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Systematic Review

A Scoping Review: The Role of Integrated Non-Communicable Disease (NCD) Programs in Improving Elderly Oral Health

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KEYWORDS

Integrated services, noncommunicable diseases, older adults, oral health, scoping review

ABSTRACT

Introduction: Oral health and non-communicable diseases (NCDs) in older adults are interconnected through shared behavioral, biological, and social risk factors. Dental caries and periodontal disease affect oral function and are associated with diabetes, cardiovascular disease, malnutrition, and reduced quality of life. However, oral health services and NCD management remain largely separated, limiting prevention and care coordination. This study aimed to map and synthesize evidence on the role of integrated NCD programs in improving oral health among older adults. A scoping review was conducted using the Arksey and O'Malley framework and PRISMA-ScR guidelines. Searches were performed in ProQuest, Scopus, and ScienceDirect for English-language articles published from 2021 to 2026. Eligible studies were descriptively analyzed and narratively synthesized.

Review: Thirteen original studies met the inclusion criteria: ten cross-sectional, two qualitative, and one descriptive study. Findings demonstrated associations between oral health and NCD-related conditions, particularly cardiovascular risk, malnutrition, and periodontal disease severity. Interprofessional collaboration, community-based screening, and social support were identified as key components of integrated care. Community education and home-visit models improved service utilization, although healthcare access barriers and primary care infrastructure gaps persisted.

Conclusion: Integrated NCD programs may improve oral health among older adults through holistic and collaborative care, but policy support and sustainable implementation strategies are essential.

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INTRODUCTION

Non-communicable diseases (NCDs) and oral health are reciprocally related, particularly among the elderly population. Periodontal disease is closely linked to poor glycemic control in people with diabetes through chronic inflammation, which can worsen the course of systemic disease.[1] Furthermore, long-term use of medications in the management of NCDs often causes oral side effects, such as xerostomia (dry mouth), which significantly increases the risk of caries and soft tissue disorders in older adults.[2] Conversely, suboptimal oral hygiene can impair masticatory function, lead to reduced nutritional intake, and negatively impact the psychosocial well-being of the elderly. Consequently, oral health is an integral component of a systemic approach in the management of NCDs in the older population.[3]

The relationship between non-communicable diseases (NCDs) and oral health has been widely recognized, but healthcare systems in many countries remain fragmented, with a separation between general health services and dental care.[4] This fragmentation restricts the integration of oral health screening and early detection for NCD patients, hinders coordination between healthcare professionals, and contributes to service delivery inefficiencies.[5] This situation has the potential to worsen health outcomes and hinder a comprehensive improvement in the quality of life of older adults.[5]

The implementation of integrated non-communicable disease programs is increasingly being implemented in various countries by combining health promotion, prevention, screening, and management of chronic diseases holistically.[6] Integration of oral health services into community-based NCD programs has shown potential to improve health outcomes, enhance service system efficiency, and increase patient satisfaction among older patients.[7] However, scientific evidence regarding the specific role, structure, and impact of these integrated non-communicable disease programs on the oral health of older adults remains scattered across studies with diverse designs, populations, and implementation contexts.[8]

Comprehensive studies mapping integrated NCD programs that incorporate dental health services for the elderly remain scarce.[9] The available reviews mostly cover health integration approaches, general oral health integration into primary health care services, without a specific emphasis on NCD management for the older population.[10] Other literature discussing oral health integration in general health services for the elderly tends to emphasize implementation principles, opportunities, and barriers, while mapping of specific integrated models and results of oral health outcomes remains limited.[11] Furthermore, evidence regarding the effectiveness of implementation strategies on the oral health of older adults is reported to be variable and inconsistent across studies, making generalization difficult.[12] These limitations of systematic evidence synthesis restrict empirical support for the design of evidence-based interventions and the formulation of policies to improve the oral health and quality of life of the elderly in the context of NCDs management.[13]

This study represents the first scoping review to specifically map oral health services for older adults with NCDs. This scoping review aimed to synthesize scientific evidence on the role of integrated NCD programs in improving the oral health of the elderly, including program characteristics, modes of service integration, and their impact on oral health outcomes and quality of life.

REVIEW

This study used a scoping review design to systematically map the scientific evidence regarding the role of integrated non-communicable disease (NCD) programs in improving oral health in the elderly population.[14] The scoping review approach was selected to facilitate the exploration of diverse research

evidence, identify key concepts, and map existing research gaps within the field.

The scoping review was implemented following the refined Arksey and O'Malley framework, and reporting adhered to the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) guidelines.[15] The process involved identifying research questions, conducting systematic literature searches, selecting studies based on predefined inclusion and exclusion criteria, mapping data, and synthesizing results.

A comprehensive literature search was performed across electronic databases, including ProQuest, Scopus, and ScienceDirect, to identify articles published between 2021 and 2026. The search strategy utilized a combination of keywords and Boolean operators covering the elderly population, oral health, non-communicable diseases, and integrated care approaches. The main keywords used were elderly, older adults, oral health, dental health, non-communicable diseases, chronic disease, integrated care, and primary health care.

