffer from shortages of trained healthcare professionals, inadequate diagnostic facilities, and limited availability of essential medicines. Additionally, geriatric care services are still in a nascent stage, and there is a lack of integrated care models specifically designed to address the needs of elderly individuals with multiple chronic conditions.⁴

A major concern in the Indian context is the high level of out-of-pocket expenditure (OOPE) on healthcare, which accounts for a substantial proportion of total health spending. For elderly individuals with multimorbidity, the financial burden is particularly severe due to the need for continuous treatment, medications, and periodic investigations. This often leads to catastrophic health expenditure, defined as healthcare spending that exceeds a certain proportion of household income, pushing families into poverty or forcing them to adopt coping mechanisms such as borrowing money or selling assets. Despite the implementation of various health insurance schemes and government initiatives, financial risk protection remains inadequate for a large segment of the population.⁵

Existing research in India has predominantly focused on individual chronic diseases, such as hypertension and

diabetes, often in isolation. While these studies provide valuable insights into disease-specific epidemiology, they fail to capture the complex interplay of multiple conditions that characterize multimorbidity. Moreover, there is a relative paucity of studies that simultaneously examine multimorbidity, healthcare utilization patterns, and economic burden within a unified framework. Rural-urban disparities in multimorbidity prevalence, access to care, and financial impact are also underexplored. Equally important is the limited attention given to patient perspectives, which are essential for understanding barriers to care, treatment adherence, and health-seeking behavior.⁶

Addressing multimorbidity requires a comprehensive and multidimensional approach that integrates epidemiological assessment with economic evaluation and health system analysis. It is essential to identify patterns of disease clustering, understand the determinants of multimorbidity, and evaluate how individuals navigate the healthcare system in managing multiple conditions. Additionally, incorporating qualitative insights into patient experiences can provide a deeper understanding of the challenges faced by elderly individuals, including issues related to accessibility, affordability, and continuity of care.⁷

In this context, the present study aims to bridge these gaps by conducting a community-based mixed-methods assessment of multimorbidity among elderly individuals in both rural and urban settings. By combining quantitative analysis of disease patterns, healthcare utilization, and financial burden with qualitative exploration of patient experiences, the study seeks to generate comprehensive evidence that can inform policy decisions and strengthen healthcare delivery systems for the ageing population in India.

Objectives

1. To estimate the prevalence and patterns of multimorbidity among elderly individuals.
2. To assess healthcare utilization patterns (public vs private).
3. To evaluate out-of-pocket expenditure and catastrophic health spending.
4. To identify socio-demographic and behavioral determinants of multimorbidity.
5. To explore patient experiences regarding access to healthcare and financial burden.

MATERIALS AND METHODS

Study Design and Setting

A community-based cross-sectional mixed-methods study was conducted from 1 May 2025 to 31 May 2026 in the rural and urban field practice areas of Mahabodhi Medical College, Gaya, Bihar, India. The quantitative component employed a cross-sectional design to assess the prevalence and patterns of multimorbidity, healthcare utilization, out-of-pocket expenditure, catastrophic health

expenditure, and associated socio-demographic and behavioral factors among elderly individuals. The qualitative component consisted of in-depth interviews with purposively selected participants to explore their experiences regarding healthcare access, financial burden, and coping mechanisms.

Mahabodhi Medical College is a tertiary-care teaching institution providing comprehensive healthcare services through its associated hospital, including outpatient and inpatient care, emergency services, diagnostic facilities, and various specialty and super-specialty services. The community-based component of the study was conducted in the institution's designated rural and urban field practice areas.

Study Population

The study population comprised individuals aged 60 years and above who had been residing in the study area for at least one year. Participants who were severely ill or unable to respond were excluded. A total of 600 elderly participants were included, with 300 recruited from rural areas and 300 from urban areas using multistage stratified random sampling. One eligible elderly individual was selected from each sampled household.

Sample Size

The sample size was calculated using the formula ($n = Z^2pq/d^2$), assuming an anticipated prevalence of multimorbidity of 40%, 5% absolute precision, and a 95% confidence level. Thus, ($n = (1.96)^2 * 40 * 60/(5)^2 = 368.8$), giving a minimum sample size of 369 participants. Considering the multistage sampling technique, a design effect of 1.5 was applied, resulting in a sample size of 554 participants. Allowing for approximately 8% non-response or incomplete information, the adjusted sample size was approximately 600 participants. For operational feasibility and equal representation of rural and urban populations, the final sample size was 600 participants, comprising 300 participants from rural areas and 300 from urban areas.

