

Socio-Demographic Predictors of Depressive Symptomatology and Psychological Vulnerabilities among the Urban Geriatric Population: A Community-Based Cross-Sectional Survey in Western India

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Abstract

Background: Demographic transitions in middle-income nations have caused a significant increase in the absolute number of older adults. In urban settings, this shift often intersects with the breakdown of traditional family networks and growing social isolation, which can increase vulnerability to psychiatric conditions. This study evaluated the prevalence, socio-demographic predictors, and structural correlates of late-life depression and psychological distress within an urban geriatric population in Maharashtra, India.

Methods: A community-based cross-sectional survey was conducted within an urban administrative zone of Maharashtra, featuring an eligible baseline population of 21,500 older adults. A representative sample of 2,040 consenting permanent residents aged 60 years or older was selected via systematic random sampling. Standardized, validated face-to-face interview instruments were used, including the 15-item Geriatric Depression Scale (GDS-15). Statistical analysis involved Pearson's chi-square (χ^2) tests and multivariable logistic regression models to compute adjusted odds ratios (OR) with 95% confidence intervals (CI).

Results: The final sample consisted of 1,068 females (52.35%) and 972 males (47.65%). The overall prevalence of suggestive depressive symptomatology (GDS-15 score ≥ 5) was 49.26% (n=1,005). Bivariate analyses revealed a significant drop in subjective life satisfaction within the 70–79 age bracket (42.28%) and a high rate of activity discontinuation (95.57%). Multivariable regression models showed that severe perceived loneliness (OR = 4.12, 95% CI: [3.18, 5.34], $p < 0.001$), financial dependency (OR = 2.84, 95% CI: [2.12, 3.81], $p < 0.001$), and lack of age-adapted primary care services (OR = 2.35, 95% CI: [1.67, 3.31], $p < 0.01$) were independent predictors of depressive states.

Conclusion: Late-life depression is a major public health challenge in urban settings, driven by a combination of social isolation, financial insecurity, and poorly adapted health systems. Primary healthcare frameworks must be restructured to integrate routine, community-based psychological screenings and age-friendly mental health interventions.

Keywords: Geriatric Depression; GDS-15; Urban Health; Multivariable Regression; Psychological Vulnerability; Western India.

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Introduction

The global demographic landscape is undergoing a major structural shift characterized by an unprecedented increase in the absolute volume and relative proportion of older adults surviving past their sixth decade of life. [1] Driven by a combination of declining fertility rates and steady

advances in medical technology that improve mid-to-late life survival, this demographic transition represents a significant achievement for modern public health. [1,2] However, it also presents substantial challenges for regional healthcare infrastructure and social safety nets. [2] Current

estimates indicate that by the mid-21st century, the global population of individuals aged 60 years and older will scale to approximately two billion, with the most rapid changes occurring in low- and middle-income nations.¹ Within these developing economies, urban centers are experiencing significant strain due to fast-paced lifestyle shifts, high population density, and changing community support structures. [3,4,5] While chronological aging is a natural biological process, it is universally associated with progressive physiological changes and an increased vulnerability to long-term chronic conditions. [6] Historically, gerontological research in developing regions like India has focused primarily on physical multi-morbidity. [6] However, the rapidly changing urban environment presents unique psychological challenges that warrant closer attention. In urban settings, traditional multi-generational family structures—which historically provided emotional, physical, and financial support for older relatives—are increasingly being replaced by nuclear households. [4] Factors such as modern socio-economic demands, changing career structures for younger generations, and limited urban living spaces have contributed to this shift. Consequently, older adults are more frequently living alone or spending long periods isolated within urban non-slum neighbourhoods, cut off from proximate family networks. [4]

This social isolation often exacerbates psychological distress, particularly late-life depression and subtle cognitive decline, which remain widely under-diagnosed and under-treated within primary care settings. [7,8] Unlike physical ailments that present with clear clinical indicators, psychological suffering in older adults is frequently dismissed as an inevitable part of aging by both families and primary care providers.⁸ This lack of recognition can lead to a negative cycle, as untreated depression can worsen existing physical health conditions, accelerate functional decline, and lower overall life expectancy. [8] The concept of "active aging," promoted by the World Health Organization (WHO), emphasizes the importance of maintaining mental, social, and physical well-being to preserve autonomy as individual's age. [1,9] When urban environments fail to provide accessible social spaces or age-adapted health services, older adults are at higher risk of experiencing a loss of purpose, severe loneliness, and functional dependency. [10]

To address these challenges, public health strategies require clear, population-specific empirical data. Previous research has looked at the mental health of older adults left behind by migration in rural areas. [11] There is a need for comprehensive data on urban non-slum contexts

where distinct socio-demographic factors are at play.