The inclusion criteria for this scoping review were as follows: (1) original research articles or reviews discussing the link between oral health and NCDs in the elderly; (2) articles highlighting integrated, collaborative, or multidisciplinary health care approaches; (3) English language publications; and (4) full text availability. The exclusion criteria consisted of studies not focusing on the elderly, lack of focus on health care integration, editorials or opinion pieces without a clear methodological approach, and duplicate articles.

The selection process involved title and abstract screening by full-text review, with all stages using a PRISMA-ScR flowchart (Figure 1).

Data from the 13 selected articles were extracted into a standardized charting form, capturing author information, publication year, country, study design, population characteristics, and key findings. The data were descriptively analyzed and synthesized narratively to identify primary themes and research gaps. As this study utilized secondary data from the published literature, ethical approval was not required.

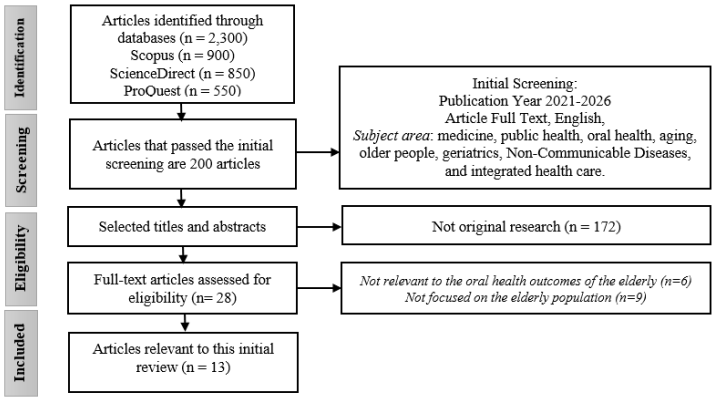

Figure 1. Diagram *scoping review*

Table 1. Characteristics of selected studies

Reference	Study Design	Sampling	Results
Comparative analysis of oral health behavior and utilization of oral health care services in the general population and among patients with non-communicable diseases in Korea: a repeated cross-sectional survey conducted from 2008 to 2022.[1]	Cross-sectional study	General population and patients with non-communicable diseases (NCDs) in Korea.	Significant differences were found in oral health behavior and service utilization between patients with NCDs and the general population, highlighting the need for integrated care for patients with chronic diseases.
Tooth-surface plaque microbiome and different levels of oral disease burden among dentate older adults living in long-term care.[2]	Cross-sectional study	Dentate older adults living in long-term care facilities.	Analysis of tooth-surface plaque microbiomes showed a relationship between oral disease burden and microbiota diversity in older adults in care facilities.
Self-rated oral health among elderly patients attending a university dental hospital in Thailand: a telephone-based cross-sectional survey study.[5]	Cross-sectional study	Older patients who attended a university dental hospital in Thailand.	Provided an overview of self-rated oral health among the elderly, which was influenced by service accessibility and systemic conditions.
Association of social network and social support with oral health among institutionalized elderly: A cross-sectional study in Bangalore city.[20]	Cross-sectional study	400 older adults (aged 60+) living in care homes in Bangalore.	Social support was significantly associated with caries experience. Strengthening social networks is crucial for improving the oral health status of institutionalized elderly.
Assessment of oral health-related quality of life and its association with periodontal status in geriatric patients.[21]	Cross-sectional study	1,155 older adults at Cité de la Santé, Toulouse University Hospital.	A significant relationship was found between undernutrition and oral pathologies such as caries, oral tissue issues, dry mouth, and poor oral hygiene.
Assessment of oral health-related quality of life and its association with periodontal status in geriatric patients.[23]	Cross-sectional study	A total of 150 geriatric patients (aged 65+) diagnosed with periodontitis in Turkey.	The mean GOHAI score was 44.51 (poor/moderate category). The subjective perception of oral health often does not align with the clinical severity of periodontitis.
Non-communicable disease management: Access to healthcare during the COVID-19 pandemic in rural Kerala, India.[27]	Cross-sectional Study	NCD patients in rural Kerala, India.	Analyzed barriers to healthcare access during the pandemic, which impacted the management of chronic diseases, including oral health conditions.
Early detection efforts for non-communicable diseases and oral health education in Padukuhan Soromintan, Sleman.[28]	Descriptive study	Residents of Padukuhan Soromintan, Sleman, Indonesia.	Demonstrated the effectiveness of early detection efforts for NCDs and oral health education in increasing community awareness and screening participation.
Exploring the link between self-rated poor oral health and cardiovascular risk: a cross-sectional study using SCORE2.[3]	Cross-sectional study	Individuals with cardiovascular risk based on SCORE2 scores.	A correlation was found between poor self-rated oral health and an increased risk of cardiovascular disease.
Oral health among adults aged ≥45 years in India: Exploring prevalence, correlates and patterns of oral morbidity from LASI wave-1.[30]	Cross-sectional study	Adults aged 45 years and above in India.	This study explored the prevalence and patterns of oral morbidity, and identified key sociodemographic correlates of oral health issues in the aging Indian population.
Multidisciplinary Professionals' Perceptions of Home-Visit Oral Care for Older Adults in Integrated Community Care: A Focus Group Interview Study.[31]	Qualitative study	Multidisciplinary professionals in integrated community care.	This study highlights the importance of healthcare professionals' perceptions of home-visit oral care for the elderly within integrated community care systems.