Sampling Technique

Multistage stratified random sampling was used. In the first stage, rural villages and urban wards were selected. In the second stage, households were selected systematically. One eligible elderly individual per household was interviewed.

Data Collection

Data collection for the quantitative component was carried out using a pre-tested, structured questionnaire administered through face-to-face interviews with eligible elderly participants. The questionnaire was developed after an extensive review of relevant literature and standardized survey tools, and was subsequently validated by subject experts in Community Medicine. A pilot study was conducted on a small subset of participants outside

the study area to assess clarity, feasibility, and reliability, following which necessary modifications were made.

The questionnaire comprised multiple sections. The socio-demographic profile included information on age, gender, marital status, educational status, occupation (current or prior), type of family (nuclear/joint), and socio-economic status assessed using a standard scale. Lifestyle factors were assessed by collecting data on smoking status (current, former, never), alcohol consumption, dietary habits, and level of physical activity. Physical activity was evaluated based on routine daily activities and categorized into adequate or inadequate according to standard recommendations.

The morbidity profile was documented through a combination of self-reported history and verification from available medical records such as prescriptions, diagnostic reports, and treatment cards. Participants were specifically asked about the presence of chronic conditions diagnosed by a registered medical practitioner, including but not limited to hypertension, diabetes mellitus, chronic respiratory diseases, cardiovascular diseases, arthritis, and other long-standing illnesses. To minimize recall bias, participants were probed regarding duration of illness, ongoing treatment, and follow-up practices.

Information on healthcare utilization was collected with reference to the preceding six months. This included the number and type of healthcare visits (outpatient or inpatient), type of healthcare facility utilized (public or private), frequency of consultations, hospital admissions, and use of diagnostic services. Details regarding preference for healthcare providers and reasons for choosing specific facilities were also noted.

Assessment of out-of-pocket expenditure (OOPE) was a critical component of the study. Participants were asked to provide detailed information on healthcare-related expenses incurred over the last six months, including costs for consultations, medications, laboratory investigations, hospitalization, and transportation. These expenditures were then annualized to estimate yearly OOPE. Efforts were made to ensure accuracy by cross-checking with bills, prescriptions, and other available documents wherever possible.

For analysis, multimorbidity was operationally defined as the presence of two or more chronic conditions in an individual at the time of the survey. Additionally, catastrophic health expenditure was defined as out-of-pocket health spending exceeding 10% of the total annual household income, a commonly used threshold in health economics to indicate significant financial burden. These standardized definitions enabled uniform assessment and comparability with existing literature.

Qualitative Component

The qualitative component of the study involved conducting in-depth interviews with 30 purposively selected participants to gain a deeper understanding of

their lived experiences in managing multimorbidity. A semi-structured interview guide was developed based on study objectives and existing literature, allowing flexibility to explore emerging themes while maintaining consistency across interviews. Participants were selected to ensure variation in age, gender, socio-economic status, and rural-urban residence, thereby capturing diverse perspectives. Each interview was conducted in a local language, in a private and comfortable setting, and lasted approximately 30–45 minutes. Prior informed consent was obtained, and confidentiality was ensured throughout the process.

The interviews primarily explored three major domains. First, healthcare access, including participants' experiences in seeking care for chronic conditions, availability and accessibility of healthcare facilities, perceived quality of services, waiting times, distance to facilities, and challenges faced in navigating the healthcare system. Participants were also asked about their preferences for public versus private healthcare and the factors influencing these choices.

Second, the domain of financial burden focused on understanding the economic implications of managing multiple chronic illnesses. Participants described their expenditure on medications, consultations, and hospitalizations, as well as indirect costs such as transportation and loss of income. Special attention was given to identifying instances of financial distress, including borrowing money, selling assets, or depending on family members for support.

Third, coping mechanisms were explored to understand how individuals and households manage the dual burden of disease and financial strain. This included strategies such as prioritizing certain treatments over others, medication non-adherence due to cost, reliance on traditional remedies, social support systems, and utilization of government health schemes.