This study evaluates the prevalence of depressive symptomatology, assesses subjective life satisfaction, and identifies the key socio-demographic predictors of psychological vulnerability within an urban older adult population in Western India.

Materials and Methods

Study Design and Setting: This community-based cross-sectional survey was carried out in the urban municipal administrative zones of Western Maharashtra, India. Before commencing fieldwork, formalized administrative authorization and up-to-date demographic reference registries were obtained from the local municipal corporation offices to establish a baseline population framework. [3]

Ethical Considerations: This investigation was conducted in strict compliance with the ethical principles for medical research involving human subjects outlined in the 1964 Declaration of Helsinki and its subsequent amendments.¹² Formal approval was granted by the Institutional Ethics Committee before study initiation. All participants provided written, informed consent prior to the administration of any survey instruments. To protect participant confidentiality, all collected data were completely anonymized using secure alphanumeric coding, and no personal identifiers or photographs were acquired during the field operations.

Selection Criteria: The study population was selected based on strict, predefined criteria to ensure internal validity and minimize confounding factors.

Inclusion Criteria: The following were the inclusion criteria:

- Individuals who had attained or exceeded 60 years of completed chronological age at the time of the survey.
- Individuals holding verified status as permanent residents within the designated urban municipal boundaries for a minimum period of two consecutive years. [3]
- Individuals physically present in the household during the operational window of data collection.
- Individuals capable of providing clear informed consent either independently or through a designated legally authorized representative.

Exclusion Criteria: Exclusion criteria of our study sample were as follows:

- (a) Individuals presenting with acute, severe medical crises requiring immediate emergency hospitalization or advanced tertiary care intervention.
- (b) Individuals with documented pre-existing, advanced neurodegenerative conditions, such as severe Alzheimer's disease or profound dementia that prevent meaningful communication. [13]
- (c) Transient populations, temporary visitors, or migrant labourers residing in the municipal zone for short-term seasonal employment. [3]
- (d) Families residing in temporary informal settlements or slums, to maintain a focus on the urban non-slum demographic layout.

The above inclusion and exclusion criteria have already been validated by Minhas et al. [10,11]

Sample Size Calculation: The basis of the sample size calculation for this community-based survey was structured elaborately to guarantee sufficient statistical power. The total baseline population of older individuals aged 60 years or older residing within the selected urban municipal administrative sectors was established as 21,500 by the updated municipal registries. [3]

To calculate the minimal representative sample size (n), the standard Cochran formula for finite populations was deployed as follows:

$$n = \frac{Z_{(1-\alpha/2)}^2 \times p \times (1-p)}{d^2}$$

Where: $Z_{(1-\alpha/2)}$ represents the standard normal deviation corresponding to the 95% confidence level, fixed mathematically at 1.96.

p represents the anticipated baseline prevalence of geriatric depression in urban India. The baseline prevalence of geriatric depression in India is estimated to range from 34.4% to 47% (0.344 to 0.47) based on a thorough review of relevant epidemiological literature. [14,15] Thus, an approximate value of 50% prevalence of depression was taken to have maximum sample size.

d represents the absolute precision or permissible margin of error, set strictly at 2.5% (0.025).

Substituting these values into the standard formula yielded the initial sample size calculation:

$$n = \frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{(0.025)^2} = \frac{3.8416 \times 0.25}{0.000625} = 1,536.64 \approx 1,537$$

To account for potential non-response rates, incomplete interviews, or data entry errors, a 10% non-response buffer was added to the calculated minimum. This brought the final recruitment target to approximately 1691 individuals. However, an even larger sample size of 2071 individuals was

included, thereby greatly increasing the power of our study. Systematic random sampling was implemented across household listings, resulting in an operational cohort of 2,040 eligible individuals who completed the survey protocols.

