Associations between the Sustainable Development Goals and Oral Health

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Abstract: This scoping review set out to identify the body of research that relates to the sustainable development goals (SDGs) and oral health. What published evidence particularly links oral health to the Sustainable Development Goals (SDGs)? was the question that led this review. A June 2023 search was done in PubMed, Web of Science, Cumulative Index to Nursing and Allied Health Literature, and Scopus for English-language papers published between 2015 and June 2023. Twelve of the five hundred publications that satisfied the inclusion requirements had their extracted data combined. These were journals from two different continents: Africa and Europe. There were ten studies that were not nation-specific. Three observational studies were conducted. SDG 1 (n = 1), SDG 3 (n = 11), SDG 4 (n = 3), SDG 5 (n = 2), and SDG 13 (n = 1) were the targets that were cited. A wide range of topics like integrated oral health care, dental education on the SDGs, enhanced health disparities, access to universal health care, and sustainable health methods were covered in the studies that linked oral health to SDG 3. The scant number of papers found indicates that, in order to fill the gap in the literature, proactive measures should be taken to produce research-based evidence that examines the interactions between oral diseases, oral health, and the SDGs. By doing this, oral disorders can be efficiently controlled using resources dedicated to the SDGs.

Keywords: sustainable development goals, oral health, universal health, dental caries, periodontitis, edentulism

1. INTRODUCTION

The burden of oral disease prevalence on public health is substantial worldwide. Worldwide, an estimated 3.5 billion people are thought to be afflicted with various oral disorders [1]. This represents about half of the world's population and more than a billion instances more than the next five most common non-communicable diseases combined [1]. Untreated dental caries in primary and permanent teeth, severe periodontal disease, edentulism, and oral and lip cancer are the main causes of the burden of oral illness [1]. The number of instances of caries in permanent teeth is estimated to be 2,029,495,070; severe periodontitis is 1,086,825,543; caries in primary teeth is 520,065,521; edentulism is 351,808,988; and oral and lip cancer is 1,401,286 [1]. Up till 2019 there has been little change in the global burden of untreated dental caries in primary and permanent dentition [2]. Oral diseases are complicated but avoidable
conditions that impair a number of vital bodily processes, including speaking, smiling, smelling, tasting, touching, eating, and swallowing [4]. They frequently result in pain, discomfort, and sickness within the craniofacial complex, undermining people’s capacity to successfully convey their emotions through facial expressions [4]. Furthermore, because general health and dental health are intertwined, oral disorders have consequences for overall health and well-being [5]. Although there is no specific mention of oral health in the agenda of the sustainable development goals (SDGs) [6], understanding the connections between oral health and the SDGs can help build multimodal therapies that maximize the potential of the SDGs’ linked web. This cooperative interaction provides a foundation for drastically lowering the prevalence of oral illnesses worldwide. The estimated yearly direct costs of managing oral diseases are USD 387 billion (including public and private dental care expenditures) and USD 323 billion (including productivity losses linked to the primary causes of oral disease burden) [1]. The economic costs of managing oral diseases are significant.

The 17 Sustainable Development Goals (SDGs) outlined by the UN represent a concerted attempt to advance peace, prosperity, and well-being for all in an environmentally responsible manner [7]. The objectives encompass eliminating poverty, ending hunger, promoting health and happiness, gender parity, clean water and sanitation, inexpensive and sustainable energy, sustainable cities and communities, responsible consumption and production, combating climate change, life below the water, life on land, peace and justice, and forming partnerships to achieve these goals [8]. There may be effects on dental health from each of these SDGs. For example, reducing disparities in oral health care access through SDG1 [7] helps address poverty [9, 10]. By addressing hunger through SDG2 [7], the risks of malnutrition on oral health can be reduced [11]. Gender discrimination in the job market will also decrease as a result of the achievement of SDGs 5 and 6, and maternal education and economic prospects will improve [7]. These improvements are crucial for the management of early childhood caries [12]. Additionally, SDG9 encourages the development of supportive infrastructure, industry investment in new technology, and creative tactics [7], all of which are pertinent to the creation of new non-invasive caries control measures. Since slums have a higher risk of tooth decay and poor periodontal health, the complex interaction of urban-related social, economic, and environmental issues, as described by SDG11 [7], forms substantial risk factors for caries [13]. However, focusing on dental health can make a big difference in achieving the SDGs. SDG12 can be attained, for instance, by highlighting preventive actions, encouraging oral health, and using recyclable dental products [7]. For the SDGs to be achieved, global action on oral health is therefore essential.

