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Research Article

Dental Care Models and their Contribution to Reducing Health Inequalities: A Public Health Perspective

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Abstract

Oral health is a vital though frequently neglected aspect of public health, with 3.5 billion affected by dental diseases. Socioeconomic inequality greatly impacts dental care outcomes, with poor populations having increased barriers in preventive as well as restorative care. The study explores different dental care models, i.e., publicly funded, private insurance-based, mixed, as well as community-based models, in terms of their ability in reducing dental care inequality. Universally accessible care is delivered in publicly funded models with challenges in terms of sustainability as well as manpower deficiency. The private insurance models deliver high quality care with increased inequality due to affordability. The hybrid models balance cost versus accessibility with bureaucratic challenges. The community-based models enhance outreach with increased funding requirements. The government measures in terms of preventive care as well as equal accessibility are promoted by measures from the Global Oral Health Action Plan from the WHO. Teledentistry, AI-based diagnostics, increased manpower, as well as reform in policies, can aid in making care more affordable as well as accessible. The review highlights that a combination of multiple strategies that involve utilization of technology, policy reform, as well as increased participation from society is necessary in order to achieve equal dental care globally.

Keywords: Oral Health Disparities, Dental Care Models, Public Health Policy, Preventive Dentistry, Health Equity.

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Introduction

Dental well-being is an integral component of overall well-being, yet it is one of the most underestimated areas of global public health. The World Health Organization states that an estimated 3.5 billion people have diseases of the teeth, making NCDs one of the most pervasive non-communicable diseases of the globe. The most pervasive of these diseases is dental caries, caused by tooth rot, and it is in 2 billion individuals who have permanent teeth rot and 514 million children who have primary teeth rot. Additionally, severe periodontal disease is in over 1 billion adults, which leads to lost teeth, pain, and a reduction in the quality of life (Osuh et al., 2022). Socioeconomic inequalities perpetuate inequalities in well-being of teeth, in which marginalized, racial/ethnic minorities, and lower-income individuals have higher levels of diseases of teeth and lower levels of care. Education, income, and occupational status have a strong relationship with well-being of teeth, in which lower-income, lower-skilled, and lower-status occupational status have higher levels of untreated rot of teeth, lost teeth, and infection. Inabilities in accessing cost-friendly and prevention-focused care perpetuate these inequalities, which lead to a greater utilization of care in an urgent scenario and costlier restorative care (Bethesda, 2021).

The cost of oral diseases is great. In developed economies, dental care is worth between 5–10% of total medical spending, amounting to billions of dollars annually. The World Health Organization's Global Oral Health Action Plan identified oral health as a determinant of social

disparity, emphasizing intersectoral strategies in the provision of care for marginalized populations (Jevdjevic & Listl, 2024). Public systems, as in Sweden and in Britain (NHS), have subsidized or universal care, which is accessible and cheap. The U.S. has insurance-based, employer-sponsored, or individual coverage, which can exclude lower-income citizens. The community systems, such as mobile clinics and non-profits, extend themselves to underprivileged citizens in an attempt to deliver cheap treatments and prevention. The mixed systems, such as Germany and in Holland, have a combination of public subsidies and private insurance, balancing cost and quality (Wang et al., 2020). The aim of this review is to study and compare various dental care models and evaluate their efficiency in minimizing inequalities in oral health.