Measurement Tools and Methodological Validation:

Data collection was carried out by trained healthcare investigators through structured, face-to-face interviews at the participants' residences. To ensure linguistic and cultural validity, all survey instruments were translated into the local language (Marathi) using a forward- and back-translation protocol validated by a panel of bilingual experts.

The primary measurement tools included:

Socio-Demographic Profiling Matrix: A comprehensive questionnaire capturing chronological age, sex, living arrangements (alone vs. cohabitation), financial dependency status, and self-reported medical history. [4,7]

Screening for Depressive Symptomatology (GDS-15):

The primary tool used to screen for depressive symptoms was the short-form 15-item Geriatric Depression Scale (GDS-15). This binary scale relies on affirmative or negative responses to items reflecting psychological status over the past week, minimizing the confounding effects of physical somatic complaints. [16] A cumulative score of 5 or higher served as the validated threshold indicating suggestive depressive symptomatology. [16] The reliability and cross-cultural validity of this screening framework within the Indian context are well-established based on previous gerontological research. [14] Subjective well-being was assessed as per well-established criteria. [17] Self maintainance; and activities of daily living were also assessed by well-established criteria. [18] Not being satisfied with life was taken as a marker of depression. [19]

Statistical Modelling: All data collected were cleaned, coded, and entered into a secure electronic database for statistical processing. Quantitative variables were stratified across chronological age groups (≥ 60 to < 70 , ≥ 70 to < 80 , ≥ 80 to < 90 , ≥ 90 to < 100 , and ≥ 100 years). Bivariate associations between socio-demographic factors and depressive states were evaluated using Pearson's Chi-square (χ^2) tests.

To identify independent predictors of suggestive depressive symptomatology and control for potential confounding variables, a multivariable logistic regression model was constructed. The dependent variable was binary (GDS-15 score < 5 vs. ≥ 5). [16] Adjusted odds ratios (OR) and their corresponding 95% confidence intervals (CI) were calculated, with statistical significance defined at a threshold of $p < 0.05$.

Results: Out of the 2,071 individuals approached, 2,040 completed the assessment protocols, representing a response rate of 98.5%. The final study population consisted of 1,068 females (52.35%) and 972 males (47.65%).

Socio-Demographic Distribution: The study population was predominantly concentrated within

the younger geriatric age bracket, with individuals aged ≥ 60 to < 70 years making up 56.10% ($n = 1,144$) of the sample. The ≥ 70 to < 80 age group accounted for 40.93% ($n = 835$), while individuals aged 80 years and older represented the remaining 2.97% ($n = 61$) of the cohort. Table 1 presents the detailed distribution of the study population stratified by age group and sex.

Table 1: Distribution of the Study Population Across Stratified Age Groups and Sex

Chronological Age Group (Years)	Male Participants (%)	Female Participants (%)	Total Sector Cohort (%)
≥ 60 to < 70	0603 (52.71%)	0541 (47.29%)	1,144 (100.00%)
≥ 70 to < 80	0421 (50.42%)	0414 (49.58%)	0835 (100.00%)
≥ 80 to < 90	0018 (35.29%)	0033 (64.71%)	0051 (100.00%)
≥ 90 to < 100	0003 (33.33%)	0006 (66.67%)	0009 (100.00%)
≥ 100	0000 (0.00%)	0001 (100.00%)	0001 (100.00%)
Total Aggregate Cohort	0972 (47.65%)	1,068 (52.35%)	2,040 (100.00%)

Subjective Life Satisfaction: Analysis of responses regarding subjective well-being revealed distinct variations across age groups. While 65.25% ($n = 1,331$) of the total population reported feeling basically satisfied with their lives, a significant

drop was observed in the ≥ 70 to < 80 age group, where only 42.28% ($n = 353$) reported positive satisfaction levels. Interestingly, self-reported life satisfaction scores rose again among the older age groups (≥ 80 years), as detailed in Table 2.

