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Authors
Dr. Chinmay Dattaraya Bhat[1],
Post graduate, Department of conservative dentistry and endodontics, Nitte (deemed to be a university), AB Shetty Memorial Institute of dental science, Deralakatte, Mangalore, 575018,
Email-ID: chinmay.23dcon04@student.nitte.edu.in,
Orcid ID:0009-0000-8032-597X

Dr Pragati Gurjar[2],
Health Department
Public Health, Maternal and Child Health
IIHMR University, Jaipur
Email ID: drpragati029@gmail.com

Prof Papri Das[3],
Principal, Institute of Nursing Brainware University, Barasat Kolkata Specialization Community Health Nursing,
Email- papridas11@gmail.com
Orcid id - 0009-0009-7244-2995

Dr. Farheen Khan[4],
Assistant Professor, Conservative Dentistry and Endodontics, Conservative Dentistry and Endodontics, Sharda University/ Sharda School of Dental Sciences, Sharda University,
Email Id: farheen.khan@sharda.ac.in

Dr. Sourav Sen[5],
Professor, Department of Public Health Dentistry, MM College of Dental Science and Research, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala – 133 207, Haryana, India.
Email Id: drsouravsen@gmail.com,
Orcid Id: 0000-0003-4343-5322

Dr. Kabir Suman Dash,[6]
Senior Lecturer, Department Of Public Health Dentistry, Kalinga Institute of Dental Sciences (KIDS), Kalinga Institute of Industrial Technology (KIIT) Deemed to be University, Bhubaneswar-751024, Odisha, India,
Email Id: kabirsumandash@gmail.com ,
ORCID ID: 0000-0002-4108-8825

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Role of Community Health Nurses in Oral Health Promotion: Impact on Dental Caries Prevention and Restorative Treatment Outcomes in Community Settings

Abstract
Dental problems continue to be common despite being highly preventable, as disadvantaged groups face the greatest obstacles in accessing timely prevention and treatment services. This review examines the contribution of community health nurses to oral health promotion, dental caries prevention, and restorative treatment outcomes across community settings. A narrative synthesis of relevant nursing, dental, public health, and interdisciplinary literature was undertaken, with attention to nurse-led education, risk assessment, preventive counselling, referral, care coordination, follow-up, and service delivery for vulnerable groups. The evidence indicates that community health nurses can extend oral healthcare beyond dental clinics by reinforcing oral hygiene and dietary behaviours, supporting fluoride and school-based programs, identifying individuals at elevated caries risk, and facilitating earlier referral. Their involvement also supports restorative care through improved communication, treatment adherence, post-treatment monitoring, and patient-centred follow-up. However, implementation is constrained by limited oral health training, workforce pressure, fragmented referral systems, geographic inequities, and uneven organizational readiness. Stronger competency frameworks, interprofessional collaboration, culturally responsive practice, and appropriate use of teledentistry and decision-support technologies are required to strengthen impact. Community health nurses represent an underused component of the oral health workforce and could contribute substantially to prevention, continuity of care, and reduction of persistent oral health inequalities. Further longitudinal, implementation, and cost-effectiveness research is needed to guide scalable models of practice.

1. Introduction

Oral diseases are still one of the most common noncommunicable health conditions in the world and continue to be a significant clinical, social and economic burden in populations. Dental caries, periodontal disease, tooth loss, and oral cancers impact people at all ages and stages, reducing the ability to consume foods and beverages, talk to others, maintain a healthy mental state, and enjoy a quality of life. Nevertheless, oral health has historically been neglected when compared to other aspects of primary health care, and oral health inequalities in disease prevention and access to key services remain. The increasing evidence that oral health is a part of overall health has bolstered the need for integrated, community-focused care that moves beyond traditional oral health care providers to a focus on prevention, health promotion, and early intervention [1]. The prevalence of oral diseases is growing, and is increasing in parallel with the population growth, aging and inequitable distribution of oral health services around the world. Dental caries is still one of the most prevalent chronic diseases today, with a prevalence across all age groups and socioeconomic statuses. Some communities have progressed, but many others

are still affected by avoidable oral diseases due to lack of access to preventive services, late detection of oral disease and lack of integration of oral health services into primary health care systems. This indicates that more sustainable public health strategies are needed that can be delivered through more accessible and community-based health approaches to reach the vulnerable population [2]. The public health implications of oral diseases are not limited to oral diseases but also include systemic health problems, decreased productivity, and higher cost of care due to oral diseases, among others, making it even more critical to improve interdisciplinary oral disease prevention strategies [3]. Recent estimates across the globe also show that oral health inequalities persist despite many decades of policy efforts to address them, and highlight the need for new workforce models to enhance prevention, early detection and continuity of care in community-based environments [4].