All interviews were audio-recorded with permission, transcribed verbatim, and translated into English where necessary. The data were analyzed using thematic analysis, involving coding, categorization, and

identification of recurring patterns and themes. This qualitative exploration provided rich contextual insights that complemented the quantitative findings, particularly in understanding barriers to care and the real-world impact of multimorbidity on elderly individuals.

Bias

Potential bias was minimized by using multistage random sampling for participant selection. Information and recall bias were reduced through a pre-tested questionnaire and verification of morbidity, healthcare utilization, and expenditure using available medical records and bills. Non-response was considered during sample size estimation. For the qualitative component, purposive sampling ensured diversity in participant characteristics, and standardized semi-structured interviews were used.

Statistical Analysis

All data were entered, coded, and analyzed using IBM SPSS Statistics. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and proportions. Binary logistic regression analysis was performed to identify independent predictors of multimorbidity, with results expressed as adjusted odds ratios (AOR) and 95% confidence intervals. Cluster analysis was applied to identify patterns of coexisting chronic conditions. Qualitative data from in-depth interviews were analyzed using thematic analysis, involving coding and identification of key themes. A p-value <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of the Institute before commencement of the study. Written informed consent was obtained from all participants before enrolment. Confidentiality and privacy of participants were maintained throughout the study.

RESULTS

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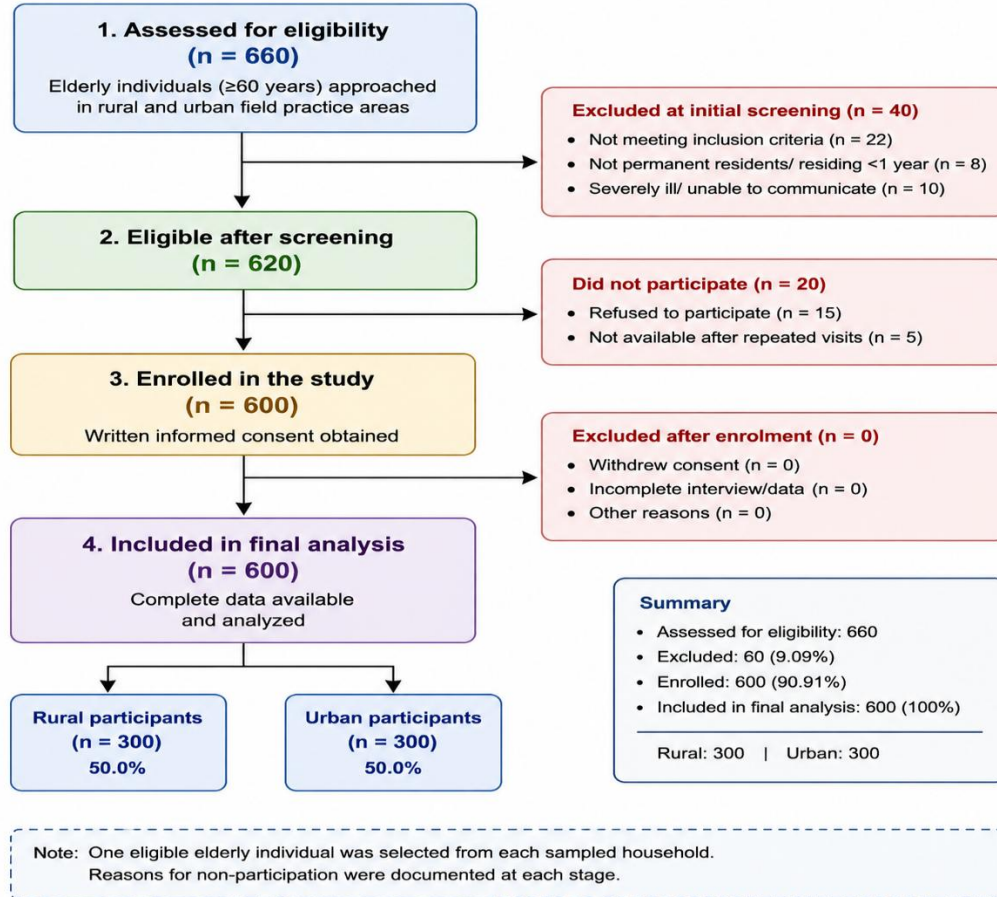


