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Title

Oral health equity for rural communities: where are we now and where can we go from here?

Abstract

Oral health is embedded in overall health and contributes to physical, social, and mental well-being. Most diseases are preventable, and yet, oral diseases pose a significant public health problem and an economic burden globally. Poor oral health is a risk factor for certain systemic diseases, such as cardiovascular disease, diabetes, and lung pathologies. Rural populations are disproportionately affected by oral disease, with higher levels of periodontal disease, caries, and the loss of teeth. These issues are worsened by barriers in access to oral health care services and minimal promotion of healthy behaviours in rural communities. Certain interventions, including mobile dental clinics, teledentistry, dental outreach camps, and educational initiatives have been successful in addressing rural challenges. Policies and action plans should be considered by public health officials to reduce the disparities in oral health among rural communities, reduce the overall burden of oral health, and promote health equity.

Declaration of interests:

On behalf of all authors, the corresponding author declares that no situation of real, potential, or apparent conflict of interest is known to them.

Author contributions:

The corresponding author was responsible for writing the original draft and the second author was responsible for reviewing and editing. Both authors contributed to research.

Keywords (5) : oral health, rurality, health inequalities, interventions to reduce disparities, disadvantaged populations.

3 key points

- Most oral diseases are preventable, but if left untreated can negatively impact the wellbeing of individuals and have high societal costs.
- Rural populations are disproportionately affected by oral disease due to limited access to oral health care services and limited support to maintain healthy behaviours.
- Interventions such as mobile dental clinics and teledentistry initiatives could improve oral health outcomes for rural communities. Policies to strengthen and expand oral health promotion and access to care should be implemented.

Introduction

Oral health is a key indicator of overall health, contributing to physical, psychological, and social wellbeing.¹ Good oral health enables individuals to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and disease of the craniofacial complex.¹ Globally, oral diseases affect approximately 3.5 billion people, with caries being the most common condition.² It is estimated that 2 billion people suffer from caries of permanent teeth, and 520 million children suffer from caries of primary teeth.² Poor oral health is a risk factor for certain systemic diseases, such as cardiovascular disease, diabetes and lung pathologies.³ Poor oral health has an economic impact, with over 34 million school hours and more than \$45 billion in productivity lost annually due to dental emergencies in the United States alone.⁴ Whilst in the UK, the NHS spends approximately £2.25 billion on dental treatment annually.⁵ Moreover, whilst most oral health conditions are preventable and can greatly improve quality of life when treated in the early stages, the NHS spent around £50.5m on tooth extractions in children under 19 years old, mostly for tooth decay.⁶ Inequalities in the experience of oral health are present globally, people on low incomes are associated with an increased prevalence of dental disease.^{7,8} Another important factor that contributes to reduced oral health status is rurality, i.e. living in a remote area. It has been posited that worse oral health can be explained, at least in part, by reduced access to health care services.⁹⁻¹¹ Despite this, oral health policy fails to include rurality as a concept to consider. Evidence from the UK context indicates that only 1% of policy documents from Wales, and none from England and Northern Ireland mention rurality as a determinant of poor oral health.¹² This paper aims to describe the current inequalities in oral health among rural populations, highlight the impact on society and discuss possible interventions and policy approaches that could be implemented to address this issue.

Literature review

Rurality and access to oral health care

Poor oral health is more prevalent among rural populations, with increased levels of periodontal disease and decayed, missing due to caries and filled teeth (DMFT).¹³⁻¹⁵ A smaller percentage (73-75%) of children in rural areas report good oral health and receive preventive dental care than urban children (78%).¹⁶ Data also indicates that people in rural areas have an increased prevalence partial edentulism (removal of several teeth) compared to those in urban areas (45% compared to 38.4% respectively). Partial edentulism is even higher (51.3%) in high poverty rural areas.¹⁷ The same phenomenon is observed with full edentulism, with a prevalence of 4.3% in urban cities compared to 8.2% in rural counties and 10.5% in high poverty rural areas.¹⁷

Rurality and reduced oral health status may be explained by three key factors, namely geography, availability of health care professionals, and rural culture.⁹

Access to health care is affected by distance, isolation, weather, and transportation. Rural patients report feeling isolated because of distance. Many people living in rural areas have to travel over 60 minutes to access dental care,¹⁸ which poses additional costs to accessing care and therefore additional barriers for those on low incomes. Such distances can lead to stress for rural patients, their families and caregivers.⁹ Pereira da Silva and Souto de Medeiros found that rural adolescents showed a high prevalence of a negative impact of oral health on their quality of life.¹⁹ Weather can also make it difficult to seek care.²⁰

