EXPLORING THE ORAL HEALTH STATUS IN INCARCERATED POPULATIONS: A NARRATIVE REVIEW

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ABSTRACT

BACKGROUND: Oral health is an important part of the overall well-being of an individual, especially among the vulnerable sections, including inmates

AIM: The evidence suggests that inmates are more likely to fall prey to poor oral health conditions.

METHODS: This review draws inferences from important evidence from 20 countries worldwide to assess the status of oral health in the incarcerated population. The analysis also highlighted the contributing factors (barriers and causative factors) affecting the oral health of inmates in prison. Furthermore, a fishbone diagram has been generated to communicate better the root cause of the current oral health of the inmates.

RESULTS: The overall analysis reflects that the incarcerated population suffers from poor oral health, which has worsened over time, leading to increased pervasiveness of oral disease in them. The analysis concluded that DMFT remained the most concerning issue among them, followed by untreated caries, periodontal diseases, gingivitis, teeth pain or discomfort, and, in rare cases, cancerous lesions and oral sub-mucous fibrosis. The study identified a high frequency of these oral conditions, ranging from 50% to over 90% in most cases. Further analysis revealed that not only were dental healthcare services in prison inaccessible, but several important causative factors also contributed to the detrimental oral health of the inmates.

CONCLUSION: These findings highlight the important issue of poor oral health in the incarcerated population in prisons, especially among adolescents and old age inmates. The review also documented key measures taken to manage poor oral health among them. However, limited evidence on the impact assessment has restricted our understanding of the effects of these measures. Therefore, the authors of this review emphasize the urgent need for comprehensive and detailed impact evaluation studies to inform policy actions in this regard.

KEYWORDS: Oral health, Incarceration, Periodontal, Dental Caries, Mouth Disease

INTRODUCTION

Almost 11.5 million people reside within prison perimeters around the world, according to a report in Global Prison Trends in 2023 [1,2]. The report addresses issues concerning prisons, ranging from overcrowding to living standards crises and unstable healthcare systems. According to Wickramasinghe et al. (2022), such grim prison conditions compromise even general healthcare delivery systems, including oral health. According to the WHO's Global Oral Health Report 2022, approximately 2 billion people suffer from caries of permanent teeth, and more than 1 billion suffer from periodontal conditions. One of the studies by Testa et al. in 2020 held that approximately 2.1 million people are in prisons around the world, of which 50% to 71% suffer from poor oral health conditions and require a standard level of treatment[3,4]. With these detrimental combinations of physical, environmental, and mental conditions, the overall well-being of prisoners is a cause for concern[2,5].

As argued by various literatures, poor oral hygiene 6 substance abuse, crowded facilities, limited access to dental care[7], and poor oral hygiene 8 affect incarcerated populations[9,10]. Such global oral health inequities[11,12] are often considered a critical domain, especially in vulnerable communities[2,13]. Formerly incarcerated individuals also highlight how difficult it is to get basic healthcare facilities in correction centres and even more challenging for oral care[14]. The most common oral conditions faced by prisoners are dental caries and tooth decay, periodontal disease, and tooth loss or missed teeth[2,15,16]. For instance, a study conducted in American prisons revealed that 74% of prisoners had lost teeth during incarceration, and 44% of them had untreated dental decay[2,17,18].

Another important problem is periodontal disease, which worsens with smoking, improper dental care, and poor oral hygiene[2,11]. Other dental conditions commonly found in inmates include oral infections, abscesses, and disorders affecting the oral mucosa [19]. Additionally, oral health disparities exist within this population[1,15,20], particularly along the lines of age, race/ethnicity, and socio-economic background[9,21]. Edentulism is also a common condition among older prisoners, which worsens with racial and ethnic minorities in prison[8,22].

Though there are various studies available on the incarcerated population, this section of people has generated less focus in research areas as well when it comes to oral health and well-being[12,23]. This review attempts to collate scattered evidence across the borders to understand the status of oral health among inmates.

MATERIAL AND METHODS

This review focuses on a primary research question: "What is the current status of oral health among the incarcerated population, and what are its contributing factors?". The eligibility criteria for the study were set before the review started. Essentially, this study focused on the oral health of the incarcerated population. Articles

published in peer-reviewed journals between 2004 and 2024 were considered and included. In addition to this, only studies that demonstrated original research work were included in this review. All types of secondary study designs, such as review papers, letters to the editor, commentaries, short communication papers, preprints, and others, were excluded.