Oral health care delivery is inequitable in terms of geography, socioeconomic status and ethnicity. Preventive and restorative dental services are often not used because of financial constraints, a lack of dental providers, low health literacy and rural living. These differences have a disproportionate impact on disadvantaged groups, resulting in negative outcomes around treatment and increased disease severity. Therefore, oral health outcomes must be improved through increased engagement of health care providers who routinely engage with communities and can help educate at the right time; identify risk; refer to appropriate services; and follow up at the right time at different stages of life [5]. This is especially significant in the context of oral health inequities that build over time, starting from childhood to older adulthood, and require integrated preventive and long-term management strategies across multiple community settings [6]. In recent years, the role of health professionals in the community has grown in significance, in regard to health education, patient engagement, and coordinating a variety of health services. Their close contacts with people and families enable them to encourage healthy behaviours, recognize new health threats and help connect people to the right care. These functions are important to consider for embedding the integration of oral health promotion within the context of routine community health care services, especially for the underserved population that has limited access to dental services [7]. There is also some evidence that primary healthcare nurses have an increasing role in supporting community involvement, self-management and coordinating care for chronic conditions, which can be effectively translated to oral health promotion programs [8]. In addition, there is recent evidence that community nurses can be targeted, trained and supported to improve their ability to provide oral healthcare, although the scope, impact and contribution of community nurses to dental caries prevention and the outcomes of restorative care are not fully synthesized across community settings [9].

Previous reviews have generally focused on oral health inequities, burden of disease, or nursing interventions alone, and few have explored evidence linking the role of the community health nurse to oral health prevention or outcomes of oral health rehabilitation in community/home-based settings. This disjointed evidence hinders the creation of holistic and integrated policies, education, and service delivery approaches.

Thus, this critical review seeks to synthesize existing evidence on community health nurses in the prevention and treatment of oral diseases, specifically dental caries, and their contribution to the achievement of positive outcomes in oral health care delivery within community settings, along with identifying areas of implementation barriers, gaps, and future research and practice recommendations.

2. Review Methodology

A narrative approach was employed to review the role of the community health nurse in oral health promotion, dental caries prevention and restorative care outcomes. Peer-reviewed literature was found using search terms for health and dental databases relevant to community nursing, oral health promotion, caries prevention, referral, restorative treatment and interdisciplinary care. The studies, reviews, policy documents, and practices were considered for inclusion, including, but not limited to, community-based population studies; community-based population reviews; community-based population policy documents; and community-based population practice reports. Sources were evaluated in terms of relevance to the review objectives, and emphasis was given to the roles of nurses, preventive strategies, treatment support, barriers to implementation, factors that facilitate implementation, and future directions. Data were presented thematically and compared between settings and population groups. The synthesis was directed towards identifying patterns, implications, evidence gaps and priorities for research, policy, education and service delivery.

3. Community Health Nurses in Oral Health Promotion: Conceptual Foundations and Scope of Practice

The focus of preventive and community health care has brought new responsibilities to community health nurses, including health promotion in a variety of areas, including oral health. Oral health is important to overall health and is viewed as a critical aspect of nursing practice in today's world. Oral health issues can affect nutritional intake, ability to communicate, progression of chronic diseases and quality of life. This evolving view has spurred efforts to integrate oral health measures, oral health preventive counseling and referral into the nursing role, and has helped community health nurses become integral to the delivery of comprehensive primary healthcare. [10] The unique role of the community health nurse allows for opportunities to promote oral health through the ability to engage individuals, families, schools, workplaces and vulnerable groups in the community setting, and to work with them for a prolonged period. They are expected to deliver evidence-based oral health information and education on oral hygiene habits and dietary habits, as well as to recognize individuals who are at higher risk for dental diseases and to refer them

promptly for dental care. Ongoing interactions with community members can also be used to support protective practices, track implementation of oral health guidance, and boost health knowledge and skills using culturally appropriate interactions. The activities are designed in a preventive model, along with the clinical dental care, yet they help to reach the population in need of oral care outside of the dental clinic [11].