While the SDGs recognize interconnectedness as a means of improving the efficient and effective use of global financial resources [14, 15], there has been little discussion of the interconnectedness and resource management for oral health within the framework of the SDGs. In a public statement, the International dentistry Federation recognized the importance of the Sustainable Development Goals and emphasized the necessity for the dentistry profession to integrate these goals into their day-to-day operations. Additionally, they support the shift of dentistry into a green economy to support people’s health and wellbeing at every stage of life [16]. Therefore, in order to comprehend the relationship between oral health and the SDGs, evidence based on research is required. It can be financially advantageous to invest in dental health [17]. Thus, the purpose of this scoping review was to map the literature on the relationships between oral health and the 17 Sustainable Development Goals (SDGs) and to suggest future research directions to fill in any gaps in the knowledge about the relationships between oral health and the SDG targets.
2. MATERIALS AND METHODS

In order to look into the evidence about the connections between the goals of each of the 17 SDGs and oral health, we carried out a scoping review. To guarantee methodological rigor and openness, the scoping review complied with the recommended Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) criteria [18]. The review was guided by the following query: What particular published evidence relates oral health to the SDGs? In June 2023, the first search was carried out on four electronic databases: Medline (Pubmed), Web of Science, Scopus, and Cumulative Index to Nursing and Allied Health Literature (CINAHL). The search was done in English and ran from June 2023 to May 2015. The quest got underway in 2015, the year the SDGs were announced. For this review, no documented procedure was found. The reference management program Rayyan was used to import the material that was found through database searches. Using the "duplicate items" feature, duplicates were eliminated in Rayyan. Title and abstract screenings were carried out individually by three independent reviewers (ORA, MTO, and OTA), adhering to the review's qualifying requirements. After that, four researchers independently finished the full-text reviews of the remaining papers (ORA, MTO, OTA, and MOF). No efforts were taken to get in touch with writers or organizations in order to locate further sources. Consideration was given to any published work that presented research on oral health and made a clear connection between those findings and the SDGs. The articles had to be in English and have their whole contents accessible in order to extract all pertinent data in order to meet the inclusion requirements. Letters, reviews, observational studies, and experimental investigations were all included in the review. We did not include articles featuring participants from outside Nigeria. Excluded were publications in books and grey literature, narrative reviews that did not center on oral health and the SDGs, and articles whose whole texts were not accessible. Information on the paper identifiers (title, author, link), the nation, the year of publication, the study aim, the study design, the study location, the SDG target addressed, the oral health status assessed, and the population investigated were retrieved from the publications included in this review.

4. RESULTS AND DISCUSSION

520 studies were found in the first search from four databases using the provided search keywords. Twelve studies satisfied the qualifying requirements and were included in the evaluation after duplicates were eliminated and the screening process was finished. Twelve research were done with a specific focus on the goals of the Sustainable Development Goals and oral health. The twelve studies were released between 2015 and 2023: five in 2022 [21–24, 28], three in 2021 [27–30], one in 2015 [26], and one in 2018 [19]. These investigations were published in the European Region from Turkey [23] and the African Region especially from Egypt [29]. Ten of the research [19–30] were not nation-specific. A policy paper [28], observational studies (cross-sectional studies [23, 29], mix-method study [27]), reviews (narrative reviews [19–25]), and expert opinions (short communications [21, 24], editorial [26], position paper [30]) are some of the study types that have directly connected oral health to the goals of the SDGs. Children [22, 23], pregnant women [19], individuals with impairments [24], oral and maxillofacial surgeons [20], and dentistry schools [27] were among the study populations mentioned in the study. The research included a wide range of topics, including universal health coverage [26, 28], early childhood caries [22, 23], and dental health and pregnancy [19].