Additionally, papers written only in the English language were included in this review. Papers of a generic nature on oral health were excluded. An extensive literature search was conducted by an independent reviewer (MB) across three electronic databases: PubMed, ScienceDirect, and ProQuest. Additionally, the reviewer performed a further literature search by citation search using the included studies. The search strategy was designed in a manner using Booleans operators "AND" – "OR" to carefully extract relevant evidence across databases using medical subject headings (MeSH):

("Oral Health"[MAJR]) AND "Dental Health Surveys"[MeSH]) AND "Prisoners/statistics and numerical data"[MAJR]); (("factors"[All Fields]) AND ("oral health"[All Fields])) AND ("incarceration"[All Fields] OR "incarceration and public health"[All Fields]); ("Periodontal Diseases"[Mesh]) AND ("Prisoners"[Mesh] OR "Incarceration"[Mesh]); "oral health"[All Fields]) AND ("prevalence"[MeSH Major Topic])) AND ("incarceration"[MeSH Major Topic]); "Oral Health/statistics and numerical data"[MAJR]) AND "Prevalence"[MeSH]) AND "Prisoners/statistics and numerical data"[MAJR]) OR "Prisons/statistics and numerical data"[MAJR]) OR "Needs Assessment"[MeSH]) AND "Dental Health Surveys"[MeSH]

The studies were selected based on established eligibility criteria, and data extraction was conducted using a systematically designed data extraction sheet in Microsoft Excel Software (version 2402).

RESULT AND DISCUSSION

Search Results and Study Characteristics

A total of 1054 studies were identified, and after multistage screening through titles, abstracts, and full texts, only 49 studies were found to be eligible for inclusion in this review. The majority of studies can be identified as emerging from a few select countries in the world, illustrating disparities in research and development in oral healthcare among the incarcerated population[2,4,6,14,15,19,25,26]. While analyzing the region of publication, it was also found that there was geographical skewness in published studies, where African countries had significantly lower publication rates compared to North American and South Asian regions (Figure 1; Table 1).

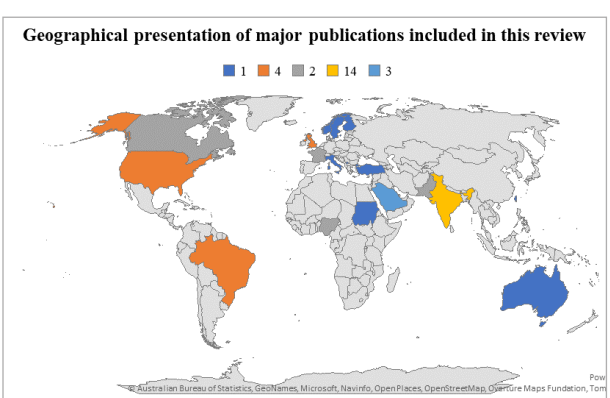


Figure 1: Map showing regional distribution of research conducted on incarcerated population to understand oral health status

Table 1: Country-wise distribution of the number of publications included in this review

Countries	Number of Publication
Australia	1
Brazil	**4**
Canada	2
Italy	1
France	2
Finland	1
Korea	1
India	**14**
South African (Western Cape)	1
Nigeria	2
Sudan.	1
Saudi Arabia	**3**
Kosovo	1
Sweden	1
KwaZulu-Natal	1
Turkey	1
Taiwan	1
Norway	1
Pakistan	2
USA	**4**
UK	**4**

The majority of studies were cross-sectional (more than 70%), while a few were qualitative (6%), and the rest were review papers (36.73%). Furthermore, most studies have comprehensively covered all age groups, ranging from 10 years to over 90 years, for both genders (male and female). The overall analysis suggested that only standard tools were used to screen the dental health of an incarcerated population. For instance, CPI (Community Periodontal Index) was used to calculate periodontal disease, DMFT (Decayed, Missing, and Filled Teeth) was used to understand tooth physiology very comprehensively, LOA (Loss of Attachment) and OPHI-14 (Oral Health-Related Quality of Life) tools were used to understand how it has affected the quality of life of patients. Moreover, these tools were used as recommended by the WHO[53,54,55] for holistic oral health assessment[7,14,20,33,35]. Overall analysis from across the studies held that the incarcerated populations face poor oral health conditions, and majority of them suffer from DMFT (mostly reported), followed by untreated caries, periodontal diseases, gingivitis, teeth pain or discomfort, and in rare cases, cancerous lesions and oral sub mucous fibrosis. These conditions varied based on the gender, age, and duration of imprisonment of the inmates.