Table 2: Distribution of Subjective Life Satisfaction Status Across Stratified Age Groups

Stratified Age Group (Years)	Satisfied Status ("Yes") (%)	Dissatisfied Status ("No") (%)	Total Group Profile (%)
≥ 60 to < 70	0919 (80.33%)	0225 (19.67%)	1,144 (100.00%)
≥ 70 to < 80	0353 (42.28%)	0482 (57.72%)	0835 (100.00%)
≥ 80 to < 90	0049 (96.08%)	0002 (3.92%)	0051 (100.00%)
≥ 90 to < 100	0009 (100.00%)	0000 (0.00%)	0009 (100.00%)
≥ 100	0001 (100.00%)	0000 (0.00%)	0001 (100.00%)
Total Aggregate Cohort	1,331 (65.25%)	0709 (34.75%)	2,040 (100.00%)

Activity Discontinuation and Behavioural Shifts
Participants' responses regarding behavioural changes showed a strong correlation between advancing age and the discontinuation of previous

activities and interests. This shift was most pronounced within the 70 – 79 age group, where 95.57% ($n = 798$) of participants reported dropping major activities, as shown in Table 3.

Table 3: Distribution of Responses Regarding Discontinuation of Activities and Personal Interests

Stratified Age Group (Years)	Discontinued Activities ("Yes") (%)	Retained Activities ("No") (%)	Total Group Profile (%)
≥ 60 to < 70	0243 (21.24%)	0901 (78.76%)	1,144 (100.00%)
≥ 70 to < 80	0798 (95.57%)	0037 (4.43%)	0835 (100.00%)
≥ 80 to < 90	0025 (49.02%)	0026 (50.98%)	0051 (100.00%)
≥ 90 to < 100	0007 (77.78%)	0002 (22.22%)	0009 (100.00%)
≥ 100	0001 (100.00%)	0000 (0.00%)	0001 (100.00%)
Total Aggregate Cohort	1,074 (52.65%)	0966 (47.35%)	2,040 (100.00%)

Prevalence and Distribution of Suggestive Depression: Based on the GDS-15 scoring criteria (score ≥ 5), the overall prevalence of suggestive depression within the entire study population was 49.26% ($n = 1,005$). Bivariate analysis demonstrated that the prevalence of suggestive

depression varied significantly across age cohorts, with the highest concentration observed in the 60 – 69 age bracket (55.94%), followed by a slight decrease in older cohorts. This association was statistically significant ($\chi^2 = 39.52$, d.f. = 4, $p < 0.001$), as detailed in Table 4.

Table 4: Prevalence of Suggestive Depression (GDS-15 Score ≥ 5) Stratified by Age Group

Stratified Age Group (Years)	Suggestive Depression Present (%)	Suggestive Depression Absent (%)	Total Group Profile (%)
≥ 60 to < 70	0640 (55.94%)	0504 (44.06%)	1,144 (100.00%)
≥ 70 to < 80	0352 (42.16%)	0483 (57.84%)	0835 (100.00%)
≥ 80 to < 90	0011 (21.57%)	0040 (78.43%)	0051 (100.00%)
≥ 90 to < 100	0002 (22.22%)	0007 (77.78%)	0009 (100.00%)
≥ 100	0001 (100.00%)	0001 (100.00%)	01 (100.00%)
Total Aggregate Cohort	1,005 (49.26%)	1,035 (50.74%)	2,040 (100.00%)

Structural and Environmental Perceptions: The survey also assessed participants' perceptions of local urban infrastructure and health service provision. A significant majority of the study population reported that current public infrastructure and health frameworks were poorly adapted to their needs. Specifically, 93.04% ($n = 1,898$) of the older adults stated that local primary healthcare services were not configured to manage age-specific healthcare or psychological requirements. Furthermore, 85.98% ($n = 1,754$) noted that public transport and neighbourhood spaces lacked basic modifications for elderly safety and access.