The quality of oral health care in rural areas is affected by a high turnover of primary care providers and a significant lack of specialists.^{9,20} Rural dwellers depend almost exclusively on local family physicians, and the high rate of turnover was reported as distressing.⁹ Furthermore, successful referral and access to specialized care was affected by rural providers' relationships with urban providers.⁹ As a result, people living in rural areas limited access to specialized care , and in turn are left feeling helpless if they suffer from severe or complex oral disease.

Rural culture, characterised by low health literacy and reticence to seek care ^{9,21} can further impact on access to and utilisation of health care services. Low health literacy can foster unhealthy behaviours, false beliefs, and lead to an increased vulnerability to adverse health outcomes.⁹ Furthermore, rural dwellers who suffer from chronic diseases may be disadvantage as self-management is complex and requires the necessary knowledge and support.⁹ Rural culture can imply an obligation to “make do” with available resources and solve problems independently, which can contribute to the severity of conditions.⁹ Those living in rural areas may be unwilling to seek care and experience vulnerability when they decide to. Barriers in accessing care for those living in a rural location can lead to a sense of defencelessness and marginalization amongst rural communities which can affect well-being and willingness to seek care.⁹

Impact of poor oral health amongst rural communities on society

Poor oral health issues amongst rural communities also pose financial burdens on the health care system. The economic burden of oral health disease occupies a large share of many countries' healthcare budget. In 2018, the United States reported the total annual costs related to dental care to be \$136 billion,²² which is forecasted to continue increasing up till USD\$272 billion in 2040.²³ This trend is not limited to the US, dental expenditures in 32 OECD countries are predicted to

increase substantially, ranging from USD\$485 billion to USD\$728 billion in 2040.²³ Increasing expenditure on oral health is observed among low- and middle- income countries as well, with the dental care being a USD\$2 billion industry in India, with an unprecedented year-on-year growth rate of 30%.²⁴ These trends highlight the need for a shift towards preventive care in order to reduce unnecessary spending.

It is in the best interest of the health system to address oral health inequalities to prevent unnecessary oral emergencies and hospitalisations.¹⁸ Limited access to dental care is a key reason for the high prevalence of untreated oral diseases,²⁵ as such it is important to increase access so that oral diseases can be treated as soon as they arise. However, in conjunction with this, it is also important to promote preventive services as they are typically more cost effective than restorative services by preventing the incidence of disease in the first instance.²⁶

Pathway to improving oral health status for rural communities

To improve overall health and well-being, it is critical to consider oral health as a central part of overall health and a steppingstone to improving quality of life. Reducing health inequities within and between countries is a goal of health systems worldwide and has been a priority for the public health sector since the World Health Organization's (WHO) Ottawa Charter for Health Promotion in 1986.²⁷ The cost of such inequities can be measured in human terms, such as premature death and disability, as well as in economic terms, such as productivity losses, lost taxes, increased welfare, and direct costs to the healthcare system.²⁸ To reduce these health inequities oral health must be taken into consideration as a public health priority. The World Health Assembly recently approved a Resolution on Oral Health which recommends a shift from the traditional curative approach towards a preventive approach.²⁹ This should include a

promotion of oral health and includes timely, comprehensive, and inclusive care within the primary healthcare system. The Resolutions affirms that oral health should be firmly embedded within the noncommunicable disease agenda and that interventions should be included in universal health coverage programmes.²⁹

Policies to improve oral health amongst rural communities

The global strategy on oral health, which was adopted in May 2022, focuses on six objectives: oral health governance, oral health promotion/prevention, oral health workforce, oral health care integrated in PHC and universal health coverage, oral health information systems, and oral health research.³⁰ Oral health being the most common noncommunicable disease in the region, the WHO regional office for South-East Asia has published an action plan to reach universal health coverage for oral health. Certain core actions could be applied similarly to address oral health in rural populations. The first being to establish an effective national oral health coordinating entity, which can allow for effective planning, resource management, and should include a capacity to work with private sectors.³⁰ Secondly, to strengthen and expand health-promoting environments through policies and activities that foster environments more conducive to health and empowers population to improve their own oral health and well-being.³⁰ Furthermore, an integrated oral health workforce planning must be ensured, as well as the design and implementation of effective workforce models, which can address shortages and misdistributions of oral health professionals.³⁰ Finally, the action plan touches on teledentistry and the importance of the promotion of patient-centred digital innovations to lower access thresholds and foster inclusiveness.³⁰