Table 1: Sociodemographic details of study subjects

Variable	Rural (n=300)	Urban (n=300)	Total (n=600)	p-value
Mean Age (years)	67.8 ± 6.5	69.0 ± 6.8	68.4 ± 6.7	0.08
Gender				0.32
• Male	150 (50%)	138 (46%)	288 (48%)	
• Female	150 (50%)	162 (54%)	312 (52%)	
Socio-economic Status				<0.01
• Lower class	210 (70%)	150 (50%)	360 (60%)	
• Others	90 (30%)	150 (50%)	240 (40%)	
Literacy Status				<0.01
• Literate	105 (35%)	183 (61%)	288 (48%)	
• Illiterate	195 (65%)	117 (39%)	312 (52%)	
Multimorbidity Present	128 (42.8%)	163 (54.2%)	291 (48.5%)	<0.01
Common Morbidities				
• Hypertension	162 (54%)	186 (62%)	348 (58%)	0.04
• Diabetes	102 (34%)	150 (50%)	252 (42%)	<0.01
• Osteoarthritis	120 (40%)	102 (34%)	222 (37%)	0.12
• Chronic Respiratory Disease	78 (26%)	48 (16%)	126 (21%)	<0.01

The study included 600 participants equally distributed between rural and urban areas. The mean age was comparable between groups (67.8 vs 69.0 years; $p=0.08$). Gender distribution was also similar, with a slight female predominance overall (52%), and no statistically

significant difference between rural and urban populations ($p=0.32$). However, significant differences were observed in socio-economic and educational status, with a higher proportion of lower socio-economic class (70% vs 50%)

and illiteracy (65% vs 39%) in rural areas compared to urban areas ($p<0.01$).

The prevalence of multimorbidity was significantly higher in urban participants (54.2%) compared to rural (42.8%) ($p<0.01$). Among individual morbidities, hypertension and diabetes were significantly more common in urban populations ($p=0.04$ and $p<0.01$,

respectively), while chronic respiratory diseases were significantly higher in rural areas (26% vs 16%, $p<0.01$). Osteoarthritis was more prevalent in rural participants (40% vs 34%), although this difference was not statistically significant ($p=0.12$). Overall, the findings indicate marked rural–urban disparities in socio-economic factors, disease burden, and multimorbidity patterns.

Table 2: Determinants of Multimorbidity among Study Participants (Logistic Regression Analysis)

Variable	Multimorbidity Present (%)	AOR (95% CI)	p-value
Age ≥ 70 years	62%	2.1 (1.4–3.2)	<0.01
Female Gender	52%	1.6 (1.1–2.4)	0.03
Urban Residence	54.2%	1.5 (1.0–2.2)	0.04
Physical Inactivity	59%	1.9 (1.3–2.8)	<0.01
Low Socio-economic Status	50%	1.3 (0.9–1.9)	0.11

Multivariate logistic regression analysis identified several significant determinants of multimorbidity among the study participants. Individuals aged ≥ 70 years had significantly higher odds of multimorbidity (AOR 2.1; 95% CI: 1.4–3.2; $p<0.01$), indicating a strong association with advancing age. Female participants were also at increased risk (AOR 1.6; 95% CI: 1.1–2.4; $p=0.03$). Urban residence showed a modest but statistically significant association (AOR 1.5; 95% CI: 1.0–2.2;

$p=0.04$). Physical inactivity emerged as an important modifiable risk factor, with nearly twofold higher odds of multimorbidity (AOR 1.9; 95% CI: 1.3–2.8; $p<0.01$). Although low socio-economic status showed increased odds (AOR 1.3), the association was not statistically significant ($p=0.11$). Overall, age, gender, residence, and lifestyle factors were key contributors to multimorbidity in this population.

Table 3: Healthcare Utilization Pattern among Participants

Variable	Rural (n=300)	Urban (n=300)	Total (n=600)	p-value
Preferred Facility				<0.01
• Public	156 (52%)	78 (26%)	234 (39%)	
• Private	144 (48%)	222 (74%)	366 (61%)	
Hospitalization (last 6 months)	54 (18%)	72 (24%)	126 (21%)	0.06
Regular Follow-up	168 (56%)	210 (70%)	378 (63%)	<0.01

The healthcare utilization pattern showed significant rural–urban differences. A majority of urban participants preferred private healthcare facilities (74%) compared to rural participants, who more commonly utilized public services (52%), and this difference was statistically significant ($p<0.01$). Hospitalization in the last six months was higher among urban participants (24%) than rural participants (18%), although this difference was not

statistically significant ($p=0.06$). Regular follow-up for chronic conditions was significantly better in urban areas (70%) compared to rural areas (56%) ($p<0.01$). Overall, urban residents demonstrated greater reliance on private healthcare and better continuity of care, whereas rural populations depended more on public facilities with comparatively lower follow-up rates.

