REVIEW ARTICLE

# Prevalence of Non-Communicable Diseases Among Elderly in India: A Scoping Review

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**DOI:** 10.55489/njcm.160220254966

## ABSTRACT

**Background:** Non-communicable diseases (NCDs) are a growing concern for India's aging population. This scoping review aimed to identify and summarize the prevalence of NCDs among elderly people in India.

**Methods:** A systematic search of PubMed and Google Scholar identified 37 studies published in English between 2013 and 2023 that met the inclusion criteria. Two independent reviewers screened and selected studies, and data was extracted and analyzed using a standardized form. The PRISMA framework was employed to visualize the study selection process.

**Results:** Hypertension was the most prevalent NCD (>50% in studies), followed by diabetes (<50% in studies, but with high new case detection). Depression was particularly prevalent among urban females (over 50%). Obesity and overweight were widespread, with women being more likely to be overweight and men to have central obesity. Significant gender disparities existed in hypertension, depression, diabetes, and visual impairments.

**Conclusion:** This review highlights the significant NCD burden among elderly Indians, particularly hypertension and diabetes, underscoring the need for targeted health interventions. Addressing modifiable risk factors with gender-sensitive approaches is essential. Further research is needed on the intersection of aging and NCDs in India to improve the quality of life for elderly individuals.

**Keywords**: Non-communicable diseases, Elderly, Hypertension, Diabetes, Prevalence

## ARTICLE INFO

**Financial Support:** None declared

**Conflict of Interest:** The authors have declared that no conflict of interests exists.

**Received**: 28-11-2024, **Accepted**: 01-01-2025, **Published**: 01-02-2025

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**How to cite this article:** Yadav PS, Katta A, Shirisha G, Kirtania M. Prevalence of Non-Communicable Diseases Among Elderly in India: A Scoping Review. Natl J Community Med 2025;16(2):211-217. DOI: 10.55489/njcm.160220254966



*www.njcmindia.com | pISSN: 0976-3325 | eISSN: 2229-6816 | Published by Medsci Publications*

## INTRODUCTION

Aging is a natural irreversible, biological phenomenon. The population is progressively aging worldwide. Around the world, the number of older people is increasing by 2.6% each year.[1] This is a faster growth rate than the total population, which is growing at a rate of 1.1% per year.[1] India is becoming an aging nation with 8.2 percent of its population being over 60.[2] According to the Government of India Elderly means any person being a citizen of India, who has attained the age of sixty years or above is called elderly. In 2006, there were 83.6 million elderly people in India, and by 2026 in the Future, this number is expected to double, reaching 173 million.[2]

The elderly population is at higher risk of Non communicable diseases (NCD). Chronic diseases, also known as NCDs, are diseases that are long-term and are caused by a combination of genetics, physiology, environment, and behaviour which results in long-term health consequences and often create a need for long term treatment and care.[3,4] Every year, NCDS take the lives of 41 million people worldwide, which is about 71% of all deaths globally.[3] In India, NCDs contribute to around 5.87 Million deaths accounting for 60% of all Deaths.[5] More than half of the older population in India have at least one chronic health issue.[6] In India, 14% of Elderly people have hypertension, 9% have diabetes, and 8.1% have heart disease.[6] People of all age groups can be affected by NCDs, but the elderly are at higher risk and experience higher rates of both mortality and morbidity.[3] Currently, there is a paucity of Literature on NCDs with a focus on the Elderly population in India. The objective of the current review is to study the Burden of NCDs among the elderly in India. This scoping review aims to answer the research question: What is the prevalence and distribution of non-communicable diseases (NCDs) among the elderly population in India in the existing literature? This scoping review focuses on the existing research available on non-communicable diseases among elderly in India, highlighting gaps in understanding their health needs. A Scoping review preferred to present an overview of a relatively broad and diverse view of the literature and identify the existing gaps.

## METHODOLOGY

An extensive systematic literature search of all materials related to the topic was carried out in the PubMed, Scopus, Embase (Elsevier) and Google Scholar databases. Articles were chosen based on relevance and included original research that addressed prevalence of NCDs among elderly in India. This study included articles in English. Since it is a search for recent evidence the studies published in the last 10 years (2013 -2023) were included. To identify relevant literature a comprehensive search strategy was employed using a combination of primary keywords, synonyms and related MeSH terms. The primary search terms included "non-communicable diseases," "elderly," "India," “prevalence.” To broaden the scope and capture a wider range of relevant studies and related MeSH terms such as "NCDs," "chronic diseases," "diabetes," "hypertension," "obesity," "aging," "older adults," "older," and "geriatric" were incorporated.