The WHO has published a global policy recommendation on increasing access to health workers in remote and rural areas.³¹ One key factor is education: medical schools play a major role by enrolling students from rural backgrounds and/or establishing schools in remote areas. This should be paired with curricula suitable for rural health needs and students' rotations in rural areas. Secondly, regulatory interventions should be implemented, which create conditions for rural health workers to do more, to make the most of compulsory service requirements, and provide education subsidies with enforceable agreements of return of service in rural or remote areas. Financial incentives are also recommended, such as hardship allowances and housing grants, to outweigh the opportunity costs associated with working in rural areas. Finally, personal and professional support are critical to ensure rural health worker retention. It is important to pay attention to living conditions for health workers and their families, provide a good and safe working environment, implement appropriate outreach activities to facilitate cooperation between health workers, and support the development of professional networks.

Interventions to improve oral health amongst rural communities

Given that rurality is a determinant of oral health, several interventions have been developed to improve access to services.

Mobile dental clinics provide an innovative solution to cater to rural populations who do not have access to dental health care services in their community. These clinics can provide a variety of dental treatments for a large number of patients, in a controlled environment with a high standard of infection control.³² Data indicates that mobile dental clinics can decrease missed appointments and directly address transportation problems seeing as the clinics are transported to areas where transportation is difficult.³² In addition, costs to set up a mobile clinic are much more moderate

compared to a conventional clinic, ranging from 200,000 to 300,000 USD, which can allow dental services to be feasible in poor rural areas.³² Furthermore, a case study in South Africa showed that a school-based mobile dental unit was cost efficient at 25% allocation of staff time and that a dental therapy led service could save costs by 9.1%.³³

Teledentistry is another approach to target those geographically disadvantaged by linking rural and remote communities with health providers using electronic health records, telecommunications technology, digital imaging, and the Internet.³⁴ Teledentistry can increase accessibility of specialists, as well as decreasing the time and costs associated.³⁵ A systematic review of the research evidence for the benefits of teledentistry found that it can be cost-saving when compared to a conventional consultation.³⁶ Teledentistry can be a cost-effective solution to target rural populations who typically do not have oral health services within reach.

Dental camps allow for increased outreach among underserved populations, by setting up alternative sites, such as classrooms, with basic portable equipment.³⁷ These camps can equally be used as an opportunity to promote healthy behaviours. A case-study of two long-term refugee camps in western Tanzania found that the programme was sustainable and was able to meet the oral needs of the camp population as well as a small segment of the native population.³⁸ Various treatments were successfully completed with dental extractions being the most common.³⁸

Education initiatives can improve access to oral health care for rural and remote populations. This approach includes training and education of dental and allied health students, training and education of rural/remote community members, and programmes on oral healthcare services in rural/remote areas.³⁹ University-based initiatives which include a defined period of rural

placement training for dental students, such as 1 to 10 weeks, have been successful in the past.³⁹ Curriculum should include a focus on oral health issues which may be specific to rural and remote areas.³⁹ Furthermore, rural residents should be supported and encouraged to pursue dentistry and outreach programmes should be promoted.³⁹

Conclusion

Rural populations are disproportionately affected by oral disease, with a higher prevalence of periodontal disease, caries, and edentulism. Prevention and treatment of such conditions is challenging due to limited access to oral health care services. However, leaving poor oral health untreated contributes to poor overall health and well-being. The burden of oral diseases in rural areas can be reduced through public health interventions which promote healthy behaviours and improve accessibility to preventive care. Such actions are essential to improving health equity, and as such must be a priority of public health officials. Targeted interventions such as mobile dental clinics, teledentistry, and dental camps are warranted. Policies such as those suggested by the WHO are also needed to stimulate change. Policy makers and public health officials should focus on establishing an effective national coordinating entity, strengthening and expanding oral health promoting environments, ensuring integrated oral workforce and design effective workforce models, and promoting patient-centred digital innovations. Furthermore, there must be a focus on increasing access to health care in rural areas by increasing the size of the healthcare workforce through enrolment of people with rural backgrounds in medical schools, educational subsidies and increasing worker retention by promoting good working and living conditions.

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