Table 4: Out-of-Pocket Expenditure and Catastrophic Health Spending

Variable	Rural (n=300)	Urban (n=300)	Total (n=600)	p-value
Mean Annual OOPE (₹)	15,200 $\pm$ 7,800	22,000 $\pm$ 10,100	18,600 $\pm$ 9,200	<0.01
Catastrophic Expenditure	84 (28%)	108 (36%)	192 (32%)	0.03
Major Cost Component	Medicines (55%)	Medicines (50%)	Medicines (52%)	—

Out-of-pocket expenditure (OOPE) was significantly higher among urban participants compared to rural participants, with a mean annual expenditure of ₹22,000 versus ₹15,200 ($p<0.01$). Overall, the average OOPE was

₹18,600, indicating a substantial financial burden on households. Catastrophic health expenditure was also significantly more common in urban areas (36%) than rural areas (28%) ($p=0.03$), reflecting greater financial

strain despite better access to healthcare services. Medicines constituted the largest share of healthcare spending in both groups, accounting for more than half of the total OOPE. These findings highlight the considerable

economic impact of healthcare, particularly among urban populations, and underscore the need for improved financial risk protection mechanisms.

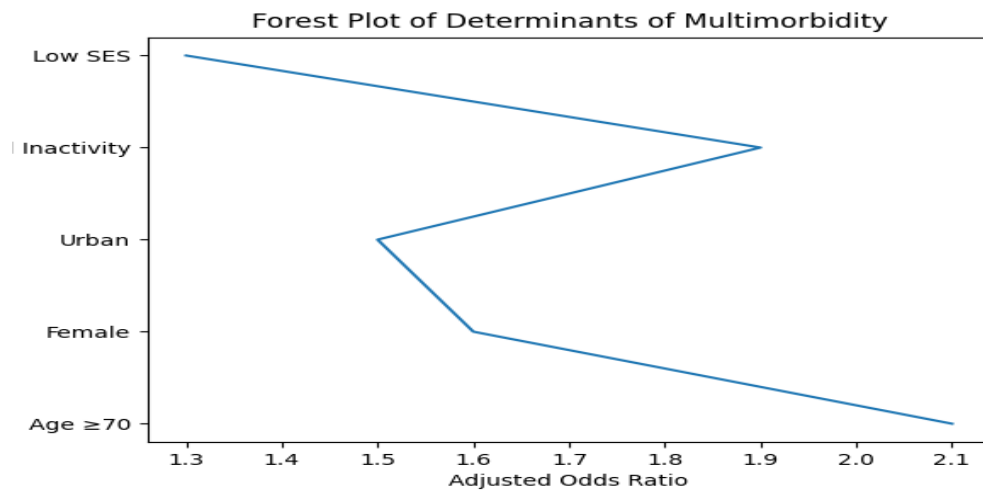
Table 5: Thematic Analysis of Qualitative Findings (n=30)

Theme	Subthemes	Key Findings
Healthcare Access	Availability, Distance, Waiting time	Rural participants reported poor access; urban participants reported overcrowding.
Financial Burden	High drug cost, hospitalization expense	Many faced financial distress and debt
Coping Mechanisms	Borrowing, family support, treatment skipping	Medication non-adherence due to cost observed

The thematic analysis of qualitative data revealed important insights into the lived experiences of elderly individuals with multimorbidity. Under the theme of **healthcare access**, rural participants reported significant challenges such as limited availability of services, long distances to healthcare facilities, and transportation difficulties, whereas urban participants highlighted issues of overcrowding and long waiting times despite better availability of services. The theme of **financial burden** indicated that high costs of medications and

hospitalization placed considerable strain on participants, with many reporting financial distress, indebtedness, or reliance on family support. Regarding **coping mechanisms**, participants adopted various strategies including borrowing money, seeking support from family members, and, notably, skipping or discontinuing medications due to cost constraints. These findings underscore the combined impact of accessibility and affordability issues on health-seeking behavior and treatment adherence.