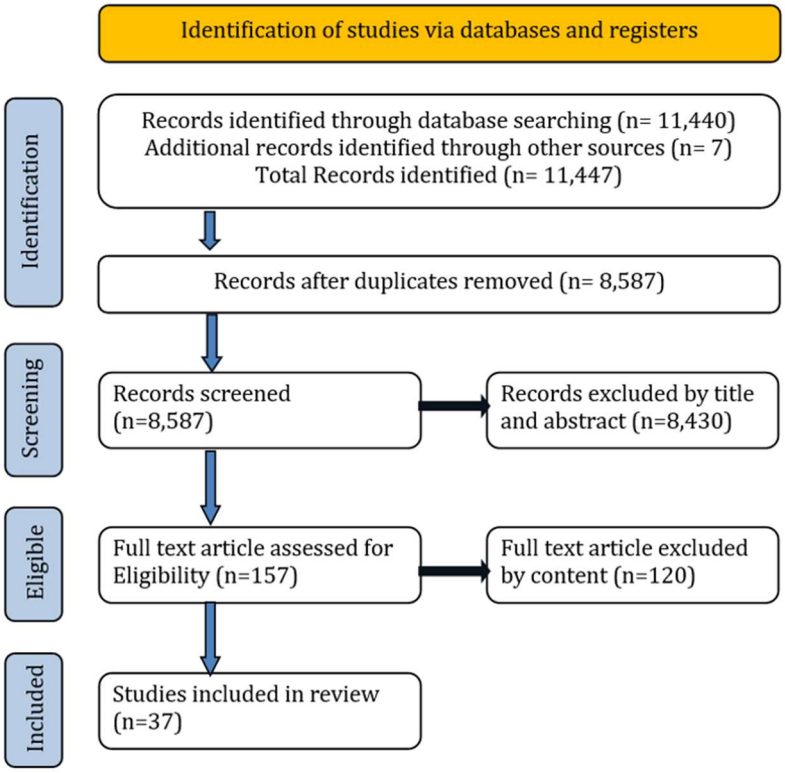


**Figure 1: Prisma Flowchart**

The search process started with identifying the primary keywords and their synonyms, which were then combined systematically using Boolean operators “AND” and “OR” to optimize the search. The finalized search terms included variations and combinations of the key concepts: "non-communicable diseases," "elderly," "India," and “prevalence.” We also included studies referencing selected articles to further avoid missing literature. A Manual search was conducted for cross references.

Two independent reviewers then screened titles, abstracts, and full-text articles based on pre-defined inclusion and exclusion criteria. Included studies were original research conducted in India with participants aged 60 or older that reported NCD prevalence. Articles published in languages other than English, reviews, commentaries, and studies on younger populations were excluded. A standardized data extraction form was developed to collect key information from the included studies. Reviewers independently extracted data and any discrepancies were resolved through discussion to ensure accuracy. The PRISMA flowchart (Figure 1) has been included to visually represent the study selection process for this scoping review. This flowchart outlines the systematic steps taken to identify, screen and select studies relevant to the prevalence of non-communicable diseases among the elderly in India.

## Results

The duration of the search strategy was from March to May 2024. A total of 11,447 studies were reviewed and analyzed. After the removal of duplicate articles, 8587 potentially relevant studies were screened for their titles and abstracts, resulting in 157 full-text articles. After careful evaluation, 120 full-text studies were excluded due to the following reasons including irrelevant research questions, studies not following the cross-sectional method, not in English, editorials, and commentaries. After reviewing all studies, 37 articles were included in the final review.[1,2,6-40] Figure 1 shows the PRISMA framework used for the literature search process.

According to our study criteria, we included only those articles that measured the prevalence of single/multiple NCDs and followed the cross-sectional methodological approach in India. The prevalence was measured among older adults (>60 years) with more female participants in the selected studies. Heterogeneity in the type of NCDs reported in the selected studies was observed as follows: Hypertension (n=17), Diabetes (n=11), Depression (n=7), Obesity and Overweight (n=6), Cognitive, Visual, and, Hearing Impairment (n=5), and heart disease (n=2).

