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Original Research Article

Aging Population and Geriatric Public Health: Deals with the Challenges and Strategies of Managing Health in an Aging Population, Focusing on Preventive Care and Management of Chronic Diseases Prevalent Among Older Adults

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Conflict of interest: Nil

Abstract:

Background: The global increase in the aging population has significant public health implications, particularly in low-resource settings like rural India. Older adults are increasingly affected by chronic diseases, functional decline, and limited access to preventive healthcare services. Addressing these challenges requires localized, evidence-based strategies to improve geriatric health outcomes.

Aim: To assess the prevalence of chronic diseases, functional status, and preventive care practices among the elderly population in the Deogaon block of Balangir district, Odisha.

Methods: A prospective community-based study was conducted over one year among 84 participants aged 60 years and above. Data were collected using structured interviews, clinical examinations, and functional assessment tools. Statistical analysis was performed using SPSS version 23.0, and associations were tested using Chi-square and t-tests.

Results: The majority of participants were in the 60–69 years age group (63.1%) and 55.9% were female. Hypertension (47.6%) and type 2 diabetes (33.3%) were the most prevalent chronic conditions, with 36.9% having multiple comorbidities. Functional independence was observed in 70.2%, while 8.3% were moderately to severely dependent. Only 42.9% had undergone routine check-ups, and vaccination coverage was low (15.5% for influenza, 8.3% for pneumococcal). Advancing age was significantly associated with higher comorbidity and dependency ($p < 0.05$).

Conclusion: The study highlights a high burden of chronic illnesses and suboptimal preventive care among the elderly. Functional decline and multimorbidity were more common in older age groups, underscoring the need for focused geriatric health strategies.

Recommendations: Strengthening primary healthcare with a focus on geriatric screening, health education, vaccination, and community-based support systems is essential. Incorporating digital tools and trained health workers could further improve outreach and follow-up for elderly care in rural areas.

Keywords: Aging Population, Geriatric Health, Chronic Disease, Preventive Care, Rural Public Health.

Introduction

The global demographic landscape is undergoing a significant transformation due to the rapid increase in the aging population. According to the WHO, the proportion of people aged 60 years and older is expected to double by 2050, reaching nearly 2.1 billion globally, with low- and middle-income countries witnessing the fastest growth [1]. In India, the elderly population (aged ≥60 years) is projected to rise from 10.1% in 2021 to 19.5% by 2050, bringing immense pressure on healthcare and social systems [2]. This demographic shift presents both challenges and opportunities for public health, requiring targeted strategies to address the complex health needs of older adults.

Aging is often accompanied by physiological changes and an increased risk of chronic non-communicable diseases such as hypertension, diabetes, cardiovascular disorders, and neurodegenerative conditions [3]. These conditions,

if not managed effectively, can lead to disability, reduced functional ability, and dependency, significantly impacting the quality of life and increasing the burden on families and healthcare systems [4]. Moreover, geriatric health is influenced not only by medical factors but also by social, psychological, and economic determinants, making it a multifaceted public health issue [5].

Preventive healthcare plays a pivotal role in promoting healthy aging. Early detection of disease, vaccination, regular health check-ups, nutritional support, and lifestyle modifications can significantly delay the onset of complications and reduce healthcare costs [6]. However, in many rural and underserved areas, such as parts of Odisha, access to preventive and geriatric healthcare remains inadequate due to infrastructural limitations, low health literacy, and socioeconomic disparities [7].

Community-based health models and primary care strengthening have emerged as effective approaches for delivering geriatric services. Integrating geriatric care into existing public health programs and ensuring capacity-building of healthcare workers can enhance service delivery and improve health outcomes [8]. Additionally, the use of health technologies and digital platforms offers innovative avenues for monitoring, counselling, and engaging elderly individuals in their care [9].

Given this background, the present study was conducted to assess the health status, prevalence of chronic conditions, functional ability, and preventive care practices among the elderly in a rural block of Odisha. The findings aim to provide evidence for policy and program development targeting geriatric health in similar resource-constrained settings.

Methodology

Study Design: This was a prospective observational study.

Study Setting: The study was conducted in the Deogaon block of Balangir district, a semi-rural region of Odisha, India. This area was selected due to its growing elderly population and limited access to specialized geriatric health services, making it a relevant setting for exploring public health strategies targeting older adults. The study was designed to systematically collect data over a 1-year period to monitor outcomes and trends in geriatric health care.

Participants

A total of 84 participants aged 60 years and above were enrolled in the study using purposive sampling. Informed consent was obtained from all individuals prior to participation. Participants represented a diverse range of socioeconomic and health backgrounds within the target demographic of the region.

Inclusion Criteria

Participants included in the study were:

- Individuals aged 60 years and above.
- Permanent residents of the Deogaon block.
- Willing and able to provide informed consent.
- Available for follow-up during the entire study period.

