

Dementia in Developing countries: A Community-Focused Review of Prevalence, Risk Factors, and Public Health Priorities

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Abstract

Background: Dementia is an emerging public health priority due to rapid population ageing, particularly in low- and middle-income countries (LMICs), where over 60% of affected individuals reside. In India, national estimates overlook substantial regional and rural-urban variation, and community-based evidence remains limited.

Objective: To review evidence on the prevalence, risk factors, methodological approaches, screening tools, and public health response to dementia, with emphasis on community-based studies from LMICs, especially India.

Methods: A narrative review of literature published between January 2000 and June 2024 was conducted using PubMed, Scopus, and Google Scholar. Community-based epidemiological studies, relevant reviews, and policy documents were included. Hospital-based studies and those focusing exclusively on pharmacological or molecular aspects were excluded. Thirty-seven articles were synthesized thematically.

Results: Global dementia prevalence is projected to increase from about 57 million in 2019 to over 150 million by 2050, with the fastest rise in LMICs. In India, prevalence among adults aged ≥60 years ranges from 4.5% to 11% across states, with higher burden influenced by education, lifestyle, and healthcare access. Nearly 45% of dementia cases are attributable to modifiable life-course risk factors. Community-based studies using culturally appropriate screening tools provide more accurate estimates, though methodological challenges persist.

Conclusion: Addressing dementia as a public health priority requires strengthening community-based research and integrating prevention, early detection, and care into existing health systems in LMICs.

Keywords: Dementia, Public Health, Prevalence, Community-based studies, India

Introduction

Dementia has traditionally been viewed as a clinical condition focused on accurate diagnosis,

symptomatic management, individualized care, and support for patients and caregivers, with the primary goal of maintaining quality of life and cognitive function. The WHO Global Action Plan on

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the Public Health Response to Dementia (2017–2025)¹ recognizes dementia as a public health priority due to its widespread impact and complexity.

Over 55 million people currently live with dementia worldwide, with about 10 million new cases annually, and numbers are projected to reach 152 million by 2050, with over 60% of cases and the fastest growth occurring in low- and middle-income countries despite most evidence originating from high-income settings.

Regional data gaps remain a challenge in India, where national-level estimates conceal substantial state-wise variation, and certain regions lack any population-based prevalence estimates despite rapid demographic ageing. While national programs such as the National Program for Non-Communicable Diseases (NP-NCD) and National Program for Health Care of the Elderly (NPHCE) have made some progress in addressing aspects of dementia care, efforts remain insufficient. There is a **pressing need for a comprehensive national dementia policy** accompanied by a **dementia-specific program**, underscoring the urgency of integrating dementia care and prevention into the existing public health system.

Methods

This narrative review was conducted to synthesize published evidence on the prevalence, risk factors, and public health response to dementia, with a particular focus on community-based studies from low- and middle-income countries (LMICs), especially India. We conducted a literature search across the following electronic databases: **PubMed**, **Scopus**, and **Google Scholar**, covering the period from **January 2000 to June 2024**. The following search terms and their combinations were used: “dementia” OR “Alzheimer’s disease” AND “prevalence” OR “epidemiology” OR “burden” OR “risk factors” AND “developing countries” OR “low- and middle-income countries” OR “India” OR “community-based”. Boolean operators were applied appropriately. The search was limited to articles published in **English**. Additional articles were identified by screening the reference lists of key publications and relevant policy documents from organizations such as the **World Health Organization (WHO)**, **Alzheimer’s**

Disease International (ADI), and **Ministry of Health and Family Welfare**, India. We included original community-based epidemiological studies on dementia prevalence or risk factors, systematic or narrative reviews pertaining to Low- and Middle-Income countries, and policy documents and program reports from national and international public health agencies. Hospital-based studies, studies focused exclusively on pharmacological interventions or molecular/genetic mechanisms were excluded from the review. All titles and abstracts were screened for relevance, followed by full-text review of potentially eligible articles. A total of **37 articles** were included in the final synthesis. Data were extracted and summarized narratively under thematic headings: **I** Global and regional prevalence of dementia, **II** Understanding dementia in a public health perspective **III** Risk factors, Pathophysiology and Recent advances **IV** Methodological approaches in Dementia studies. **V**. Screening and Diagnostic Tools. Rather than pooling quantitative data, we focused on describing patterns, highlighting disparities, and identifying evidence gaps in LMIC contexts.