Hypertension was the most common NCD reported among the selected studies. The prevalence was recorded as more than 50% (n=12) of the studies. In four out of seven studies that compared the prevalence with gender, females showed a higher prevalence than males. The risk factors associated with increased chances of hypertension were advancing age, high literacy level, higher BMI, sedentary lifestyle, living in a joint family, type of occupation, high socioeconomic condition, and presence of any co-morbidity. Among the co-morbidities, the prevalence of overweight and obesity was identified as a high-risk factor. Moreover, alcohol and tobacco consumption contributed to an 85.6% higher chance of being hypertensive. According to a study 68.2% of the hypertensive participants were aware, 65.4% were treated and 24% achieved adequate control.[16] Some of the health determinants like obesity, disturbed sleep, constipation, and physical activity (up to 30 minutes) had a significant positive association with hypertension.

The second most common NCD reported among the selected studies was Diabetes. Though the prevalence recorded was less than 50% in all the studies, the number of newly detected cases was higher suggesting an even higher number of undetected cases.[11] Two out of three studies found that males had a higher prevalence, whereas a study did not find a significant gender difference.[12] The age trend between 60-70 years was identified when diabetes was reported. Higher educational levels and BMI (≥25 $kg/m^2$) were identified risk factors. A study reported that 45.7% of the diabetic participants were aware, 94.6% were treated, and 34.3% were under control.[34] Though the treatment coverage was better, the screening rate for diabetic retinopathy was abysmal. Obesity was associated with eight-fold higher risk of diabetes compared to individuals of normal weight.

The third common NCD reported among the selected studies was Depression. Four out of seven studies reported more than 50% of the prevalence of depression among the elderly participants. The prevalence was highest among the urban female residents (67.2%). Similarly, the prevalence of severe depression was reported higher among females (72.4%). A study compared and recognized that depression, anxiety, and stress were prevalent in 84.2%, 49.2%, and 55.9% of the participants, respectively.[35] The risk factors identified for depression by the selected studies are as follows; nuclear family, separated/ divorced/widowed, living alone, females, low or no income, stress in family, no role in family decision-making, lack of physical activity, and existing co-morbidities. A significant association was found between depression and other co-morbidities such as hypertension, diabetes, and functional and cognitional impairment.

Obesity and overweight were reported as the fourth most common NCD among the selected studies. According to the BMI criteria, the highest to lowest prevalence is as follows: Overweight, generalized obesity, and central obesity. The women were more overweight than the men, while the men were more centrally obese than the women. A positive correlation was found between BMI, waist circumference, and percent body fat.