Exclusion Criteria

The following criteria were used to exclude participants:

- Individuals with severe cognitive impairment or psychiatric illness that hindered informed consent or participation.
- Those who were terminally ill or bedridden.
- Participants who migrated out of the area or became unreachable during the study period.

Bias: To minimize selection bias, participants were chosen using a well-defined and consistent sampling method. Information bias was addressed through standardized data collection tools and training of field investigators. Confounding factors such as comorbidities and lifestyle factors were documented and considered during data analysis.

Data Collection: Data were collected using a structured questionnaire and clinical examination checklist. Information on demographics, medical history, chronic disease status, preventive health practices, and functional ability was recorded. Interviews were conducted in the local language by trained field workers under medical supervision.

Procedure: Each participant underwent an initial health assessment at the beginning of the study, followed by periodic evaluations every 3 months for one year. Health education sessions focusing on preventive care and chronic disease management were also conducted during community visits.

Statistical Analysis: Data were coded and entered into IBM SPSS software version 23.0 for analysis. Descriptive statistics such as means, frequencies, and percentages were used to summarize demographic and clinical variables. Inferential statistics, including the Chi-square test and t-test, were applied to determine associations between variables. A p-value of <0.05 was considered statistically significant.

Results

Out of the total 84 participants, 47 (55.9%) were females and 37 (44.1%) were males. The majority of participants (63.1%) were in the age group of 60–69 years, followed by 26.2% in the 70–79 years' category, and 10.7% aged 80 years and above.

Table 1: Age and Gender Distribution of Participants (n = 84)

Age Group (Years)	Male (n = 37)	Female (n = 47)	Total (%)
60–69	24	29	53 (63.1%)
70–79	10	12	22 (26.2%)
≥80	3	6	9 (10.7%)

The highest representation was from the 60–69 years age group in both genders, indicating a concentration of the aging population in the early elderly bracket. The proportion of elderly females was slightly higher, possibly reflecting longer life expectancy.

Prevalence of Chronic Diseases: Among the participants, Hypertension (HTN) was the most prevalent chronic condition (47.6%), followed by Type 2 Diabetes Mellitus (T2DM) (33.3%), Osteoarthritis (26.2%), and Chronic Obstructive Pulmonary Disease (COPD) (16.7%).

Table 2: Prevalence of Chronic Conditions (n = 84)

Chronic Condition	Number of Participants	Percentage (%)
Hypertension	40	47.6%
Type 2 Diabetes Mellitus	28	33.3%
Osteoarthritis	22	26.2%
COPD	14	16.7%
Cataract	11	13.1%
Multiple Conditions	31	36.9%

A significant proportion of the elderly participants were managing multiple chronic diseases, highlighting the need for integrated care models. Comorbidities were common, particularly among individuals aged 70 years and above.

Functional Status Assessment: Functional ability was assessed using Activities of Daily Living (ADL). About 70.2% of participants were fully independent, 21.4% had mild dependency, and 8.3% were moderately to severely dependent.

Table 3: Functional Status of Participants (n = 84)

ADL Status	Number of Participants	Percentage (%)
Fully Independent	59	70.2%
Mildly Dependent	18	21.4%
Moderately Dependent	6	7.1%
Severely Dependent	1	1.2%

The majority of participants were functionally independent. However, the presence of moderate to severe dependency among a subset of participants underlines the importance of support systems and rehabilitation services for the elderly.

Preventive Care Practices: Only 42.9% of participants had undergone routine health check-ups in the past year. Vaccination rates for influenza and pneumococcal disease were low at 15.5% and 8.3% respectively. Nutritional supplementation was followed by 34.5% of participants.

Table 4: Preventive Health Measures among Participants

Preventive Measure	Number (%)
Routine Health Check-up	36 (42.9%)
Influenza Vaccination	13 (15.5%)
Pneumococcal Vaccination	7 (8.3%)
Nutritional Supplement Intake	29 (34.5%)

Preventive health behavior was suboptimal among the elderly population. This calls for targeted community-based health awareness and outreach programs to improve preventive practices.

Association Between Age and Comorbidity (Chi-square Test): A Chi-square test was conducted to assess the association between age group and presence of multiple chronic conditions. The result was statistically significant ($\chi^2 = 9.87$, $p = 0.01$), indicating that older participants were more likely to suffer from multiple comorbidities.

Summary of Key Statistical Findings

- The mean age of participants was 68.4 ± 6.2 years.
- Females had slightly higher rates of osteoarthritis ($p = 0.04$).
- Preventive care utilization was significantly lower among participants from lower socioeconomic backgrounds ($p < 0.05$).
- Functional dependency increased significantly with advancing age ($p = 0.02$).