Materials and Method

The following is a review based on a comparative study of different dental care systems in understanding the role of these in minimizing inequalities in health. The data sources for this comprise peer-review literature, reports of WHO, government policy, and epidemiological studies. Secondary data is extracted using sources such as reports of government health organization, PubMed, and Google Scholar for a critical analysis. Four of the major care systems, which have been chosen, are (1) public funded systems (i.e., UK, Sweden), (2) private insurance systems (i.e., U.S.), (3) community and social enterprises systems (i.e., non-profits, mobile clinics), and (4) systems of care which have a mix of systems (i.e., Germany, Netherlands). The inclusion of studies is based on studies which have examined access, cost, utilization, and outcome of these systems. The studies have been compared systematically using major parameters such as cost-effectiveness, accessibility, equity, and patient satisfaction. Statistical data for utilization of care, cost barriers, and prevalence of oral diseases is compared for disparity among different groupings of a population. Qualitative thematic content is examined for understanding policy and structural determinants of accessing care (Hajek et al., 2021). Government intervention studies, prevention programs, and studies on the workforce distribution have been included for understanding best practices. Limitations of variability in systems of care, variability in economies, and variability in data among different countries have been a drawback. This is, however, countered in this review using a process of cross-checking different sources and identifying trends which can be generalized rather than individual instances.

Table 1. *The key elements of the Materials and method / Own depiction*

Component	Description
Study Design	Comparative analysis of different dental care models and their impact on health inequalities.
Data Sources	Peer-reviewed journals, WHO reports, government health policies, epidemiological studies, and healthcare system evaluations.
Selection Criteria	Included studies that analyze dental care models in terms of accessibility, affordability, and effectiveness in reducing health disparities. Excluded studies focusing solely on cosmetic dentistry.
Data Collection	Literature review of existing policies, healthcare frameworks, and socioeconomic influences on oral health outcomes.
Analysis Approach	Comparative evaluation of public, private, and mixed healthcare models, focusing on their effectiveness in promoting oral health equity.
Limitations	Potential bias in secondary data sources, variation in healthcare policies across countries, and lack of uniform metrics for oral health outcomes.

3. Result

3.1 Overview of Dental Care Models

Dental care systems in different countries vary, based on different levels of priority, financing, and levels of access. Public Healthcare Systems, such as Britain's National Health Service (NHS) and Nordic systems, have primary financing in the form of taxation, which covers universal or highly subsidized care. The systems make provision for universal access, despite whatever flaws there may be in relation to socioeconomic status, although such factors as lengthy waits and shortages of facilities can undermine provision efficiency (Eaton et al., 2019). Private and Insurance-Based Models, for example, in Germany and in the U.S., have individual or employer-based coverage, which leads to inequalities in access. Full coverage is typically found in high-income levels, while lower-income and noninsured individuals have barriers in accessing care due to unaffordability and a lack of public support.

Mixed and Hybrid Models in these countries of Canada, Australia, and France blend public financing and private insurance. Such systems have public programs for standard care along with options for citizens to expand care via private insurance. The systems balance care and access, yet may continue to have cost barriers for a few. Community-

Based and Alternative Models of care consist of mobile clinics, school programs, and programs of teledentistry. The strategies reach under-resourced populations, providing preventive and urgent care in non-traditional care environments. The strategies are especially valuable in reaching lower-income, homeless, and rural populations, although for maximum impact of these strategies, there is a necessity for policy support and financing (Kandelman et al. 2012). Both systems have a set of respective strengths and weaknesses, and ideal systems promise affordability, access, and integration of prevention care.

3.2 Impact of Dental Models on Inequalities in Health

Dental care systems play an important role in impacting inequalities in health, particularly in relation to access, cost, and prevention. There is disparity in access between urban and rural populations, and between different levels of socioeconomic status. The publically funded systems, such as in Britain in the case of the NHS, have broader coverage, though struggle to deliver lengthy waits and shortages of practitioners in rural areas. The U.S. system of private insurance is characterized by wide gaps, in which upper-income patients can receive first-rate care, and lower-income and uncovered patients have minimal access, utilizing emergency room facilities for care of teeth (Parul Dasson Bajaj et al. 2023). The community programs, which include mobile clinics and school programs, represent a partial solution for filling gaps in access, though there is underfinancing and variability (Piotrowska et al. 2020). Affordability and Cost Effectiveness is greatly divergent among various models. The universal systems, funded by taxation, provide access for all for necessary dental care, cutting costs. The public subsidies in such systems, along with private insurance, in Germany and Australia, attempt a balance between cost reduction and quality of service (Barber, Lorenzoni & Ong 2019). In other systems, which have a dominance of private insurance, there is a higher cost for users, accompanied by inequalities in care. The cost-benefit, in the long term, of such treatments is lower in systems of private insurance, due to cost barriers, than in public systems, which place priority on subsidized prevention. Effectiveness of Preventive Care is another vital element in reducing oral health disparities. Prevention is given priority in public programs, which involve school treatments of fluoride, periodic visits, and education for oral hygiene. The Nordic countries have managed to integrate prevention programs in national programs, which led to lower cases of diseases of the teeth. In contrast, private systems of care traditionally place priority on treatment since some of these care programs do not provide routine prevention visits, which leads to delayed care and additional costs in the long term (Ruff & Niederman 2018).