The theoretical underpinning for this concept of community health nurses in oral health promotion is based on the principle of primary healthcare which is rooted in the concepts of prevention, access, continuity of care and interdisciplinary teamwork. The incorporation of oral health into primary healthcare allows for early detection of oral disease, better alignment between medical and dental care providers and better opportunity for preventive care during a routine healthcare visit. This model helps to facilitate the collaboration of all health care professions to improve oral health and promotes the equitable distribution of preventive services, especially to the most vulnerable populations with less access to oral health care services [12]. Clinical knowledge, in addition to community health nurse skills, is required to be effective in oral health promotion. These focus on skills and aspects of health education, risk assessment, communication, leadership, community engagement, critical decision-making, and multidisciplinary care coordination. Good public health skills enable nurses to be able to evaluate the public health needs of the community and respond to public health problems, using evidence-based interventions; respond to new public health challenges; and monitor the effectiveness of public health programmes. These capabilities extend their contribution to the promotion of oral health by enabling them to provide oral health care at the individual and community level and to be resilient and adaptive in health care systems [13].

The participation of the community is a second characteristic of community health nursing. Oral health promotion interventions that engage the community, community organizations, schools and public health entities have been more accepted and sustainable than those based on the single clinical model. Community health nurses may serve as facilitators to foster partnerships, promote participation and make health promotion interventions culturally and socioeconomically appropriate. Geographical barriers and a shortage of dental staff are key factors that hinder the provision of preventive and restorative dental services in rural communities, where such collaboration is especially useful [14]. There is also a focus on the population groups that have a level of social vulnerability, such as those who experience homelessness, disability, frailty and advanced age. They may face several challenges to good oral health, such as poor access to health care, lack of self-care skills and other social priorities. Community-based oral health programs, led by nurses, have the potential to increase access to services by providing outreach, patient navigation, health education, and engaging in interprofessional collaboration and reduce disparities in oral health service utilization and oral health service continuity for high-risk groups [15]. The same principles apply to community-based interventions for older adults and individuals with disabilities, and the integration of preventive oral health care with the routine management of health services helps to facilitate ongoing oral health surveillance, caregiver education, and integration into overall health care management [16].

As the community health nurse is becoming more involved in the health promotion process, this is a shift from managing episodic diseases towards providing a holistic approach to health promotion, which includes oral health in primary health care. They are well equipped to play a key role in helping to mitigate oral health disparities and build community-based approaches to dental caries prevention and better outcomes. The community health nursing practice areas that provide important opportunities for the promotion of oral health in the community are summarized in Table 1.

Table 1. Core Roles of Community Health Nurses in Oral Health Promotion

Role	Key Activities	Primary Outcome	References
Health education	Oral hygiene, diet, fluoride education	Improved oral health literacy	[10,11]
Risk assessment	Oral screening, early identification	Early detection of oral disease	[12,13]
Community engagement	Outreach and health promotion	Greater program participation	[14]
Care for vulnerable groups	Outreach to the elderly, disabled, and homeless	Reduced oral health disparities	[15,16]

4. Community Health Nurse–Led Strategies for Dental Caries Prevention

The emphasis of caries prevention is more on community-based approaches, which focus on early detection, health promotion and ongoing behavior change than on treatment alone. Community health nurses play a pivotal role in primary healthcare as they have ongoing access to children, families, older people and other high-risk groups. The opportunities for providing oral health education, risk assessment, preventive counseling and referral are extended beyond the traditional clinical setting through routine interactions with healthcare providers. This interprofessional approach can help in the earlier detection of caries risk factors and provide equal access to prevention services for multiple populations [17]. Health education is still one of the most effective nurse-led interventions in decreasing the risk of dental caries. Community health nurses provide education to their clients about toothbrushing skills, sugar consumption, infant feeding practices and the importance of regular dental visits in culturally appropriate ways. They can

provide the mothers and their children several opportunities to educate them on how to prevent certain diseases in the family, through the maternal and child health checkup and immunizations, as well as during community outreach. Oral health literacy is also supported when oral health care is continuous, and it is especially important when children rely on their caregivers to care for their oral health, as this helps ensure that they develop healthy oral care habits that help prevent the development of caries. [18] Community-based preventive intervention strategies that are implemented through nurse-led interventions add to the efficacy of nurse-led interventions. Fluoride-based prevention strategies like promoting the use of fluoridated toothpaste, community water fluoridation, and professional fluoride treatments remain vital elements of caries prevention efforts among populations. By providing education on safe and appropriate use of fluoride, community health nurses help with acceptance of preventive programs and make it easier for people to participate in public health programs. Many of these activities are part of an overarching oral health policy aimed at reducing inequalities in caries prevalence and promoting prevention across the life course [19].