The references addressed the following Sustainable Development Goals (SDGs): SDG 1 [29], SDG 3 [19–30], SDG 4 [24–29], SDG 5 [28,29], and SDG 13 [25]. The mention of SDG 1 (no poverty) was intended to
instruct dentistry students in the nondiscriminatory provision of free dental care. Enhancing patient access to oral health education for enhanced overall health and well-being was one of the many focuses of SDG 3 (good health and well-being) [21, 29]. Additionally, it entailed addressing health disparities related to oral and craniofacial conditions [20], developing global health-focused dental educational curricula [27], developing appropriate policies to integrate oral and general health [19,23,24], using digital tools to improve oral health access [30], and establishing sustainable oral healthcare approaches for managing early childhood caries [22]. With consideration for reducing and promoting gender equality in healthcare access, as referenced in SDG 5 (gender inequality) [28,29], the reference to SDG 4 (quality education) concerned involving dental students in their early years of dental education in the design and implementation of research [29] and promoting access to oral health promotional education in people with disabilities [24]. Moreover, a study examined methods for lowering carbon emissions in dental practices in accordance with SDG 13’s goals for climate change [25].

![Identification of studies via databases diagram]

**Figure 01:** PRISMA Flow chart of studies

According to this scoping review, there isn’t much written about how oral health and the SDGs are directly related. The few research were primarily concerned with SDG 3 and oral health, and they came from three of the six World Health Organization regions. Few primary research have shown a connection
between oral health and the SDGs, while some have done so with SDGs 1, 4, 5, and 13. Oral illnesses and SDG 3 were found to be linked distally, as opposed to proximally, by the one epidemiological investigation. The few published research did, however, show a dedication to bringing the goals and tenets of the several SDGs into dentistry practice and education. In order to forward the objectives of sustainable development, they understand how critical it is to address more general concerns about gender equality, health, education, the environment, and social inclusion in addition to offering high-quality dental treatment. A more equitable and sustainable approach to oral health care could be fostered by highlighting the interconnectedness between the goals of the SDGs, oral health, and the effective and efficient use of resources for the SDG. However, there is a dearth of research-based evidence directly linking oral health and the SDGs, and the main focus of the few publications on the link between oral health and the SDG is with SDG3. It is apparent, therefore, that the accomplishment of SDG 3 depends on the advancement of the other 16 SDGs [31, 32]. Therefore, it makes sense to draw links between oral health and the other SDGs as well, especially if they are intimately related to the goals of SDG 3.

As writers, we acknowledge that many published publications may be linked to the SDGs provided they undergo a comprehensive review process. However, it emphasizes how crucial it is to not only recognize the potential alignment of research with the SDGs but also actively and effectively translate this recognition into concrete actions and outcomes when authors fail to make these connections throughout the research process, from planning and implementation to reporting. However, drawing this connection calls attention to writers' responsibilities in helping to accomplish these globally important aims and encourages them to think about the wider societal ramifications of their work. By doing this, those involved in oral health initiatives can significantly contribute to resolving some of the most important issues our world is currently experiencing. One framework for tackling some of the most intricate and interwoven problems facing the globe is provided by the SDGs. When it comes to producing information and solutions that advance these objectives, research may be a very effective instrument. Nevertheless, the potential influence of research remains unmet until deliberate efforts are made to close the gap between research activities and the SDGs. The potential to connect the SDG3 with other SDGs and targets [31, 33] serves as an example of the "gap" in the direct relationship between oral health and numerous SDGs. This is a lost opportunity to use research findings related to oral health for the benefit of society and the environment.