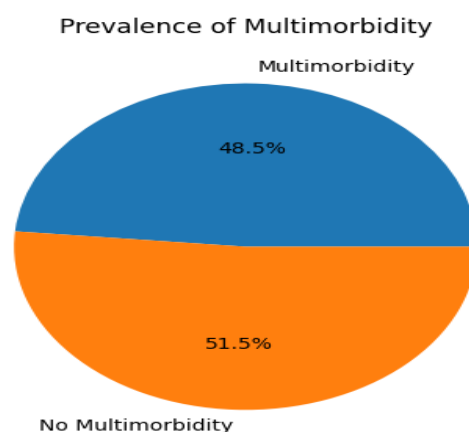
Fig 1: forest plot of determinants of multimorbidity



The forest plot illustrates the strength of association between various determinants and multimorbidity using adjusted odds ratios (AORs). Age ≥ 70 years shows the strongest association with multimorbidity (AOR ≈ 2.1), indicating that elderly individuals in this age group are more than twice as likely to have multimorbidity compared to younger counterparts. Physical inactivity (AOR ≈ 1.9) is another major contributor, highlighting its role as an important modifiable risk factor. Female gender (AOR ≈ 1.6) and urban residence (AOR ≈ 1.5)

demonstrate moderate but significant associations with increased odds of multimorbidity. Low socio-economic status shows a relatively weaker association (AOR ≈ 1.3) and appears closer to the null value, suggesting that its effect may not be statistically significant, which aligns with the p-value reported in the table. Overall, the plot clearly indicates that advancing age and lifestyle factors, particularly physical inactivity, are the most influential determinants, while socio-economic status plays a comparatively lesser role in this model.

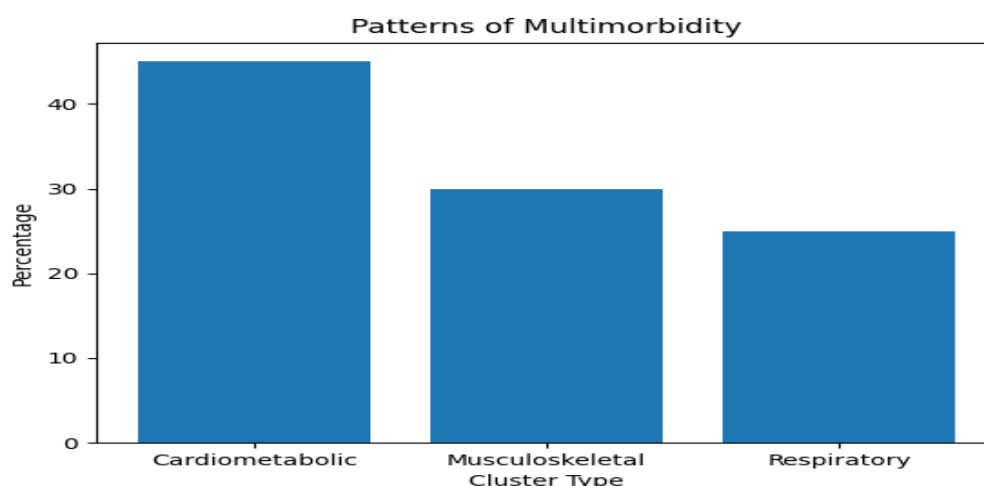
Fig 2: prevalence of multimorbidity



The pie chart demonstrates that nearly half of the study population was affected by multimorbidity. Specifically, 48.5% of participants had two or more chronic conditions, while 51.5% did not have multimorbidity. This indicates a substantial burden of multiple chronic diseases among the elderly population, highlighting that multimorbidity is

a common condition rather than an exception. The near-equal distribution also underscores the growing public health significance of multimorbidity and the need for healthcare systems to shift from single-disease management to integrated, patient-centered care approaches.