**Table 1: Prevalence of Non-Communicable Diseases (NCDs) Among Elderly in India**

| Study Author(s) and Year | Sample Size (n) | Sex (M/F) | Type of NCD | Prevalence (%) |
|---|---|---|---|---|
| Anup Singh et al (2019)[7] | 400 | 194/ 206 | Hypertension | 49.99% |
| Gonmei Z et al (2018)[8] | 202 | 109/ 93 | Hypertension | 49.5% |
| Maniyara K et al (2023)[16] | 300 | 118/ 182 | Hypertension | 72.3% |
| Soumyashree MN et al (2018)[23] | 420 | 0/ 420 | Hypertension | 34.7% |
| Sheth AM et al (2016)[24] | 600 | 365/ 235 | Hypertension | 42.7% |
| Patel A et al (2019)[27] | 627 | 303/ 324 | Hypertension | 51.99% |
| Bartwal J et al (2016)[32] | 440 | 177/ 263 | Hypertension | 38.86%. |
| Ramesh J et al (2017)[33] | 100 | 43/ 57 | Hypertension | 59% |
| Medhi GK et al (2021)[12] | 430 | 210/ 220 | Diabetes | 7.9% |
| Chavada VK et al (2021)[28] | 202 | 103/ 99 | Diabetes | 20.3%. |
| Arora I et al (2019)[22] | 1061 | 444/ 617 | Diabetes | 35.25% |
| Kapil U et al (2018)[36] | 1003 | 363/ 640 | Hypertension | 54.5% |
| | | | Diabetes | 14.6% |
| Borra S et al (2015)[20] | 100 | 50/ 50 | Hypertension | 32% |
| | | | Diabetes | 24%, |
| Ahmed M et al (2019)[30] | 110 | 64/ 46 | Hypertension | 45.5% |
| | | | Diabetes | 26.4% |
| Gupta S et al (2020)[34] | 374 | 157/ 217 | Hypertension | 50.3% |
| | | | Diabetes | 21.7% |
| Kulkarni Set al (2019)[11] | 3527 | 1440/ 1781 | Diabetes | 21.9%. |
| | | | Diabetic Retinopathy | 14.3%. |
| Binu J et al (2014)[21] | 89 | 34/ 55 | Obesity | 54%. |
| Chingale A et al (2019)[26] | 457 | 339/ 361 | Obesity | 32.6% |
| Sanjay TV et al (2017)[39] | 247 | 91/ 156 | Obesity | 62.3% |
| Rajkamal R et al (2018)[25] | 251 | 113/ 138 | Overweight | 30.7% |
| | | | Obesity | 8.3% |
| Rajkamal R et al (2014)[29] | 682 | - | Overweight | 41.4% |
| | | | Obesity | 4.5% |
| Behera P et al (2016)[40] | 395 | 172/ 223 | Depression | 11.4% |
| Debnath A et al (2023)[14] | 230 | 110/ 120 | Depression | 68.2% |
| Sengupta P et al (2015)[31] | 3038 | 1384/ 1654 | Depression | 8.9%. |
| Verma M et al (2019)[15] | 320 | 143/ 177 | Depression | 58.1% |
| | | | Anxiety | 38.7% |
| Ramesh S et al (2023)[35] | 311 | 115/ 196 | Depression | 84.2% |
| | | | Anxiety | 49.2% |
| | | | Stress | 55.9% |
| Mohan D et al (2019)[10] | 426 | 160/ 266 | Mild Cognitive Impairment | 26.06% |
| | | | Dementia | 5.63% |
| Kumari R et al (2021)[19] | 425 | 185/ 240 | Cognitive Impairment (CI) | 36% |
| | | | Depression | 29.1% |
| Joshi R et al (2013)[17] | 2254 | 1174/ 1250 | Hypertension | 46.3%. |
| | | | Cardiovascular Disease | 3.3% |
| Chobe M et al (2022)[13] | 1671 | 870/ 801 | Hypertension | 40.4% |
| | | | Diabetes | 31.2% |
| | | | Arthritis | 22.1% |
| | | | Sensory impairment | 10.1% |
| | | | Heart disease | 7.8% |
| | | | Dyslipidemia | 7.0% |
| Prabhakar T et al (2022)[1] | 350 | 159/ 191 | Hypertension | 4% |
| | | | Cataract | 1% |
| | | | Diabetes | 1% |
| | | | Osteoarthritis | 9% |
| | | | Obesity | 5% |
| Thakur RP et al (2013)[9] | 407 | 156/ 252 | Visual Impairment | 83.29% |
| | | | Hearing Impairment | 63.1% |
| | | | Depression | 52.3% |
| | | | Hypertension | 30.7% |
| Kaur G et al (2019)[2] | 225 | 110/ 115 | ocular | 78.7% |
| | | | musculoskeletal | 71.6% |
| | | | hypertension | 52.4% |
| | | | respiratory | 51.1% |
| | | | gastrointestinal | 36.9% |
| | | | coronary artery | 19.6% |
| | | | diabetes | 11.6% |
| Marmamula S et al (2021)[6] | 1821 | 828/ 993 | Hypertension | 25.4% |
| | | | Diabetes | 9.0% |
| | | | Heart disease | 1.5% |
| | | | Overall (At least one NCD) | 35.4% |
| Das RA et al (2017)[38] | 167 | 82/ 85 | Hypertension | 63% |
| | | | Diabetes | 61% |
| | | | visual impairment | 36.5% |
| | | | Overall (at least one NCD) | 89.2%. |
| Ahamed F et al (2021)[37] | 457 | 238/ 219 | Overall (at least one NCD) | 82.3% |
| Kshatri JS et al (2020)[18] | 725 | 378/ 347 | Overall (at least one NCD) | 48.8% |

In addition, factors such as family history, female gender, overeating, comorbidity, religion, education, occupation, sleep, smoking, and alcohol consumption were significantly associated with obesity and overweight.