Reference	Study Design	Sampling	Results
Implementation status of non-communicable disease control program at primary health care level in Bangladesh: Findings from a qualitative research.[31]	Qualitative study	Primary health care level stakeholders and facilities in Bangladesh.	Evaluated the implementation of NCD control programs and identified gaps and challenges in delivering integrated health services at the primary care level.
Oral health care of older adults in Hong Kong.[11]	Cross-sectional study	Older adults in Hong Kong.	Reported a high burden of dental caries and periodontal diseases among the elderly and advocated for the integration of dental services into primary health care to manage these chronic conditions.

A total of thirteen original research articles met the inclusion criteria and were analyzed in this scoping review. The evidence base comprised ten cross-sectional studies, two qualitative studies, and one descriptive study. These studies primarily focused on the elderly population (aged ≥60 years) across diverse settings, including community health centers, university hospitals, and long-term care facilities, emphasizing the integration of oral health into the management of NCDs.

The relationship between oral health and NCDs in the elderly is consistently supported by evidence of shared biological pathways. Cross-sectional findings demonstrate that poor oral health is not merely a localized issue but also a significant indicator of systemic risk. For instance, poor self-rated oral health is significantly correlated with an increased cardiovascular risk profile using the SCORE2 assessment.[29] Furthermore, large-scale clinical data reveal a statistically significant link between oral pathologies such as dental caries and dry mouth and the risk of undernutrition in frail older adults.[21] Microbiome analysis also suggests that the diversity of tooth surface plaque is directly related to the overall burden of oral disease in the institutionalized older population.[2] These findings reinforce the argument that oral health is a critical determinant of healthy aging.

Despite these clear linkages, healthcare systems often remain fragmented. Longitudinal survey data from South Korea indicate significant disparities in oral health behavior and service utilization between patients with NCDs and the general population, highlighting a gap in integrated chronic care management.[1] Qualitative evidence identifies that while interdisciplinary collaboration is essential, implementation at the primary care level is often hindered by infrastructure limitations, lack of professional training, and fragmented documentation systems.[31] In Hong Kong, the high burden of periodontal disease among the elderly further underscores the urgent need to integrate dental services into general primary health care to manage chronic conditions more holistically.[11]

Integrated programs that utilize community-based approaches show promise in improving health literacy and screening participation. In Indonesia, descriptive research has demonstrated that combining NCD early detection with oral health education effectively increases community engagement.[28] Social determinants also play a pivotal role; evidence from India shows that older adults with robust social networks and higher social support have significantly lower caries and better oral hygiene.[20] This suggests that integrated NCD programs must address not only clinical factors but also the social needs of the elderly to be effective.

Successful integration requires a shift in professional practice. Qualitative focus group interviews reveal that multidisciplinary healthcare providers perceive home visit oral care as a vital component of integrated community care for the elderly, though it

requires formalized coordination protocols.[31] Moreover, self-rated oral health, while subjective, often serves as a reliable proxy for healthcare accessibility and systemic health status, provided that clinical indicators are also monitored.[5,23] Barriers such as the COVID-19 pandemic have further exposed the healthcare system, directly impacting the management of oral systemic conditions.[27]

CONCLUSION

This Scoping review demonstrated that oral health and non-communicable diseases in the elderly share a profound bidirectional relationship, primarily mediated by shared risk factors and an interrelated systemic inflammatory process. Based on thirteen original research studies, the high prevalence of oral diseases among older adults significantly contributes to increased morbidity and diminished quality of life. The integration of oral healthcare into NCD management programs is a critical strategy for enhancing primary prevention, facilitating early detection, and improving health service efficiency.

Evidence from diverse methodologies, including cross-sectional, qualitative, and descriptive research, indicates that service models centered on interprofessional collaboration, community-based screening, and multidisciplinary care planning provide clear clinical benefits and improve oral health-related quality of life. However, the successful implementation of these programs continues to be hindered by persistent systemic barriers, including fragmented service delivery, limited workforce capacity, and a lack of robust policy support. Consequently, strengthening health system integration and securing sustained policy commitment are essential to ensure the effectiveness, sustainability, and equitable distribution of healthcare benefits for the elderly population in the context of NCD management.

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