3.3 Government Policies and Interventions in reducing the inequalities

Dental care access is shaped by government policy and action, which can reduce inequalities in oral health. Various strategies have been introduced globally and on a national level in an attempt to enhance oral health equity through public financing, regulatory systems, and public-private partnerships. The World Health Organization's Global Oral Health Action Plan aims to integrate oral health in universal care systems, encouraging prevention-focused strategies, universal access to appropriate dental care, and accessible care for marginalized populations. The plan urges a reduction in epidemiological disease burden of oral diseases by addressing common risk factors of tobacco, unhealthy diet, and poor oral hygiene, along with challenging governments of each country to give priority to oral health in public agendas. Reforms and National Policies have influenced access to dental care (Watt et al. 2015). In the USA, The Affordable Care Act enhanced children's access in marketplace and Medicaid programs, although care for adults is voluntary under Medicaid, which leads to inequalities for lower-income citizens (Kominski, Nonzee & Sorensen 2020). In Britain, subsidized or free care is provided for eligible citizens in its National Health Service, which is broader in its access though is marred by lengthy waits and shortages of practitioners (Tikkanen et al. 2020). In Scandanavia, oral care is included in universal systems, focusing on prevention and timely care (Nguyen et al. 2023).

Public-Private Partnerships have been instrumental in addressing gaps in access to dental care, particularly among marginalized sectors. Non-profits, mobile clinics, and corporate-sponsored programs in collaboration with governments make care accessible for cheap or for free among marginalized sectors. For example, programs such as Britain's Smile4Life and America's Mission of Mercy make care accessible for those who have minimal access. Besides, programs in teledentistry have been formulated as a cost-effective solution for addressing gaps in access, particularly in rural areas (Joudyian et al. 2021). Broadly, government action, when well-implemented, can reduce inequalities in oral health by making care more accessible, more affordable, and more prevention-focused. Yet, in states with fractured or insurance-based systems, inequalities persist, which underlines a greater role for public policy and investment in community-led solutions (Northridge, Kumar & Kaur 2020).

4. Discussion

Dental care systems in other parts of the world have various levels of success in reducing inequalities in oral health. Models based on public systems, for instance, in Britain

through its NHS and in Sweden through its universal system, have universal coverage and an orientation toward prevention, making care accessible for all levels of income. Such systems, however, traditionally have drawbacks such as long waits, shortages of practitioners, and budgeting restraints, which can lead to restricted timely care. In spite of these drawbacks, such systems deliver needed care for a large percentage of citizens, keeping costs down for lower-income citizens (Vahdati et al. 2024). Private, for-profit systems, which exist in states like Germany and in the United States, promote improved access to first-rate-quality care, but create wide inequalities on an income-related basis. In the U.S., for instance, large numbers of lower-income citizens have little or no dental coverage, which leads to delayed care in emergencies, rather than scheduled prevention. Costs for care, in particular for complex treatments, continue to pose a formidable barrier, in particular for marginalized citizens. While a streamlined and competitive system is an advantage of for-profit systems, it is premised on prioritizing profits, which leads to restricted access for marginalized citizens (*Oral Health in America: Advances and Challenges: Executive Summary* 2021). Mixed and hybrid systems, such as those in France, Canada, and Australia, combine public subsidies and private insurance in a balance between cost and quality. Such systems attempt to provide care in an accessible manner, keeping costs contained. Inequalities in levels of coverage and bureaucratic requirements, however, can continue to create gaps in access for those who fail eligibility for public subsidies (Dixit & Sambasivan 2018). Community and alternative programs, including mobile clinics, school programs, and teledentistry, have been instituted as innovative solutions for accessing underprivileged groups. Such programs have an easier time reaching urban-rural disparities and accessing homeless individuals or low-income families. Sustainability is a primary issue based on a dearth of funds, voluntary effort dependency, and little integration in traditional medical care systems.