Present Status of Oral Health among Incarcerated Population

Current prevalence

The pooled evidence suggests that the prevalence of various oral health conditions among inmates ranges from 10% to 80% worldwide. Overall analysis indicates that dental caries and periodontal diseases are the most common oral conditions among the incarcerated population, accounting for 60% to 90% of cases[15,6,18,30,31]. This has been followed by tooth loss and oral infections, accounting for 10% to 30% of the cases across different geographical regions[2,14,25,32-37] (Figure 2). For instance, the

USA[11,25,51] has a greater rate of untreated dental cavities, periodontal diseases[27,28] and tooth loss (44% of inmates)—similarly, 86% of Brazilian prisoners [10,15,29] report having unfavourable dentine conditions[10]. Furthermore, 70 and 90% of prisoners in lower-middle-income countries (LMICs), such as India[6,17,22,23], Pakistan[26,28], and countries in Sub-Saharan Africa7,[14,25,27,30] have dental caries and periodontal disease[27,28]. This can be attributed to the lack of access to basic dental health services and preventive care in the prisons. In addition to this, it was also found that the prevalence of these diseases was higher in adolescents or older age inmates compared to middle-aged individuals. However, due to the non-availability of data from all the regions of the world, generalisation of these findings has remained limited[2].

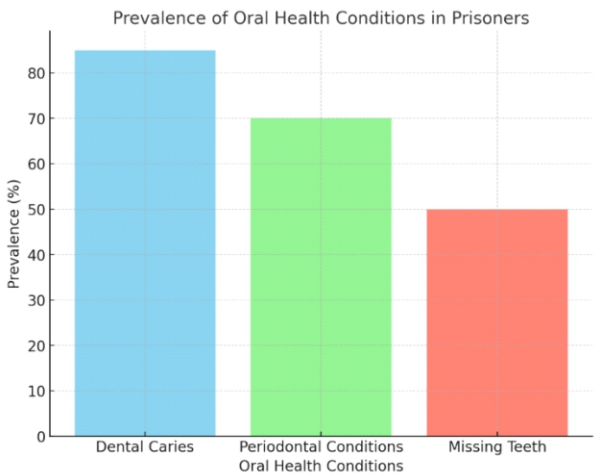


Figure 2: Prevalence percentage of most common oral health conditions among prisoners

Evidence in the Indian context

A study by Balkrishna et al. in 2021[37] argues that the prevalence of dental decay was high in males. This study indicated that the factors associated with imprisonment influence oral hygiene practices, food preferences, and the psychological aspects of prisoners[34]. Another study by Reddy et al. in 2012[7] also highlighted similar findings from the study conducted in Karnataka prison. Recently, Kumar et al. (2022)[36] conducted a cross-sectional survey in Delhi NCR and found that the occurrence of dental decay was higher among inmates imprisoned for 3-6 years and 6-10 years compared to those with up to 3 years of imprisonment. This can be attributed to the poor conditions and inadequate facilities leading to worsening and higher prevalence of dental disorders in incarcerated population.

Furthermore, a study by Sharma et al. in 2020 [17] found that the number of studies conducted to assess the oral health status of inmates was relatively low, thereby limiting our ability to understand the actual conditions in prisons comprehensively. However, one of the intervention-based studies conducted by Radhika Mitra (2024) in Kolkata's Central Jail concludes that when inmates were given training and educational interventions, it resulted in a significant change in their knowledge about oral health and hygiene, as well as their attitudes and practices. This study found that increased awareness led to improved attitudes and practices among inmates, resulting in a marked decrease in issues related to periodontal health and an increase in hygiene practices.

Potential causative factors that lead to poor oral health of the incarcerated population

Amaya et al. (2023)[2], in their scoping review, identified various determinants that led to the poor oral health of the incarcerated population. Notably, WHO's "Oral Health Status" report 2022 identifies that maximum oral health neglect can be seen in vulnerable populations. Another study by Nobile et al. (2007)[38] found that the health conditions of inmates in Italian prisons were inadequate. Similarly, Decerle et al. (2012)[16] described that the poor availability of dentists became an important factor in service utilization. Similar observations were also reported by Talbert et al. (2022)[14]. Moreover, this root cause analysis was developed based on a range of available scientific evidence in this field, leading to the poor oral health of inmates. These were classified based on four main causative factors: limited accessibility to dental services, socio-cultural factors, environmental factors, and administrative constraints[2,27,28,31–33,35,38,40,42,27,37,39,42].

A detailed analysis is presented in Figure 2 as an Ishikawa diagram illustrating the root causes of deteriorated oral health conditions among inmates.