Community health nurses can also play an important role in preventing caries by offering programs to schools. Nurses are able to support the implementation of preventative programs such as fissure sealant programs, assess oral hygiene practices, and provide referrals to dental care services and support for preventative education in the school environment through their partnership with the dental community. Improvements in sealant delivery systems that take place following the release of more efficient and effective sealant application techniques improve the feasibility of community preventive services by providing more effective sealant delivery systems for school-age children in resource-limited settings [20]. A second component in the effectiveness of a prevention program that is community health nurse-led is the use of structured oral health education programs that not only educate, but also supervise care, and then follow up with the child. Regular monitoring, individual feedback and reinforcement of oral hygiene behaviors lead to increased compliance with preventive recommendations and sustain preventive behaviors in the school child population. These extensive programs have been proven to have a substantial influence on the oral hygiene status and the reduction of modifiable oral caries risk factors in routine community nursing practice, demonstrating a need for a community-based approach. The findings remain consistent with the community health nurse's vital role as an important health partner in the prevention of oral health issues and in the development of the community's oral health goals for the future [21].

The challenges in dental caries prevention show that prevention goes beyond clinical processes and includes continuous education, behavioral support, screening for risk factors, and making arrangements for preventive services. The inclusion of these roles within primary healthcare may further improve the oral health of a population, reduce the preventable burden of disease and help to achieve more equitable access to prevention services in the community. Community health nurses' role in dental caries prevention and the pathway in which they may influence the outcome of oral health at the community level is depicted in Figure 1.

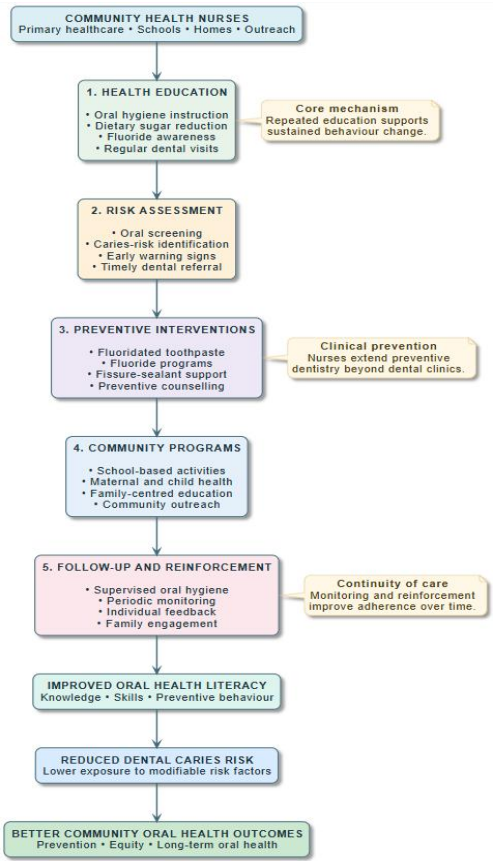

Figure 1. Community health nurse-led strategies for dental caries prevention in community settings

5. Impact of Community Health Nurses on Restorative Treatment Outcomes

By helping to bridge the gaps between early detection, referral, treatment and follow-up on the continuum of community care, community health nurses can help to improve the oral health of their communities. Dentists and other health care professionals do their part to detect and correct dental problems, but nurses often are the first to recognize oral health problems before the patient goes to the dentist. This is especially important in long-term care facilities where patients may have functional limitations, cognitive impairment, and may depend upon a caregiver to diagnose dental disease. It is important for the nursing staff to be able to identify the oral health changes or dysfunction that may lead to advanced disease if not treated early and that may benefit from a referral to a dentist using oral health screening tools [22]. The interprofessional working aspect of the restorative care pathway is also enhanced. When a nurse and a dentist work together, the mouth can be assessed in a systematic way, patient needs can be communicated and effective planning of care for patients with complex health needs can be made. Oral health care planning for residents within collaborative models has helped to increase nursing staff members' understanding of the oral health care needs of residents and has helped to integrate dental care into the normal care of long-term care residents. These models can improve the rate of treatment and the continuity of treatment from the moment the deficit is detected, to a professional evaluation and follow-up [23].