Implementation of whole-population care models is hampered by a number of barriers, first among which is finance, shortages in human resources, insurance, and public awareness. In public systems, too, dental care is assigned lower budget priority than other medical emergencies, and hence there is a scarcity of funds for prevention and routine care. In systems based on insurance, particularly in the U.S., excessive cost-sharing discourages a large number of people from seeking timely care, further extending inequalities in oral health. Work shortages, particularly in rural areas, lead to lengthy waits in public systems and undermine outreach programs (Khan et al. 2023). Additionally, regulatory and licensing barriers hamper foreign-trained practitioners in being able to work, cutting down on practitioners. Insurance gaps, too, act as a barrier, inasmuch as a large number of policies exclude full coverage of adult dental care, leaving a large number of people uncovered for necessary care. Lastly, public awareness of prevention of diseases of the mouth is minimal, and urgent medical concerns take priority over visits for a dentist routinely, resulting in an increase in cases of avoidable diseases such as caries and periodontitis (Ju et al. 2021).

To meet these, a combination of policy reform, increase in numbers, and technology improvements is necessary. Teledentistry is a potent solution in addressing gaps in access, allowing for remote consultations and prevention screening, particularly in under-resourced regions. In Australia and Canada, it is possible for public systems to integrate telehealth solutions, reducing inequalities. AI-powered diagnosis further boosts efficiency in allowing for early diagnosis and automated treatment options, cutting costs and improving results. Scaling and reconfiguring the dentist supply in numbers, via additional education programs, subsidies for rural practices, and recognition of foreign qualifications, can help reduce shortages (Khanna et al. 2022). Policy changes in universalising dental care under universal health coverage can achieve a substantial reduction in costs, such as in Sweden and Norway, where investment in prevention led to cost savings in medicine in the long term. Promotion of public-private partnerships can enhance access, financing mobile clinics and subsidised care for underprivileged sectors (Burström & Sagan 2018).

While all of these various care systems have virtues, none of them is a utopian solution for addressing inequalities in oral care. The public systems, which have universal coverage, struggle being fiscally sustainable and have shortages in staff. The systems of insurance have great care, though, and have severe inequalities based on cost. The hybrid systems balance access and efficiency, though, and have regulatory barriers and variability in coverage. The solutions in community reach well beyond undercovered areas, though, on a dependent, non-scalable budget. The solution for narrowing the gap in oral care is a multi-part solution involving telemedicine, AI-assisted diagnosis, broader strategies in the workforce, and policy change. Placing a priority on prevention, making it accessible, and incentivizing innovation, we can take the world in a direction toward a more sustainable, more just system of dental care (Patrick et al. 2006).

Conclusion

Dental care inequalities result from budget limitations, shortages of practitioners, and access barriers. Models of public care give universal care, though it is budget and

staffing constrained, while private systems of care give great care, though it is too expensive. Hybrid and community-led models reduce inequalities, though policy support is necessary. A multi-faceted strategy is needed—a broader reach through teledentistry, improved early diagnosis with AI, and more workers can mitigate shortages. Policymaking action in making dental care a part of universal health coverage and public-private partnerships can make it more affordable and promote prevention. No single model eradicates inequalities, but a convergence of technology, policy adjustment, and community action can lead to a more just and productive system of global dental care. Prevention, access, and cost must take priority so that oral care is a human right, rather than a privilege.

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