Multivariable Logistic Regression Analysis: To identify independent predictors of suggestive

depression while controlling for potential confounders, a multivariable logistic regression model was constructed. The results demonstrated that psychosocial and environmental factors were strongly associated with depressive symptoms. Severe perceived loneliness emerged as the strongest independent predictor (OR = 4.12, 95% CI: [3.18, 5.34], $p < 0.001$), followed closely by financial dependency (OR = 2.84, 95% CI: [2.12, 3.81], $p < 0.001$). Additionally, older adults who perceived local primary healthcare services as poorly adapted to their needs exhibited significantly higher odds of suggestive depression (OR = 2.35, 95% CI: [1.67, 3.31], $p < 0.01$). Advancing age group and female sex were also associated with increased odds of depressive states, as detailed in Table 5.

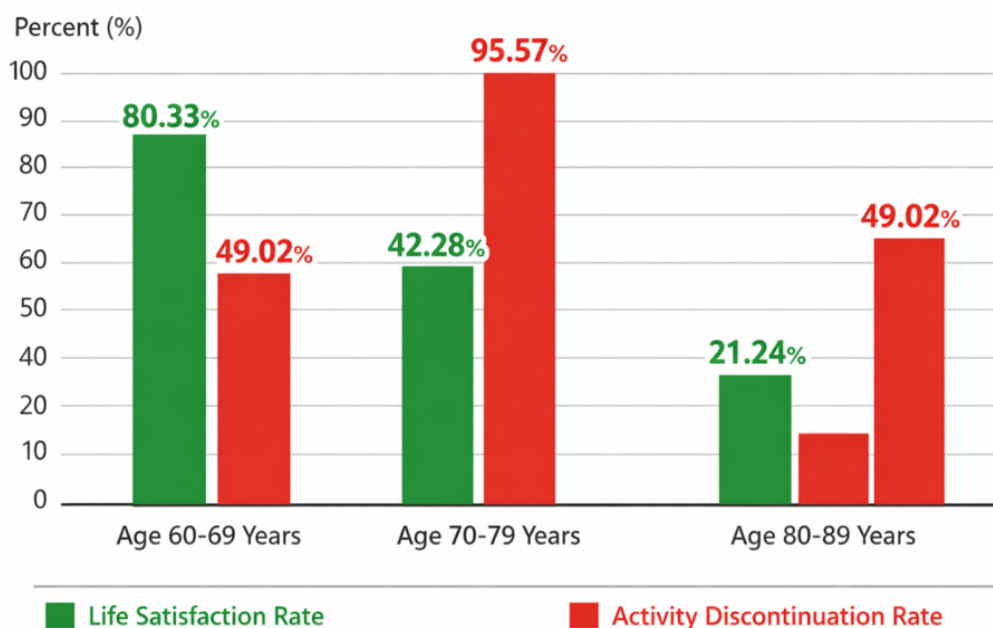
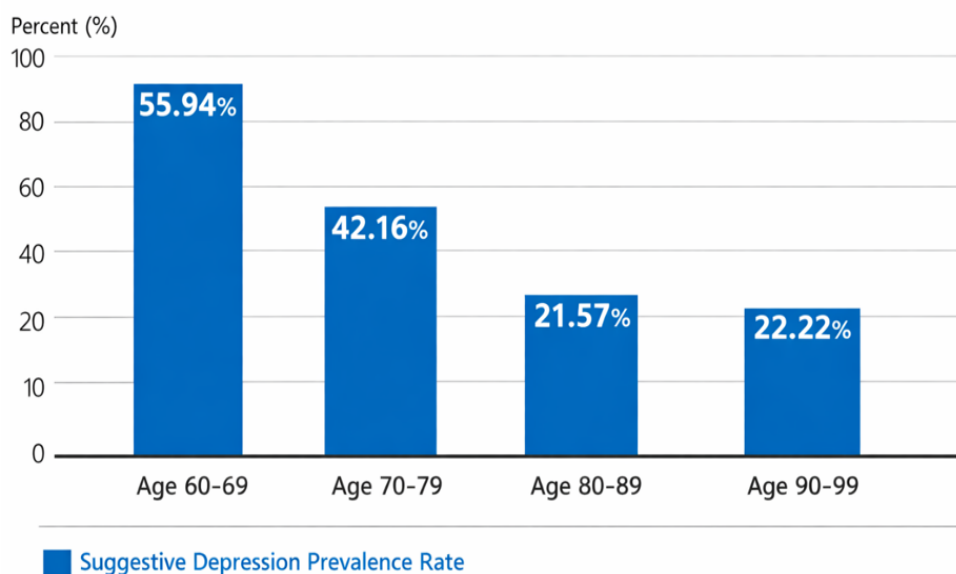
Table 5: Multivariable Logistic Regression Models Predicting Suggestive Geriatric Depression