Results

I Global and regional prevalence of dementia

Overview of Global trends

Earlier projections estimated that the number of people with dementia would **increase from 57.4 million in 2019 to 152.8 million by 2050**.¹ Women are disproportionately affected, with a **female-to-male ratio of 1.69** in 2019. The **lowest increases in prevalence** are expected in **high-income Asia Pacific (53%)** and **Western Europe (74%)**, while the **highest rises** are projected in **North Africa and the Middle East (367%)** and **Eastern Sub-Saharan Africa (357%)**.² . This variation highlights that the **burden of dementia is not uniform across populations**, with **population aging and growth** being the major contributors to the observed trends.

The Burden of Dementia is not uniform across different populations

The global burden of dementia is substantial and expected to rise sharply in the coming decades. According to the Global Burden of Disease (GBD) Study 2021 by the Institute for Health Metrics and

Evaluation, an estimated **56.9 million people were living with dementia worldwide**, with a **higher preponderance among females (36.1 million cases)**.³ The age-standardized rate of dementia incidence increased minimally from 93.6 (80.1–106.7) per 100,000 in 1990 to 95.0 (81.6–107.9) in 2019.⁴ with the highest rise reported in East Asia (14.3%), Western Pacific Region (13.6%) and Asia Pacific (12.4%).⁴ A Systematic review⁵ on emerging trends in cognitive impairment and dementia among older populations in Asia has reported a diverse and varied prevalence of Dementia by region. Dementia prevalence shows marked variation across Asia, ranging from 87.1% in a Taiwanese study of 6,549 participants to 41.4% in urban Hong Kong (2023), 6.44% in a broad age-range study in Japan (20–97 years), and 9.11% in China (2022). Moreover, a 2020 Malaysian study reported an 8.5% prevalence and a 2023 Bangladeshi study recorded an 8.0% prevalence among individuals aged ≥ 60 years⁵.

National Trends and Regional Variations

According to a nationwide study by Lee et al.⁶ inadequately representing the national and state populations. \n\nMethods: \nFrom the Longitudinal Aging Study in India (LASI), the estimated dementia prevalence among individuals aged 60 and older in India is 7.4% (6.4–8.5), and age-standardized dementia prevalence is 8.0%. Cross-state variation in dementia prevalence in India shows lowest prevalence in Delhi at 4.5% and highest in Jammu and Kashmir at 11% (7.3 to 14.8). Southern states such as Tamilnadu, Kerala, Karnataka reported a prevalence of 6.1%, 8.27%, 7.61% respectively. Chandigarh, Daman & Diu, Dadra & Nagar Haveli, Goa, Lakshadweep, Puducherry, Andaman & Nicobar lacked the Population projection information as per Census of India 2011.⁷

Prevalence of dementia in urban and rural settings

Understanding rural-urban differences in dementia prevalence requires careful consideration of methodological approaches and comparative analysis of social, economic, and environmental factors to design targeted interventions.

Global level: According to a study conducted in Taiwan in 2022 with 10 432 participants aged 65 years and above, the prevalence of dementia in

rural, suburban, and urban areas among the elderly was 8.69% (95% CI, 8.68–8.69), 6.63% (95% CI, 6.62–6.63), and 4.46% (95% CI, 4.46–4.47), respectively with Urbanization an independent factor for dementia.⁸ 10,432 participants aged 65 years and more were selected through computerized random sampling from all administrative districts in Taiwan and were assessed using an in-person interview. We calculated the prevalence of MCI and dementia, with their risk factors examined using multivariable logistic regression. \nRESULTS: The prevalence of dementia in rural, suburban, and urban areas among the elderly was 8.69% (95% CI, 8.68–8.69) Belina et al. studied the prevalence of dementia in rural areas and urban populations from Northern Portugal and found the prevalence of dementia was 2.7% with a rural /urban Prevalence Ratio of 2:1.⁹ The study conducted by Nakamura et al.¹⁰ aimed to examine rural-urban differences in the prevalence of cognitive impairment in Japan. Cognitive impairment was found to be higher in the rural area with 8.4% and 2.0% in the rural areas.