Functional and Cognitive impairment were also the common type of NCD reported among the selected studies. The prevalence of visual impairment was highest, followed by hearing and cognitive impairment. Men were more affected by visual impairments, while women suffered more from hearing and cognitive impairments. An independent significant association was found between literacy, memory complaints, depression, and cognitive impairment. Walking imbalance, depression, anxiety, and alcohol consumption were positively associated, while leisure activities at home were negatively associated with cognitive impairment.

Finally, two studies among the selected articles reported on cardiovascular diseases. The prevalence of CVD ranged from 2-10%. Being overweight was the highest-risk health determinant for hypertension, heart disease, high cholesterol, and stroke. As compared to men, more women had prevalent uncontrolled and incident hypertension. Moreover, every two out of five high-risk elderly had dyslipidemia.

## Discussion

This scoping review was performed to identify the literature on the Prevalence of Non-communicable diseases among the elderly in India. We identified 37 research studies in India that measured the prevalence of single or multiple non-communicable diseases among the geriatric Population using a cross-sectional approach.

The review highlights a significant prevalence of NCDs among the elderly in India, with hypertension in first place followed by diabetes being the most common NCDs. This aligns with global trends where aging populations face increased NCD risks. The high prevalence of hypertension among the elderly in India emphasizes the urgent need for targeted health interventions. Notably, females exhibit a higher prevalence, emphasizing the importance of gender sensitive approaches. Risk factors such as age, literacy level, BMI, and lifestyle play a significant role. Comorbidities, particularly overweight and obesity, contribute to hypertension risk. Similar findings have been reported by several studies exhibiting hypertension as one of the most common (40-70%) NCD. Also, among the co-morbidities, obesity contributed the most as an influencing factor for hypertension.[41,42,43]

The prevalence of diabetes reported in the selected studies was less than 50%. However, the high number of newly detected cases suggests a substantial burden of undiagnosed diabetes. Undetected cases may contribute significantly to the overall disease burden, emphasizing the need for improved screening and awareness programs. In contrast to our study, a study by Sunita et al concluded that the type of occupation was significantly associated with diabetes.[41]

Four out of seven studies reported a Prevalence of Depression exceeding 50% among elderly Participants. Among elderly individuals, females face a higher risk of depression. Sociodemographic correlates indicate an elevated risk among those who are widowed, divorced, or separated. Coping with loneliness increases vulnerability to depression among the elderly. Depression is linked to Hypertension, diabetes, and cognitive impairments. These factors highlight the importance of holistic care and support required for the elderly. Further Research is required to develop targeted interventions that focus on addressing mental health challenges among the elderly. A study on depression conducted in South India reported similar findings in which depression was positively associated with poor education, females, those living alone, and lower socio-economic status.[44]

This review highlights the methodological heterogeneity observed across the included studies. The studies varied in sample sizes, study designs, and regional coverage, which has implications for the interpretation of the findings. Smaller studies, with limited sample sizes, may overestimate the prevalence of conditions due to a lack of representativeness, while larger studies, though more generalizable, may fail to capture insights from specific subpopulations. The predominance of cross-sectional designs across studies restricts the ability to infer causal relationships between identified risk factors and non-communicable disease (NCD) outcomes. Moreover, several potential biases, including selection bias in participant recruitment and reporting bias in self-reported health conditions, could have influenced the results, highlighting the need for caution when interpreting the findings across diverse contexts. Furthermore, our study could not conduct a quality assessment and risk bias of the included studies as we opted for a scoping review.

This review also sheds light on gender disparities in NCD prevalence and control. Women were more prone to Hypertension and Depression, while men exhibited a higher rate of Diabetes and visual impairments. These research findings suggest that gender-sensitive approaches are important in public health planning and resource allocation. The Interplay between various risk factors such as literacy level, socioeconomic conditions, and lifestyle choices with NCD prevalence cannot be overstated. A significant correlation exists between obesity and NCDS like diabetes and Hypertension indicating that addressing weight management could have a cascading positive effect on overall health outcomes.