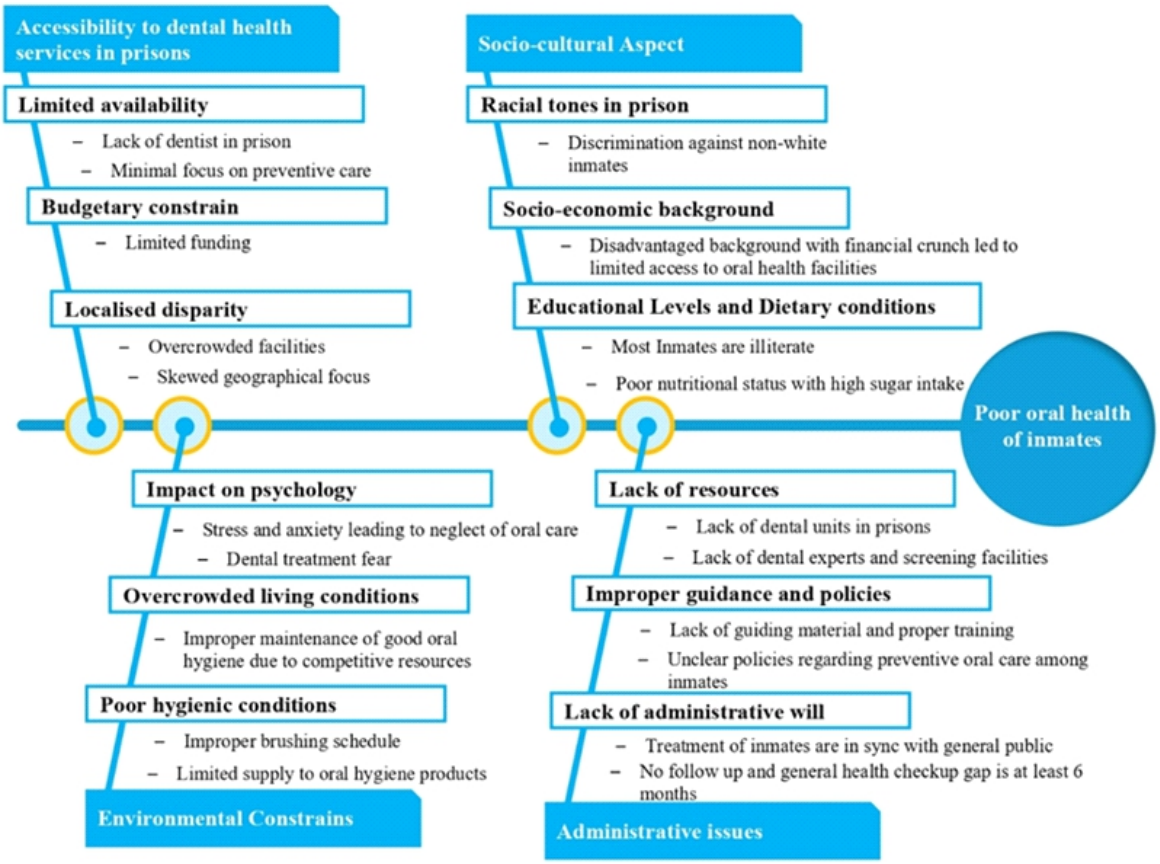
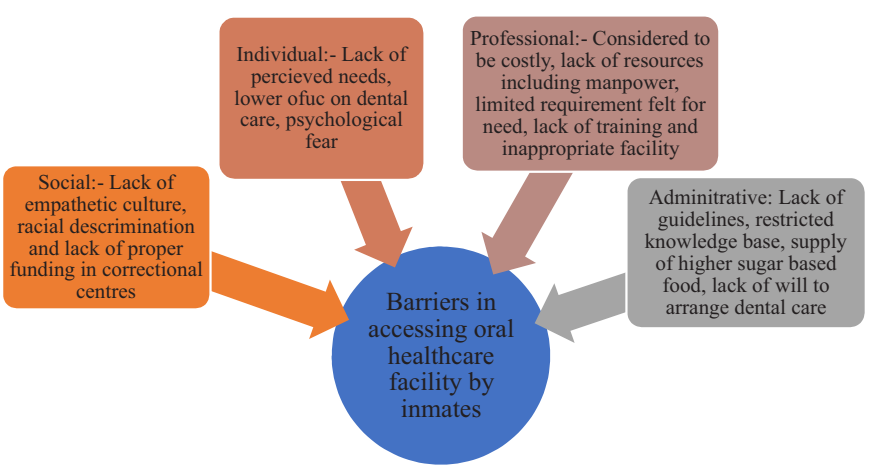


Figure 2: Root Cause analysis of poor health of incarcerated population

Barriers identified in accessing oral health care within the prisons

According to Heidari et al.[4] (2014), barriers to accessing the facility can be grouped into three main categories: individual, professional, and social. However, in one of the studies by Donnelly et al. (2019), it was also recorded that a lack of policy and guidelines (administrative constraint) was a significant determinant of improper oral health among inmates. This result was also supported by Sharma et al. (2020), Reddy et al. (2012), Yu Pei Yang et al. (2023), and Cavalcanti et al. (2014)[7,10,19,21,23,25,27,33]. Flowchart 1 illustrates the types of constraints faced by the incarcerated population in accessing oral health services within the prison.