India: Menesgere et al.¹¹ especially rural India, are sparse and therefore we aimed to assess risk factors in a rural cohort on aging and compare it with an urban cohort. Methods We are presenting baseline data on proportion of hypertension, diabetes, obesity, physical inactivity, and Cardiovascular Risk Factors, Aging, and Incidence of Dementia (CAIDE) evaluated the risk factors for Dementia in India and reported that the proportion of participants with hypertension, diabetes, and obesity was lower in the rural cohort, whereas physical inactivity was higher in comparison with the urban cohort. Shaji et al.¹² in “The dementia India report: prevalence, impact, costs and services for dementia. Alzheimer’s & Related Disorders Society of India (ARDSI), 2010” has reported the rural prevalence of dementia to be at 3.39% while in urban setting at 4.86%. Education, occupation, and healthcare access were protective factors, with urban residents showing better awareness and access to care, while many rural cases remained undiagnosed due to lower health-seeking behavior.

A study focused on differential distribution of Dementia¹³ among the Himalayan belt of Northern India reports a 1.6% prevalence among elderly individuals with female preponderance. This pattern

may be explained by differences in life expectancy, and the absence of cases in tribal populations has been attributed to dietary factors such as staple consumption of barley, wheat, and maize.

II Understanding dementia from a Global Public health perspective

Dementia needs to be addressed as a Public Health problem globally. The alignment with each individual criteria of a public health problem is discussed as follows:

High Prevalence: According to the World Health Organization (WHO), over 55 million people are living with dementia globally. There are 10 million new cases every year. This number is projected to increase to 152 million by the year 2050.¹⁴ Over 60 % of the global estimate of Dementia cases live in low- and middle-income countries.¹⁵

Significant Morbidity and Mortality: Dementia is currently the seventh leading cause of Death and one of the major causes of disability and dependency among older people worldwide.¹⁵

Economic Burden: Globally, the total cost of dementia was US\$ (1.3 trillion), with 50 % of the cost accounted by informal care in 2019 according to WHO.¹⁵ In 2020, Dementia cost rose substantially to 14513 billion international dollars. China INT\$2961 billion, USA INT\$2331 billion, Japan INT\$1758 billion face the largest absolute economic burden. The cost of informal care ranges from 60-97% in high income countries to 85-45% in lower-middle-income countries, and treatment and formal care costs range from 10-50% in lower-middle-income countries to 30-80% in high-income countries.¹⁶

Impact on Quality of life: Persons with Dementia had multiple health conditions and had experienced poor quality of life.^{17,18} Patients with Alzheimer's dementia experience worse Quality of life compared to those with Mild Cognitive impairment.¹⁷

Epidemic risk: Dementia remains one of the major problems of the elderly population, with increasing life expectancy across the globe. The number of cases is projected to reach 150 million by 2050, especially among developing countries.¹⁹

Preventability and Intervenability: Evidence has been generated for 14 modifiable risk factors in the prevention of Dementia since 2017 till date.^{14,20,21} Life cycle approach is implicated in the prevention or risk reduction of Dementia with different risk factors operating at different time points such as early, middle and later phases of life. The specific actions identified in reducing the risk factors^{21,22} are as follows: Good quality education, accessible hearing aids for people with hearing loss, treating depression, preventing head injuries by use of helmets and protection in contact sports, encouraging physical exercise, reducing smoking, prevention or reduction of hypertension (< 130mm Hg), maintaining healthy body weight, reducing social isolation, treating visual loss, and reducing exposure to air pollution.