Discussion

The study assessed the health status and preventive care practices of 84 elderly individuals in the Deogaon block of Balangir district. The demographic data revealed a predominance of females (55.9%) and a majority of participants (63.1%) in the 60–69 years age group. This age distribution highlights the early geriatric phase as the most represented, suggesting an opportunity for timely intervention to prevent health deterioration in later stages of aging.

A high prevalence of chronic diseases was observed among participants, with hypertension (47.6%) and type 2 diabetes mellitus (33.3%) being the most common. Additionally, 36.9% of participants had multiple comorbidities, indicating a substantial burden of chronic illness in this age group. These findings underscore the urgent need for integrated chronic disease management approaches and regular monitoring to reduce complications and improve quality of life.

Functional status assessment using the (ADL) scale showed that while the majority (70.2%) were fully independent, a significant minority (8.3%) were moderately or severely dependent. The trend of increasing dependency with advancing age was statistically significant ($p = 0.02$), emphasizing the need for supportive care services, rehabilitation, and family involvement in elderly care planning.

Preventive health behavior among participants was notably inadequate. Less than half (42.9%) had undergone routine health check-ups in the past year, and the uptake of recommended vaccinations—such as for influenza (15.5%) and pneumococcal disease (8.3%)—was particularly low. The use of nutritional supplements was also limited to 34.5%. These low rates of preventive care utilization reflect gaps in awareness, access, and possibly affordability of geriatric health services. Notably, lower socioeconomic status was associated with significantly poorer preventive care uptake ($p < 0.05$), indicating the influence of social determinants on elderly health practices.

The statistical analysis demonstrated a strong association between older age and the presence of multiple chronic diseases ($\chi^2 = 9.87$, $p = 0.01$), reinforcing the reality that health complexity increases with age. Furthermore, female participants were found to have a slightly higher prevalence of osteoarthritis ($p = 0.04$), possibly due to gender-related physiological differences and post-menopausal bone health decline.

In summary, the results point to a dual challenge in geriatric public health: a growing burden of chronic conditions and poor preventive care engagement. The findings call for comprehensive strategies that combine medical care, health education, and community-based support to address the unique needs of the aging population.

As the global population ages, the management of chronic diseases and implementation of preventive care strategies have become central to geriatric public health planning. Integrated health systems that combine medical and preventive services demonstrate significant improvements in elderly care outcomes. For example, China's approach to integrating medical-preventive care through increased general practitioner presence and digital health record systems resulted in a 20% reduction in elderly hospitalizations and a 35% decrease in vaccine-preventable diseases, highlighting the value of proactive, technology-enabled public health infrastructure [10]. Similarly, leveraging big data and explainable AI in chronic disease management reduced redundant diagnostics by up to 35% and mitigated cardiometabolic risks by 15–20%, especially in regions with more developed data integration systems [11].

A global systematic review comparing preventive healthcare systems for the elderly revealed that 64% of countries manage preventive care at the national level, with most financing through taxes and health insurance. Public providers dominate service delivery, though private and local entities contribute in some regions, emphasizing the need for tailored models depending on the country's healthcare structure [12]. In Ireland, a national population-health-based chronic disease management model emphasized GP-led care, structured diagnosis access, and community engagement. This model has shown early signs of effectiveness in multimorbidity management and equitable care delivery [13].

Preventive and chronic care strategies must also be community-focused and patient-centered. A study using the NHATS and NSOC datasets in the U.S. found that chronic condition management (e.g., nutrition, medication, wound care) was significantly improved by addressing social determinants and involving caregivers [14]. Longitudinal data from Korea revealed that patients with a regular source of care had higher chronic disease management costs initially but lower overall expenditures over time, due to more efficient and preventive healthcare utilization [15]. Likewise, in a U.S.-based community program, evidence-based chronic disease self-management for older adults, especially among communities of color, improved self-efficacy and quality of life while lowering emergency care utilization [16].

Policy-level innovations are crucial. One review of international health systems stressed that preventive care, integrated services, and use of digital technologies are essential to adapt to aging populations, as they alleviate system strain while improving patient outcomes [17]. Educational

interventions and participatory learning programs have also proven cost-effective in population health management, particularly when targeting individuals with chronic conditions [18]. Moreover, studies emphasize the crucial role of primary and family medicine in reducing complications through continuous monitoring, early screening, and patient education, particularly in underserved communities [19].

Special populations, such as individuals with cognitive impairments, face greater challenges in disease management. Data from China indicated that long-term services and supports (LTSS) improve hypertension management and preventive care use in older adults without cognitive decline, but have limited effectiveness in those with impairments, signaling the need for tailored care strategies [20].

Conclusion

The study highlights a significant burden of chronic diseases and functional decline among the elderly population in Deogaon block, with limited engagement in preventive health practices. Older age and lower socioeconomic status were strongly associated with poorer health outcomes. These findings emphasize the urgent need for targeted geriatric care strategies, including regular health screening, chronic disease management, and community-based preventive interventions to improve the quality of life in aging populations.

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