The other major impacts of the primary care integration of oral health are on oral health communication, efficiency at oral health communication and referral. By detecting symptoms while providing routine health care, community health nurses can inform patients about the importance of restorative care, start referrals and inform dental providers of pertinent medical information. These functions will minimize medical/dental separation and will take into account the patient's overall health status when making treatment decisions for the patient for restorative treatment. Support systems to help patients navigate through multiple healthcare settings are especially crucial for those with limited access to dental services and for those who need help with navigating multiple health services [24]. Other social factors, disease and behavior before and after the oral procedure also have an impact on the restoration. Patients can have a transport problem, financial limitations, polypharmacy, disability, and limited caregiver support, impacting treatment completion and maintenance. The nursing/dentistry/social work partnership can overcome these, however, when they work together to manage cases, access resources and deliver support for each patient's individual needs. This is particularly relevant for those with complex needs who are not able to have follow-up visits or have full treatment [25].

In addition, a two-way referral system exists between dental and medical care and community health nurses are involved. The information gained from dental appointments could lead to further evaluation of health status by primary care providers, and systemic diseases that are identified in the community may impact dental treatment planning or healing. Referring to other disciplines and following up after glucose monitoring

has been detected in the dentist's environment has proven the value of structured communication and disciplined action. Nurses can assist this process by monitoring referrals, reminding medical staff to assess patients and providing the necessary medical information for restorative care decision-making [26]. Following the post-treatment direction and maintaining the treatment for long periods are also factors that determine the success of the treatment. Nursing follow-up can serve as a reminder of oral hygiene, medication, diet, and/or attendance at follow-up appointments. Adherence interventions involving both pharmacists and nurses have been shown to improve adherence to therapeutic recommendations, particularly through the provision of coordinated education, monitoring and patient engagement. Even the principles of restorative dentistry will apply; with proper maintenance and the early treatment of complications, the longevity of the treatment will rely on the patient's self-care [27].

A patient-reported outcome is an important indicator of whether restorative treatment has a positive impact on daily functioning and quality of life. Dental patient-reported outcomes incorporate aspects of pain, chewing function, appearance, satisfaction with dentition and psychosocial functioning. Community health nurses may be able to document these outcomes on subsequent visits and relay patient concerns to dentists. They can continue to assess the success of clinical restoration in terms of comfort, function and confidence through their regular patient interactions [28]. While technological advances in restorative dentistry can be used to potentially shorten treatment time and enhance the patient experience, these outcomes will rely on the successful preparation, communication, and follow-up. The use of immediate digital restorative workflows has been shown to have positive patient-reported outcomes and shorter treatment times in a few clinical situations. Pre-treatment readiness, post-treatment education and information, early detection of complications and patient engagement can all be enhanced by community health nurses' support of these innovations. As a result, their engagement improves the outcome from the technical to the sustainable, patient-focused restorative [29].

By helping to facilitate early referrals, enhance collaborative interdisciplinary communication, ensure adherence to treatment, and provide patient-centred monitoring of recovery, community health nurses help improve restorative treatment outcomes. They work best as part of a multi-agency strategy for care, and connect community, primary care and dentistry. Table 2 summarizes the roles community health nurses can play in different aspects of restorative care.

Table 2. Community Health Nurse Contributions Across the Oral Care Continuum

Care Stage	Nursing Role	Expected Benefit	References
Early identification	Oral screening	Earlier referral	[22]
Referral	Coordinate dental consultation	Reduced treatment delay	[23,24]
Care coordination	Multidisciplinary communication	Better continuity of care	[25,26]
Follow-up	Reinforce self-care and appointments	Improved treatment adherence	[27]
Outcome monitoring	Assess patient-reported outcomes	Better functional recovery	[28,29]