Fig 3: pattern of multimorbidity



The bar chart illustrates the distribution of different patterns of multimorbidity among the study participants. The cardiometabolic cluster was the most prevalent, accounting for approximately 45% of cases, indicating that conditions such as hypertension, diabetes, and obesity commonly coexist. This was followed by the musculoskeletal cluster (30%), reflecting a substantial burden of osteoarthritis and chronic pain among the

elderly. The respiratory cluster was the least common (25%), comprising conditions like COPD and asthma. These findings highlight that cardiometabolic diseases dominate the multimorbidity profile, emphasizing the need for integrated NCD management strategies at the primary care level. Additionally, the notable contribution of musculoskeletal and respiratory conditions underscores

the importance of comprehensive, multidisciplinary approaches in elderly healthcare.

DISCUSSION

The present study included 600 elderly participants equally distributed between rural and urban areas, with a mean age of 68.4 ± 6.7 years. The age and gender distributions were comparable between the two groups, although females constituted a slight majority (52%). Rural participants had significantly lower literacy levels and poorer socioeconomic status than their urban counterparts. Similar findings have been reported by Patel et al. (2022)⁸ using Longitudinal Ageing Study in India (LASI) data, where rural older adults had lower educational attainment and poorer socioeconomic conditions than urban residents, contributing substantially to rural–urban health disparities. Likewise, Arokiasamy et al.⁹ (LASI investigators) demonstrated that educational and wealth inequalities remain major determinants of health among older Indians, with disadvantaged rural populations experiencing poorer health outcomes. Furthermore, findings from the National Family Health Survey (NFHS-5) also indicate that literacy and socioeconomic inequalities continue to be more pronounced in rural India, influencing access to healthcare and disease prevention.

In the present study, the overall prevalence of multimorbidity was 48.5%, with significantly higher prevalence among urban participants (54.2%) than rural participants (42.8%). This finding is consistent with the LASI-based study by Patel et al. (2022)⁸, which reported significantly higher multimorbidity among urban older adults (35.4%) compared with rural residents (19.1%), attributing this difference to sedentary lifestyle, obesity, and greater detection of chronic diseases in urban populations. Similarly, Pati et al.¹⁰ reported that multimorbidity increases markedly with advancing age and is more frequently diagnosed among urban elderly because of better healthcare access and higher prevalence of non-communicable disease (NCD) risk factors. A systematic review by Xu et al. (2023)¹¹ also concluded that multimorbidity affects nearly one-half of older adults globally, with higher prevalence observed in urban settings due to lifestyle transitions and increased longevity.

Hypertension (58%) was the most prevalent chronic disease in the present study, followed by diabetes (42%), osteoarthritis (37%), and chronic respiratory disease (21%). Urban participants had significantly higher prevalence of hypertension and diabetes, whereas chronic respiratory diseases were more common in rural participants. Similar observations were reported by Patel et al. (2022)⁸, who found cardiometabolic diseases to be the predominant contributors to multimorbidity among urban older adults, while respiratory disorders were relatively more frequent in rural populations owing to biomass fuel exposure and occupational dust. Pati et al.¹⁰

also identified hypertension and diabetes as the most frequent chronic disease combination among elderly Indians with multimorbidity. In addition, a recent community-based study from rural Punjab published in the Indian Journal of Public Health (2025) demonstrated a high burden of hypertension among older rural women, reinforcing hypertension as the leading chronic disease in Indian elderly populations.

Multivariable logistic regression in the present study identified age ≥ 70 years, female gender, urban residence, and physical inactivity as significant determinants of multimorbidity, whereas low socioeconomic status did not remain statistically significant after adjustment. These findings closely resemble those of Patel et al. (2022)⁸, who reported advancing age, urban residence, obesity, physical inactivity, and educational status as major contributors to multimorbidity among older adults in India. Pati et al.¹⁰ similarly demonstrated that increasing age and female gender significantly increased the likelihood of multiple chronic diseases because women generally survive longer and accumulate more chronic conditions. International evidence from Xu et al. (2023)¹¹ also supports physical inactivity as one of the strongest modifiable risk factors associated with multimorbidity, emphasizing the importance of promoting healthy ageing through regular physical activity.

The present study demonstrated clear rural–urban differences in healthcare utilization. Urban elderly preferred private healthcare facilities (74%) and had significantly higher rates of regular follow-up (70%), whereas rural participants relied predominantly on public healthcare facilities. Comparable findings were reported by Patel et al. (2022)⁸, who suggested that better healthcare availability in urban areas contributes to increased diagnosis and regular management of chronic diseases, while rural populations continue to depend on government health services. Pati et al.¹⁰ further observed that continuity of care is generally better in urban settings because of easier access to specialist services and private providers. Similar trends have also been documented in LASI analyses showing greater healthcare utilization among urban elderly despite persistent inequities in affordability.