Despite the Global trends of NCDS and Extensive data, there's a notable gap in literature specifically addressing the intersection of aging and NCDS in India

pointing to a need for focused further research. Healthy aging involves Addressing NCDS. To promote healthy aging, we must address common NCD conditions like hypertension, diabetes, and depression among older adults. This approach improves their quality of life.

## Conclusion

This scoping review revealed a significant burden of NCDs among India's elderly population, with hypertension and diabetes being the most prevalent. Notably, the review highlighted concerning gender disparities, with women experiencing a higher burden of hypertension and depression. These NCDs can significantly increase the risk of functional limitations and disabilities among the elderly.

The findings emphasize the urgent need for targeted public health interventions in view of the burgeoning problems affecting elderly people in India. Efforts should focus on modifiable risk factors like obesity and physical inactivity through lifestyle modifications and health promotion programs. Specific public health strategies could include the establishment of targeted health screening programs for the elderly in underserved areas, integrating geriatric care into primary healthcare systems and promoting community-based interventions to address these challenges effectively. Early detection and management of diabetes are crucial, considering the high number of newly diagnosed cases. Future research should explore longitudinal trends in NCD prevalence and assess the efficacy of public health interventions to build an evidence base for effective policy-making. Additionally, addressing the mental health needs of the elderly, particularly females, is critical.

By prioritizing early detection, prevention, and holistic care that addresses modifiable risk factors and gender disparities, India's healthcare system can empower its elderly population to live longer, healthier lives, and potentially reduce the prevalence of disabilities associated with NCDs. This comprehensive approach, grounded in the findings of this review, provides actionable insights for policymakers and public health practitioners to promote healthy aging and improve quality of life for this growing segment of the Indian population.

## References


1. Prabhakar T, Goel MK, Acharya AS. Multiplicity of noncommunicable diseases among the elderly in a suburban area of Delhi. Indian Journal of Community and Family Medicine. 2022 Jan 1;8(1):50-5.
2. Kaur G, Bansal R, Anand T, Kumar A, Singh J. Morbidity profile of noncommunicable diseases among elderly in a city in North India. Clinical Epidemiology and Global Health. 2019 Mar 1;7(1):29-34.
3. World Health Organization. Noncommunicable diseases. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases. Accessed December 22, 2024.
4. Pan American Health Organization (WHO/Americas Region). Noncommunicable diseases. Available from: https://www.paho.org/en/topics/noncommunicable-diseases. Accessed December 22, 2024.
5. World Health Organization. Burden of NCDs and their risk factors in India (Excerpted from Global Status Report on NCDs - 2014). Available from: https://www.who.int/docs/default-source/searo/india/health-topic-pdf/noncommunicable-diseases/ncd-situation-global-report-ncds-2014.pdf?sfvrsn=ee0a9307_2 Accessed December 22, 2024.
6. Marmamula S, Modepalli SB, Kumbham TR, Challa R, Keeffe JE. Prevalence of disabilities and non-communicable diseases in an elderly population in the Telangana state, India: a population-based cross-sectional study. BMJ open. 2021 Feb 1;11(2):e041755.
7. Singh A, Narasannavar A and Naik Z. Prevalence of hypertension among the elderly people of Belagavi city, Karnataka: A community based cross sectional study. Al Ameen J Med Sci 2019; 12(2): 68-72.
8. Gonmei Z, Dwivedi S, Toteja GS, Singh k, vikram nk, bansal pg, rathore s. Dyslipidemia among the elderly in slums of west delhi. Asian j pharm clin res. 2018 feb 1;11(2):410-2.
9. Thakur RP, Banerjee A, Nikumb VB. Health problems among the elderly: a cross. Sectional study. Annals of medical and health sciences research. 2013 Apr 23;3(1):19-25.
10. Mohan D, Iype T, Varghese S, Usha A, Mohan M. A cross-sectional study to assess prevalence and factors associated with mild cognitive impairment among older adults in an urban area of Kerala, South India. BMJ open. 2019 Mar 1;9(3):e025473.
11. Kulkarni S, Kondalkar S, Mactaggart I, Shamanna BR, Lodhi A, Mendke R, Kharat J, Kapse R, Dole K, Deshpande M. Estimating the magnitude of diabetes mellitus and diabetic retinopathy in an older age urban population in Pune, western India. BMJ open ophthalmology. 2019 Feb 1;4(1):e000201.
12. Medhi GK, Dutta G, Borah P, Lyngdoh M, Sarma A. Prevalence of diabetes and its relationship with body mass index among elderly people in a rural area of Northeastern state of India. Cureus. 2021 Jan;13(1):e12747.
13. Chobe M, Chobe S, Dayama S, Singh A, Metri K, Basa JR, Raghuram N. Prevalence of non-communicable diseases and its associated factors among urban elderly of six Indian states. Cureus. 2022 Oct;14(10):e30123. DOI: https://doi.org/10.7759/cureus.30123
14. Debnath A, Sandooja C, Kishore J. Depression and associated factors among older adults in a North Indian state: a cross-sectional study. Cureus. 2023 Mar;15(3):e35962. DOI: https://doi.org/10.7759/cureus.35962
15. Verma M, Grover S, Tripathy JP, Singh T, Nagaraja SB, Kathirvel S, Singh G, Nehra R. Co-existing non-communicable diseases and mental illnesses amongst the elderly in Punjab, India. European endocrinology. 2019 Aug;15(2):106-112. DOI: https://doi.org/10.17925/EE.2019.15.2.106 PMid:31616502 PMCid:PMC6785953
16. Maniyara K, Kodali PB, Thankappan KR. Prevalence, awareness, treatment, control and correlates of prevalence and control of hypertension among older adults in Kerala: A mixed methods study. Indian Heart Journal. 2023 May 1;75(3):185-9.
17. Joshi R, Taksande B, Kalantri SP, Jajoo UN, Gupta R. Prevalence of cardiovascular risk factors among rural population of elderly in Wardha district. Journal of cardiovascular disease research. 2013 Jun 1;4(2):140-6.
18. Kshatri JS, Palo SK, Bhoi T, Barik SR, Pati S. Prevalence and patterns of multimorbidity among rural elderly: findings of the AHSETS study. Frontiers in public health. 2020 Nov 5;8:582663.