6. Implementation Challenges, Barriers, and Enabling Factors

To be able to carry out health promotion for oral health among community health nurses, it is important that health systems are supportive, workforces are sufficient, and collaboration between primary care and dental care exists. Although they are now more aware of their role, the implementation of oral health promotion is inconsistent, due to the competing clinical role, lack of support within the organisation and lack of opportunities for oral health to be integrated into routine community work. Additionally, there is qualitative evidence that the oral care workload burden, lack of resources and oral care responsibility ambiguity contribute to the inconsistency and quality of oral care provided by nursing staff, which suggests that there is a need for adding institutional support and setting frameworks for oral care practices [30]. Digital technologies have proven to be potential solutions to some of the challenges of implementation. Teledentistry is a tool that allows health care providers to consult, screen, refer, follow up and educate patients on oral health care remotely, improving access to preventive and restorative dental care for patients in underserved and/or geographically remote populations. The use of teledentistry in community health nursing practice can enhance continuity of care and minimize the need for travel, as well as help to speed up specialist referral, especially where dental services are not available [31]. The capacity of health systems is one of the key matters for successful implementation. There is still a lack of government support for the provision of oral health programmes, and medical services and dental services are not well coordinated, with services being ineffective and not being funded. The problems are more likely to be evident in fragile and resource-poor health systems where policy development, provision of training for health workers and interdisciplinary service delivery are key components of the model to ensure sustainability of a community-based oral health care system [32].

Oral health outcomes are also related to the quality of nursing care on the patient pathway. The absence of performing nursing activities before dental care and poor patient preparation, documentation, communication and coordination of care will impact care efficiency and continuity. These differences can be reduced and more secure and integrated oral health care can be provided in community and clinical settings through a more uniform approach to nursing and enhanced interprofessional communications [33]. Human resource development is also contributing as an

enabler. There is a lack of formal training in oral health assessment, oral health preventive counselling and referrals among many community health nurses, which leads to low confidence in oral health discussions. Other issues such as a shortage of workforce, growing needs for services and ongoing professional development requirements, constrain the implementation. Therefore, investment in competency-based education, workforce planning and lifelong learning is imperative to prepare nurses for expanding roles in the community oral healthcare [34].

Some areas of the country still have "dental deserts," or places lacking sufficient dental health care providers, both interprovincially and intraprovincially. Community health nurses should also have functional referral systems and easy access to dental services to ensure better oral health outcomes in the community. Geographic barriers can be reduced with improved access to care, access to care at their door, and improved integration of primary care, which results in better community-based oral health care delivery [35]. It is also critical for effective implementation to have cultural competence. There are different ways of accepting oral care interventions and taking action on health prevention advice, depending on differences in language, beliefs, health literacy and past experience with the health care system. Culturally responsive and culturally competent CHNs are better able to enhance engagement, build trust and reduce oral health disparities among culturally diverse populations, such as immigrants and other socially vulnerable populations [36].

IP education and collaborative working are important enablers to an embedded oral health in community nursing. The oral health training programs are conducted regularly and boost the knowledge and confidence of nurses in oral health care and also ensure optimal referral from oral health services. These efforts encourage collaborative efforts for oral health and facilitate care transitions across community services and care provided in a dental setting [37]. To achieve general uptake of digital health technologies, organizational readiness, digital infrastructure and professional acceptance and training are all pivotal. The use of Digital Health poses challenges to health workers, such as access to the Digital Health Tool, integration into the existing processes, institutional support, etc. These factors will need to be taken into account to effectively use technology-based oral health care in the community. To strengthen health promotion, communication and access to preventive and restorative services in rural and underserved populations, successful implementation of community-led digital health strategies [38, 39] requires active community engagement and sustainable models of implementation. Challenges that would arise in the process of implementation are workforce training, collaborative work among professionals, health policies, cultural responsiveness, and innovative technologies. Improvement in these facilitators would provide more assistance to CHNs in promoting oral health. Table 3 outlines the major challenges and facilitators to community nurse-led oral health programs.

Table 3. Major Implementation Barriers and Enabling Factors

Domain	Barriers	Enabling Factors	References
Workforce	Limited training, staff shortages	Continuing education	[30,34,37]
Health system	Weak referral pathways	Integrated primary care	[32]
Access	Rural and geographic disparities	Community outreach	[35]
Culture	Low health literacy, language barriers	Culturally competent care	[36]
Technology	Digital readiness limitations	Teledentistry and digital health	[31,38,39]

7. Future Directions and Research Priorities

Future directions for community oral health promotion include standardized nurse-led models, interdisciplinary collaboration, and integration of emerging technologies. Future assessments of nurse-led oral health programs need to be done with a focus on identifying evidence-based best practices for nurse-led oral health and generating similar evidence in a variety of community settings [40]. While AI can help CHNs with risk prediction, clinical decision support and tailored health education, it also brings in ethical, privacy, and equity considerations that must not be overlooked when implementing AI [41]. Further measures to increase the use of AI health monitoring tools, such as oral and systemic health scores, can enhance preventive health and facilitate integrated community health care delivery [42]. Better teamwork between nursing, dentistry, medicine and public health, and through access to oral health care, better workforce configurations to improve access efficiency and access to oral health care, particularly for older people and other vulnerable groups, are also recommended for future health care models [43,44].