Flowchart 1: Visual representation of barriers faced by the incarcerated population in accessing oral healthcare in prison

Steps were taken to improve oral health conditions among the incarcerated population.

Table 2 highlights that regional governments, as well as other civic bodies, were actively engaged in managing the oral health of prison inmates. However, the paucity of literature, especially intervention-based studies[33] further restricts our understanding of the impact of these interventions and measures. This also underscores the need for intervention-based studies to better understand how a particular measure taken or intervention implemented improves the overall oral health of the incarcerated population[18,31,36,39,44, 49,51].

Table 2: Country-wise policy intervention implemented to improve oral health of inmates

Country	Policy Intervention
USA	The National Commission on Correctional Health Care requires the provision of standard dental services in correctional facilities (NCCHC, 2021)
Brazil	Mobile dental units were created to cover inmates (however, coverage remains limited)[2,10,29]
Scotland	National oral health improvement strategies for prisons were implemented effectively, focussing on preventive care rather than curative care (the prevalence of almost all oral health problems is less than 30%, one of the best in the world)[26,39,41]
Norway	When prisoners enter the correctional system, general health screening includes oral health screening, allowing for the tracking of inmates in the future to reduce disparities in oral needs and treatment[12,26,42].
India	National Oral Health Policy 2021 was drafted to take care of oral diseases among the population; however, implementation remains bleak[23,35-37,40]
UK	The NHS takes care of healthcare infrastructure in the UK, ensuring equitable healthcare for all. Also, it has a very active tobacco cessation program even for the incarcerated population, highlighting lower rate of oral infections and cancers[4,39]
South Africa	Witnessed reduction in oral infections due to upgraded prison dental clinics[42,43]
Mexico	A pilot basis program on tele-dentistry was launched to provide consultations, including exclusive specialist care based on the need assessment of the prisoners[10]

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Identified research gaps in the existing literature available

It was found that limited epidemiology-based evidence was available with respect to the oral health of the incarcerated population. Additionally, geographical disparities in underdeveloped countries have found LMICs [23,26,27,37,44-51] to be ineffective in providing an overall oral health condition for inmates compared to developed countries. Notably, a higher prevalence has been found in available literature in developing countries. Moreover, it was also found that longitudinal studies examining the prognosis of different oral health conditions over time were minimal. Authors of this review also highlight that intervention-based follow-up studies are highly scarce, which further limits the understanding of the long-term impact of any intervention. In addition to this, we also found that studies focusing on different determinants of health, such as socio-economic, digital, and environmental conditions, were also very few. Therefore, the authors of this review recommend that future studies focus on these aspects as well to generate a holistic sense of the status of oral health among inmates and the impact of any arbitrary measures taken.

Strengths and Limitations

This review attempts to present the current state of oral health among the incarcerated population. This study enumerates not only the overall prevalence of inmates' oral diseases but also analyses the barriers to accessibility of oral healthcare and the causative factors that led to poor oral conditions among them. The authors also present quantifiable evidence of measures taken by various countries to improve their conditions. Furthermore, this review also highlights the existing lacunae and lack of knowledge and awareness on this subject, which may be helpful in paving the way for future studies.

However, this review study had certain limitations. Authors have access to only a limited number of databases; hence, only a limited number of resources were pooled to generate evidence. Additionally, studies included in this review demonstrated heterogeneity in research methodology, thereby increasing the likelihood of plausible bias in reporting outcomes.

CONCLUSION

This narrative review concludes that the oral health of incarcerated individuals remained significantly neglected across different geographical regions of the world. Although measures were taken at the regional level to focus on the oral health of inmates, it was found that persistent barriers continued to be the driving force behind the studies. Furthermore, this study also underscores the urgent need for comprehensive impact evaluations and intervention-based studies to

understand the needs and conditions of the inmates. Therefore, a multidimensional and inclusive approach is required to address the burden of poor oral health among inmates, ensuring a healthy and dignified life.

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