19. Kumari R, Langer B, Gupta RK, Bahl R, Akhtar N, Nazir H. Prevalence and determinants of cognitive impairment and depression among the elderly population in a rural area of North India. Indian Journal of Community Medicine. 2021 Apr 1;46(2):236-40.

20. Borra S, Kommula VM, Jyothirmai MS. Prevalence of hypertension and diabetes among the rural elderly in South India. Int J Curr Microbiol Appl Sci. 2015;4(5):251-4.

21. Binu J, Harnagle R. A study on the prevalence of overweight and obesity and its influencing factors among rural geriatric population in Kerala. Int J Curr Microbiol Appl Sci. 2014;3:284-93.

22. Arora I, Singh S, Bhuwal PK, Singh S. Prevalence of diabetes mellitus and its associated risk factor assessment among elderly in urban area of Punjab. Int J Community Med Public Health. 2019 Jan. 24;6(2):610-4. DOI: https://doi.org/10.18203/2394-6040.ijcmph20190177

23. Soumyashree MN, Viveki RG. Prevalence of hypertension and co-morbidities among elderly women in rural area: a cross sectional study. International Journal of Community Medicine and Public Health. 2018 Sep;5(9):4018.

24. Sheth AM, Jadav PA. Prevalence and factors affecting hypertension among old age population in rural area. International Journal of Community Medicine and Public Health. 2016 Jul;3(7):1866-71.

25. Rajkamal R, Seralathan M, Jayakiruthiga S. Prevalence and factors associated with overweight and obesity among elderly people in a semi-urban area of Chennai. Int J Community Med Public Health. 2018 Sep;5(9):3887-91.

26. Chingale A, Katti SM. Prevalence of obesity among elderly residing in an urban area of Belgaum. Int J Community Med Public Health [Internet]. 2019 Sep. 26;6(10):4417-20. DOI: https://doi.org/10.18203/2394-6040.ijcmph20194504

27. Patel A, Shankar G. A cross-sectional study of hypertension among the elderly residing in urban field practice area of SN Medical College, Bagalkot, Karnataka. Indian Journal of Forensic and Community Medicine. 2019 Jul;6(3):116-20.