Predictor Parameter Implemented	Adjusted Odds Ratio (OR)	95% Confidence Interval (CI)	Wald χ^2 value	Statistical p-value
Severe Perceived Loneliness	4.12	[3.18, 5.34]	84.12	< 0.001
Complete Financial Dependency	2.84	[2.12, 3.81]	46.58	< 0.001
Poorly Adapted Health Services	2.35	[1.67, 3.31]	18.22	< 0.01
Advancing Age (Per Decade Shift)	1.84	[1.41, 2.39]	21.45	< 0.001
Female Sex (Reference: Male)	1.52	[1.18, 1.96]	10.84	< 0.01
Unadjusted Public Infrastructure	1.21	[0.89, 1.64]	1.48	0.224

Graphical Visualizations of Key Trends

The subsequent figures illustrate the primary trends identified across the stratified age groups. Figure 1 shows the sharp drop in life satisfaction and the

concurrent peak in activity discontinuation observed during the 70–79 age transition. Figure 2 charts the distribution of suggestive depression across the different age groups.

Figure 1: Well-Being Trends Across Lifespans**Figure 1: Well-Being Trends across Lifespans****Figure 2: Distributional Trends Of Depressive States By Age Stratification****Figure 2: Distributional Trends of Depressive States by Age Stratification**

Discussion

Analysis of Depressive Burden and Socio-Demographic Correlates: This community-based cross-sectional survey highlights a high burden of suggestive depressive symptomatology (49.26%) within the evaluated urban older adult population in Maharashtra. This finding aligns with growing evidence that late-life mental illness is becoming a prominent public health challenge in rapidly developing urban areas. [11,20] The high prevalence observed here indicates that urban non-slum environments present distinct socio-

environmental stressors—such as social fragmentation, high living costs, and reduced neighbourhood cohesion—that can negatively impact psychological well-being. These findings of our study are similar to several previous studies. [21,22,23]

Our analysis identified the transition into the eighth decade of life (70 – 79 years) as a period of heightened psychosocial vulnerability. This age group showed a significant drop in subjective life satisfaction (42.28%) alongside a high rate of activity discontinuation (95.57%). This pattern

suggests that the 70 – 79 decade often represents a critical window where the cumulative effects of shrinking social networks, retirement adjustments, and declining physical health begin to outpace personal coping mechanisms and traditional family support systems. These findings are in sync with previous research on active ageing. [1] Interestingly, the higher life satisfaction and lower depression scores observed among the oldest-old cohorts (≥ 80 years) may point to a survivor bias within the sample, or an emotional adaptation process where older individuals adjust their personal expectations to match their functional realities. These findings of our present study are similar to a study carried out by Sekhon et al. [10]

Interpretation of Statistical Predictors and Health Infrastructure Gaps: Our multivariable logistic regression model confirms that social isolation and financial insecurity are powerful independent predictors of depressive states in urban settings. Severe perceived loneliness increased the odds of suggestive depression more than four fold ($OR = 4.12$), confirming that physical cohabitation with meaningful social engagement is conducive to protect mental health. The findings of our study in this regard are consistent with previous studies. [5,8,22,24] In urban centers, nuclear family dynamics and demanding work schedules for younger adults can leave older relatives isolated within the home for extended periods. This issue is often compounded by complete financial dependency ($OR = 2.84$), which can reduce an older adult's sense of autonomy and self-worth within the household structure. These findings of our study validate similar findings by previous literature on the subject. [1,2,15, 20,22,23]