Disparities and Vulnerable population: Low socioeconomic status, limited access to health care and lower education witness higher prevalence of Dementia, especially in low- and middle-income countries. Two thirds of persons with Dementia live in LMICs.²³ High prevalence of risk factors, poor dementia awareness, stigma and misconception about Dementia are the significant risk factors in Low- and Middle-income countries.²⁴ The majority of global dementia care costs occur in high-income countries (HICs)

Need for Public health intervention:

Dementia management requires a coordinated, multipronged approach integrating healthcare policies, community support services, and public awareness initiatives. One example of above-mentioned approach at Global level is that of WHO's Global Action Plan on the Public Health Response to Dementia (2017-2025).¹

Social and Behavioral influence: Evidence from Systematic review and meta-analyses of longitudinal studies²⁵ by Wang et al showed that strong social engagement and frequent social contact were positively associated with low prevalence of Dementia. Loneliness was significantly associated with an increased risk of Dementia.

III Risk factors, Pathophysiology and Recent advances

A report from the Lancet Commission²¹ on Dementia, 2024 recommends Life course approach

of modifiable risk factors. Forty-five percent of the dementia cases could be prevented or delayed if the risk factors were addressed efficiently.

Early Life (Green Zone): Less education accounts for 5% of dementia cases, highlighting the importance of cognitive reserve development in childhood.

Midlife (Yellow Zone): The largest contributors to dementia risk are hearing loss (7%) and high LDL cholesterol (7%). Other significant risk factors include depression (3%), traumatic brain injury (3%), physical inactivity (2%), diabetes (2%), smoking (2%), hypertension (2%), obesity (1%), and excessive alcohol use (1%).

Late Life (Blue Zone): Social isolation (5%), air pollution (3%), and visual loss (2%) are major contributors to dementia risk in older adults.

Dementia is characterized by primary pathophysiological mechanisms which include Amyloid-beta ($A\beta$) Plaque Accumulation, Tau Protein Hyperphosphorylation, Neuroinflammation, Oxidative Stress and Vascular dysfunction.²⁶ The Glymphatic system acts in a similar fashion as that of the regular lymphatics thereby ensuring homeostasis in the brain and removal of waste products like $A\beta$. Defective glymphatic system, low expression of AQP4, sleep disruptions lead to the inefficient removal and $A\beta$ plaques and thus increase the risk of neurodegenerative diseases.^{27,28} Microglial cells maintain brain function by clearing waste and supporting neurotransmission, but inappropriate activation can trigger inflammation and amyloid-beta ($A\beta$) accumulation. Consequently, therapies targeting microglial activation, particularly anti-inflammatory agents, are being explored as potential disease-modifying treatments. Aducanumab and Lecenemab are the two mAbs which have been approved by US FDA for treatment in early Alzheimer's disease with proven β -amyloid pathology.²⁹

IV Methodological Approaches in Dementia studies

Dementia is a complex disorder so that measurement of its prevalence across older populations require different study designs, each with its own merits and demerits. Various factors like gradual onset, delay in diagnosis, exponential increase with age, misclassification of other cognitive

syndromes (delirium, old age psychosis) are found to be misleading in estimating the prevalence of dementia.³⁰ Comorbid physical illnesses may impair functioning and be misattributed to cognitive decline, leading to misclassification of dementia. Additionally, obtaining informed consent from caregivers is challenging when individuals with severe cognitive impairment are included in surveys.

Overview of common study designs used in prevalence studies

A single study design is not appropriate to estimate the prevalence of Dementia. Few study designs are described below, which may be used in combinations to estimate the true prevalence.

Community prevalence studies use population-based sampling and face-to-face cognitive screening and are considered the most reliable for estimating true dementia prevalence by identifying early cases. However, they are limited by low response rates, selection bias, single-phase designs, and the need for caregiver input to assess functional decline.

Population-based cohorts allow long-term follow-up of older adults, enabling direct estimation of dementia incidence and detailed health assessment. However, advanced age at recruitment leads to high attrition and survival bias, while neurophysiological testing is often constrained by cost, limited mobility, comorbidities, and poor feasibility in severely affected individuals.

Non-population-based Cohorts are those cohorts specifically recruited for cognitive decline dementia and provide more specific neuroimaging and testing but have limited generalizability and small subgroup sample sizes.