Out-of-pocket expenditure was significantly higher among urban participants, and medicines accounted for more than half of total healthcare spending. Catastrophic health expenditure affected nearly one-third of study participants. These findings are consistent with the multinational study by Ahamad V et al. (2022)¹² published in BMJ Global Health, which demonstrated that increasing multimorbidity substantially increases medicine-related OOPe in India, with medications constituting the largest component of household health expenditure. Similarly, Kansra et al. (2024)¹³, in a state-wide STEPS survey published in the Indian Journal of

Medical Research, reported that diabetes and hypertension were associated with substantial catastrophic health expenditure, primarily due to long-term medication costs. These observations highlight that chronic disease management imposes a considerable financial burden despite the availability of government insurance schemes, emphasizing the need to strengthen financial protection for elderly patients with multimorbidity.

The qualitative component revealed that inadequate healthcare access, financial hardship, and medication non-adherence were common experiences among elderly participants. Rural respondents emphasized geographical barriers and transportation difficulties, whereas urban participants mainly reported overcrowding and long waiting times. High medication costs frequently resulted in borrowing money or skipping treatment. These findings are consistent with Patel et al. (2022)⁸, who highlighted that healthcare accessibility and socioeconomic inequalities are major contributors to rural–urban disparities in multimorbidity management. Similarly, Ahamad V et al. (2022)¹² reported that medicine costs are the principal driver of OOPE among individuals with multimorbidity and are associated with poorer treatment adherence. The findings also agree with Kansra et al. (2024), who emphasized that medication expenses and outpatient care remain inadequately covered under existing financial protection schemes, resulting in significant economic hardship for households managing chronic diseases.

Generalizability

The findings are reasonably generalizable to elderly populations in rural and urban communities with similar socio-demographic and healthcare settings in Bihar and comparable regions of India. However, generalization to populations with substantially different socioeconomic conditions or healthcare systems should be made with caution.

Conclusion

Multimorbidity is highly prevalent among the elderly in India and is associated with significant healthcare utilization and financial burden. There are notable rural–urban disparities, and existing healthcare systems are inadequately equipped to manage complex multimorbidity. Strengthening primary healthcare, integrating chronic disease management, and improving financial risk protection are essential to address this growing challenge.

Limitations

The cross-sectional design limits assessment of temporal and causal relationships. Reliance on some self-reported information introduces recall and reporting bias, although available records were used for verification. As the study was conducted in the field practice areas of a single

medical college, generalizability to populations with different socioeconomic and healthcare settings is limited.

Recommendations

- Development of integrated multimorbidity care models at the primary healthcare level
- Strengthening Health and Wellness Centres (HWCs) for geriatric care
- Expansion of financial protection schemes to reduce OOPE
- Training healthcare providers in comprehensive geriatric assessment
- Further longitudinal studies to assess causal relationships

Acknowledgement

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List of Abbreviations

AOR	–	Adjusted	Odds	Ratio
CI	–	Confidence	Interval	
OOPE	–	Out-of-Pocket	Expenditure	
NCDs	–	Non-Communicable	Diseases	
LASI	–	Longitudinal Ageing Study	in India	
SPSS	–	Statistical Package for the Social Sciences		
WHO	–	World Health Organization		

Source of Funding

This study received no external funding and was conducted using personal and institutional resources.

Conflict of Interest

The authors declare that they have no conflict of interest.

Author Contributions

Dr Ujjwal Sourav: Conceptualization, study design, methodology, data analysis, interpretation of findings, and manuscript preparation.

Dr Suman Kumar Bharti: Methodology, data collection, interpretation of results, and critical revision of the manuscript.

Dr Nidhi: Data collection, qualitative assessment, interpretation of findings, and critical revision of the manuscript.

All authors reviewed and approved the final manuscript.

Data Availability

The data generated and analyzed during the present study are available from the corresponding author on reasonable request, subject to institutional and ethical restrictions.

Author Biography

Dr. Ujjwal Sourav is an Associate Professor in the Department of Community Medicine at Mahabodhi Medical College, Gaya, Bihar, with academic and research interests in community health, epidemiology, and non-communicable diseases.

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