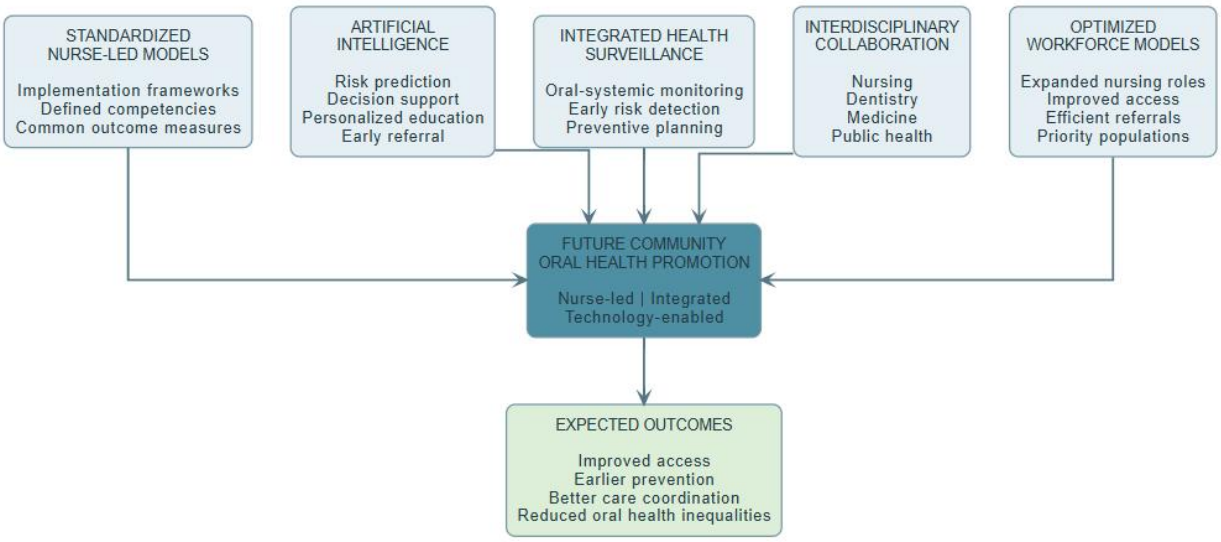

Figure 2. Future directions for strengthening community nurse-led oral health promotion

Community health nurse-led oral health interventions should be studied with well-designed longitudinal and multicenter research studies using standardized outcome measures to establish research priorities for the long-term effectiveness of these interventions. The need is to extend the investment into implementation research, cost-effectiveness analysis, patient-reported outcome and competency assessment of the workforce as support for evidence-based policy decision-making. In addition, further research is needed on how to implement effective community programs in other health care systems, including consideration of health inequities, digital readiness, and sustainability, to maximize community health nurse support for dental caries prevention and restorative treatment outcomes.

8. Conclusion

Community health nurses have a key role in delivering oral health beyond the confines of the dental office and in bringing health prevention to the forefront of routine health and community services. They can continue to interact with individuals and families, which allows for the provision of oral health education, identification of caries risk, referral, follow-up and reinforcement of caries prevention behaviors throughout the lifespan. These functions are particularly important for children, older adults, rural populations, and socially disadvantaged groups who are often deprived of access to dental care and receive it late. This involvement also impacts restorative care through the efficient referral, care coordination, treatment adherence and post-treatment monitoring. For nurse-led oral health promotion, however, the impact is limited due to limited training of nurses, a shortage of nurses, a lack of a clear referral pathway, and inconsistent organization support. The standards-based competencies, increased interprofessional collaboration, culturally competent practice and utilization of teledentistry and decision support technologies will all be factors in progress. There is a need for future research to address the need for powerful longitudinal assessment, cost-effectiveness, patient-reported outcomes, and scalable models of implementation. Therefore, the CHN role in an oral health system is a viable way to reduce preventable disease, improve continuity of care and close oral health disparities, which exist.

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