Dementia registries derived from healthcare institutions providing routine care have low population coverage and require ongoing maintenance costs. They are also prone to selection bias, as they mainly include individuals who are educated, financially able, and well connected to health services.

Administrative datasets uses electronic health records from the national or state level with readily available data at low cost. It allows for inclusion of primary health care data with possibility of detecting early dementia.

Combination of study designs

The most relevant outcome of an appropriate study design would be estimation of age-specific prevalence of Dementia in a population and association with its determinants, such as social, economic, health related and lifestyle factors and so on. The estimates need to fulfill the following criteria:

- ✓ Generalizable to a population
- ✓ Address Recruitment bias and attrition
- ✓ Long term follow up to detect trends
- ✓ Based on statistically adequate large samples
- ✓ Inferred by resilient and long-lasting processes.

V Screening and diagnostic tools for Dementia

Assessment of Dementia shall be based on Cognitive domain and Functional domain. Screening for Cognitive impairment:

Hindi Mental State Examination (HMSE) - Indian adaptation of the MMSE, specifically designed for illiterate and rural elderly populations. It covers key cognitive domains and has shown a sensitivity of 81.3% and specificity of 60.2% at a cut-off score of ≤ 23 for cognitive impairment.³¹ Hindi Mental State Examination (HMSE) might be used to screen for dementia in both rural and urban areas. However, it might not be suited for detecting Dementia in people with higher education, especially in urban areas.

*Vellore Screening Instrument for Dementia*³² -combines informant-based and direct testing to provide a culturally appropriate tool for low-literacy populations in South India, showing good reliability and field utility (Charles et al., 2016).

*Rowlands Universal Dementia Assessment Scale*³³ - developed to reduce cultural and educational biases in cognitive screening. It evaluates multiple cognitive domains such as memory recall, praxis, and executive function, making it suitable for multicultural settings (Storey et al., 2004)

*Montreal Cognitive Assessment*³⁴ -globally accepted tool for detecting mild cognitive impairment, with a cut-off score of < 26 ; however, it is affected by education level, requiring adjustments for those with ≤ 12 years of education (Nasreddine et al., 2005).

Addenbrooke's Cognitive Examination (III) -detailed cognitive assessment tool that evaluates five domains—attention, memory, fluency, language, and visuospatial skills—allowing for differentiation of dementia subtypes (Hsieh et al., 2013).

Screening for Functional domain:

Functional ability is an essential domain in the assessment of elderly individuals, particularly in the context of cognitive impairment.

*The Katz Index of Activities of Daily Living (ADL)*³⁵ is widely used to evaluate basic self-care tasks such as bathing, dressing, toileting, transferring, continence, and feeding, helping to determine the level of dependence or independence in daily functioning (Katz et al., 1963).

For assessing more complex skills necessary for independent living, the *Lawton and Brody Instrumental Activities of Daily Living (IADL) Scale*³⁶ is often used; it includes domains such as handling finances, managing medication, using transportation, and preparing meals (Lawton & Brody, 1969).

*The Barthel Index*³⁷ is another validated tool that evaluates mobility and personal care, with scoring that reflects the degree of independence, making it useful for both clinical and community-based settings (Mahoney & Barthel, 1965).

Together, these tools provide a comprehensive understanding of functional status and are often used in conjunction with cognitive screening tools in geriatric assessments.

Conclusion

Community- Based studies on Dementia are essential for capturing the true burden of dementia among diverse populations. Data on specific communities with insights into regional variations are useful in understanding the local practices and helpful in line with designing culturally effective interventions. The locally available data can be utilized by the policy makers to allocate resources and planning of health care services according to the community needs. Studies suggest that individuals with more years of schooling might score within the normal range on screening tests, even if they have early signs of dementia in urban population. This

could lead to an underestimation of dementia cases in urban populations. Dietary influences, Impact of Air Pollution, Climate Change on Dementia are potential newer thrust areas for exploration and research. Research on Barriers to Dementia diagnosis and management can guide policies to improve early detection and care in underserved communities

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