28. Chavada Vijay K, A. Mary Stephen, Kavita Vasudevan. Prevalence and knowledge, attitude, practices about diabetes mellitus among elderly people in urban slums of Puducherry India. Int. J. Heal. Clin. Res. [Internet]. 2021 Nov.8 [cited 2024 Jul.12];4(19):164-9.

29. Rajkamal R, Singh Z, Stalin P, Muthurajesh E. Prevalence and determinants of overweight and obesity among elderly population in an urban area of Puducherry. Int J Med Sci Public Health. 2014 Mar 1;4(3):369-72.

30. Ahmed M. Prevalence of Diabetes and Hypertension among Geriatric Population in a Rural Village of Mysore. International Journal of Preventive, Curative & Community Medicine (E-ISSN: 2454-325X). 2019 Dec 16;5(1):28-33.

31. Sengupta P, Benjamin AI. Prevalence of depression and associated risk factors among the elderly in urban and rural field practice areas of a tertiary care institution in Ludhiana. İndian journal of public health. 2015 Jan 1;59(1):3-8.

32. Bartwal J, Rawat CS, Awasthi S. Prevalence, Awareness, Treatment and Control of Hypertension among the Elderly Residing in Rural Area of Haldwani Block, in Nainital District of Uttarakhand. Journal of Cardiovascular Disease Research. 2016;7(3):112-115.

33. Ramesh J, Stanly M, A population-based study on hypertension among elderly in a slum in Chennai. *J Community Health Manag* 2017;4(4):143-147.

34. Gupta S, Kumar R, Kalaivani M, Nongkynrih B, Kant S, Gupta SK. Prevalence, awareness, treatment, and control of diabetes and hypertension among elderly persons in a rural area of Ballabgarh, Haryana. Journal of family medicine and primary care. 2020 Feb 1;9(2):777-82.

35. Ramesh S, Kosalram K, Srinivas V. Non-communicable diseases and their impact on depression, anxiety, and stress among the geriatric population residing in old age homes in Chennai, Tamil Nadu. Journal of Family Medicine and Primary Care. 2023 Sep 1;12(9):1931-7.

36. Kapil U, Khandelwal R, Ramakrishnan L, Khenduja P, Gupta A, Pandey RM, Upadhyay AD, Belwal RS. Prevalence of hypertension, diabetes, and associated risk factors among geriatric population living in a high-altitude region of rural Uttarakhand, India. Journal of family medicine and primary care. 2018 Nov 1;7(6):1527-36.

37. Ahamed F, Ghosh T, Kaur A, Debnath A. Prevalence of chronic morbidities and healthcare seeking behavior among urban community dwelling elderly population residing in Kalyani Municipality area of West Bengal, India. Journal of family medicine and primary care. 2021 Nov 1;10(11):4193-9.

38. Das RA, Kumar SG, Roy G. Morbidity pattern and its relation to functional limitations among old age rural population in Kerala, India. Journal of family medicine and primary care. 2017 Apr 1;6(2):301-4.

39. Sanjay TV, DP AK, Madhusudan M. Prevalence and determinants of obesity among elderly in an urban area of Bengaluru. National Journal of Community Medicine. 2017 Nov 30;8(11):672-7.

40. Behera P, Sharan P, Mishra AK, Nongkynrih B, Kant S, Gupta SK. Prevalence and determinants of depression among elderly persons in a rural community from northern India. The National Medical Journal of India. 2016 May 1;29(3):129-135.

41. Patel S, Sharma A, Tiwari R. Prevalence of Non-communicable Diseases among Elderly Women. National Journal of Community Medicine. 2022 Jan 31;13(01):7-12.

42. Chauhan S, Kumar S, Patel R, Simon DJ, Kumari A. Burden of communicable and non-communicable diseases-related inequalities among older adults in India: a study based on LASI survey. BMC geriatrics. 2022 Oct 10;22(1):790.

43. Mini GK, Thankappan KR. Pattern, correlates and implications of non-communicable disease multimorbidity among older adults in selected Indian states: a cross-sectional study. BMJ open. 2017 Mar 1;7(3):e013529.

44. Pushparani JP, Chitrasena S, Ramasubramanian R. A study on the prevalence of depression and its associated factors among the elderly in Kancheepuram district, South India. Nat J Res Community Med. 2017;6(4):230-3.