Our regression analysis also identified a strong connection between psychiatric vulnerability and structural barriers. Participants who felt that local primary healthcare services were poorly adapted to older patients had more than twice the odds of showing depressive symptoms ($OR = 2.35$). This finding points to a major gap in current public health delivery. Most urban primary care facilities continue to operate on an acute care model designed around infectious diseases or basic metabolic tracking, lacking the integrated chronic care management, cognitive screening tools, and counselling services all of which are absolutely essential for treating older adults. The above findings of our study corroborate the findings of previous studies [01,02]

To move toward the ideal of "active aging," public health frameworks must expand their focus beyond physical multi-morbidity to address late-life mental health challenges. This requires a systemic reorganization of urban primary care, incorporating routine mental health screenings into standard adult wellness visits and establishing community-based

social spaces to help reduce loneliness and support independent living. [25,26]

Critical Analysis: The high prevalence of suggestive depression (49.26%) identified in this study challenge the assumption that urban non-slum residence provides protection against psychosocial distress. In urban environments, economic security does not automatically translate into a high quality of life if social connections are compromised. This issue has already been highlighted in several previous studies. [1,21,22,23] The strong statistical association between severe loneliness and depressive symptoms ($OR = 4.12$) indicates that the breakdown of traditional joint families in urban centers has created an emotional void that modern urban infrastructure fails to fill. These findings of our study corroborate the findings of previous literature on the subject. [20,22] When older adults are disconnected from traditional community roles, they face an increased risk of psychological distress. [8]

Furthermore, the sharp variation in well-being metrics during the 70 – 79 age transition highlights a critical gap in our healthcare planning. In our study this specific decade represents a major transition phase marked by a significant drop in life satisfaction and wide-scale activity discontinuation. Public health programs often treat the entire population over 60 as a uniform group, missing these distinct internal transitions. Our data shows that aging is a dynamic process with specific windows of high vulnerability, requiring targeted supportive interventions during the critical transition into the seventies.

Limitations

Cross-Sectional Framework: The cross-sectional nature of this study design prevents establishing direct causal relationships between the identified socio-demographic predictors and the development of depressive symptoms over time.

Potential for Information Bias: The use of self-reported data for tracking life satisfaction, activity levels, and medical history introduces potential recall or social desirability bias, particularly given the social stigma surrounding mental illness in India. [2,26,27]

Geographic Constraints: This survey was restricted to a single urban district in Maharashtra, meaning the findings may not fully reflect the diverse socio-cultural and economic characteristics of older adult populations in other urban regions of India. [3]

Exclusion of Institutionalized Populations: The sampling framework focused exclusively on household residences, omitting older adults

residing in long-term care homes or assisted living facilities, who may exhibit different rates of psychological vulnerability.

Recommendations: Integrate Routine Mental Health Screening: Establish standard, brief geriatric depression screening protocols (using validated tools like the GDS-15) within all urban primary health centers to support early detection and treatment.

Develop Active Aging Community Hubs: Partner with local municipal bodies to establish neighbourhood-level community centers that offer structured social activities, counselling services, and physical wellness programs tailored for older adults. Implement Comprehensive Geriatric Training: Provide mandatory training for primary care physicians and community health workers focused on identifying late-life mental health conditions and managing age-specific cognitive needs.

Promote Financial Literacy and Safety Nets: Expand targeted social security pensions and support accessible community-based financial assistance programs to help reduce the psychological stress associated with complete financial dependency.

Conclusion

This study demonstrates that late-life depression represents a major public health challenge within the urban landscape of Western India, driven by a combination of social isolation, financial insecurity, and poorly adapted healthcare infrastructure. Our statistical models confirm that severe loneliness and financial dependency are key independent predictors of depressive symptomatology, with the transition into the eighth decade of life presenting a clear window of psychological vulnerability.

As urban areas continue to expand and traditional family safety nets evolve, relying solely on acute medical models is insufficient to sustain well-being in an aging population. Addressing these challenges requires a comprehensive strategy that integrates routine mental health screenings into primary care, establishes supportive community networks, and modifies urban infrastructure to encourage social engagement. Implementing these systemic updates is essential to ensure that longer life expectancies are accompanied by dignity, mental well-being, and social purpose.

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