The absence of corroborating data for these associations could impede the formulation of regulations that accurately gauge the returns on investments made towards achieving the Sustainable Development Goals. The SDGs offer a uniform language and impact framework that improves accessibility globally and makes it easier to compare outcomes across various locations [34]. The SDGs also facilitate voluntary commitments relating to the goals and the exchange of knowledge and skills across multi-stakeholder partnerships, allowing for regular reports on the goals' implementation. Furthermore, as nations have pledged to prioritize progress for the most marginalized communities, it is imperative to take into account the unique situation of each nation. The potential benefits of the SDGs on oral health outcomes, however, may be hampered by the paucity of reporting on the impact of national advancement on the goals on oral health. Only two narratives that examined the relationship between the SDGs and ECC in the context of a particular nation were discovered during our scoping assessment [23, 24]. Future studies evaluating country-level progress on the SDGs should also analyze the influence on indicators linked to oral disease control in each country in order to fully understand the impact of the SDGs on oral health. All
nations that have committed to the SDGs must consider these oral health indicators [35], and discussing them in connection with the SDGs will offer insightful information and encourage advancement toward accomplishing oral health objectives. Oral and maxillofacial surgeons are one group of oral health professionals that have argued for their participation in reaching SDG3, according to our scoping review [20]. This acknowledgement of the value of oral health specialists can also promote in-depth conversations and close observation of the relationships between oral health and the SDGs. Oral epidemiologists are a noteworthy professional group that can be essential in producing evidence and advancing knowledge of this connection. They possess the ability to coordinate epidemiological surveillance, gathering precise data regarding the prevalence and dispersion of oral disorders, and investigate potential effects of the SDGs [36]. The review’s conclusions should serve as a call to action for other oral health practitioners, encouraging them to work together and keep a close eye on how SDG investments are affecting oral disorders that are pertinent to their areas of expertise. Oral health practitioners have the ability to advance the attainment of SDG targets linked to oral health by working together and pooling their resources.

The acknowledgement in some of the literature of the potential contributions oral health can make to reducing inequality through access to oral health education, supporting gender equality in oral health care access, and the role of dentistry in climate change was noteworthy. These honors highlight the dental profession’s multifaceted influence. This emphasizes how crucial dentistry is for improving social justice, environmental sustainability, and oral health as well as more general society objectives. By accepting these contributions, dentists can help solve some of the most important issues facing the world today. They can also encourage investment and the creation of oral indicators, which may be used as output measurements for these SDGs to track improvements in oral health. It is possible to establish a connection between oral health and several SDGs. It may be necessary to develop new research approaches as well as educate dental stakeholders about the SDGs’ aims and targets in order to produce fresh evidence on the connections between oral health, oral illnesses, and the SDGs and targets. The authors of this scoping study [27, 29] have noted that intentional efforts aimed at dental students, oral health researchers, and faculty members are necessary to strengthen the links between dentistry and the SDGs. This comprehension ought to go beyond a cursory knowledge to a more profound sense of the connections between these worldwide goals and particular study areas.

The links between and effects of sustainable developmental initiatives at the macro, meso, and micro levels should also be evaluated, and biological, behavioral, environmental, and structural techniques should be included. They ought to assist in locating affordable oral healthcare options that work well in environments with limited resources. The impact of each SDG initiative on the burden of oral diseases and each intervention’s contribution to the control of oral diseases should be specifically assessed in these oral health interventions. Significant advancements in oral health can be achieved by comprehending and resolving these links, as well as bringing it into line with the larger global sustainable development agenda. The lack of research directly relating oral health to the SDG is being brought to light for the first time by this study. It serves as a reminder to the community of oral health researchers to use the SDG platform for much more research. A constraint of this research is that it solely examined literature composed in the English language. Furthermore, it’s possible that we overlooked pertinent studies that could have shown a connection between oral health and the SDGs even though they did not state it clearly in their findings. This underscores the potential for important data pertaining to the relationship between oral health and the SDGs to be missed by researchers doing database searches. In
order to tackle this problem, researchers studying oral health should improve their capacity to synchronize their findings with the Sustainable Development Goals (SDGs), identifying and resolving possible hazards and prospects associated with social, environmental, and financial dimensions. By doing this, individuals can make a significant contribution to the global agenda and add value to their research.

4. CONCLUSIONS

The limited number of publications that specifically address the links between oral health and the SDGs is brought to light by this scoping review. The SDG3 is the primary topic of the few articles. A select number highlight the links between oral health and SDGs 1, 4, 5, and 13, emphasizing the need to reduce carbon emissions through dental practice, promote oral health education to enhance health in general, and provide access to free oral health care in order to address poverty. Furthermore, there was little data available about the connections at the national level between oral health and the SDGs, and only one professional organization for oral health recognized its significance in relation to SDG 3. It is imperative to take proactive measures in producing research-based evidence that examines the interactions between oral diseases, oral health, and the more general 17 SDGs in order to close this gap. By doing this, we can increase the resources dedicated to successfully managing this significant public health issue.

REFERENCES


