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A Right to Health-Based Approach to Dental Caries: Toward a Comprehensive Control Strategy

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Keywords
Human rights law · Dental caries · Dental public health · Prevention · The right to health

Abstract
Background: Health is a matter of human rights, and dental caries is the most common noncommunicable disease globally. Consequently, dental caries is a matter of human rights and its control, particularly prevention, must be a priority. Although largely preventable, this is too often neglected, both in the literature of human rights and health law, and in dental research. The right to oral health has recently been acknowledged by the World Health Organization (WHO), but it is insufficiently clear what this right entails. ***Summary:*** This article introduces a right to health-based narrative in the context of dental caries. The right to health is stipulated in human rights treaties, including the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the Convention on the Rights of the Child (CRC). States that are parties to these treaties, which are virtually all States globally, are mandated to ensure the enjoyment of individuals' right to the highest attainable standard of health, including oral health. ***Key Messages:*** Dental caries is a matter of human rights. States have binding obligations to address dental caries: they require the regulation of the healthcare system, i.e., the traditional focus on operative care, but also put the regulation of other risk factors on an equal footing, such as the regulation of the living environment and access to fluoride. A right to health-based approach to dental caries thus offers a comprehensive approach to dental caries control, particularly prevention.

Introduction

Poor oral health is a matter of major concern: 3.5 billion people suffer from oral diseases globally [1]. More particularly, dental caries, a largely preventable condition, is the most common health condition worldwide, with approximately 2 billion persons suffering from caries of their permanent teeth, with most untreated [1]. Children are not spared from this condition, with 520 million children suffering from caries of their primary teeth [1].

Dental caries is a multifactorial noncommunicable disease (NCD). It is largely caused by modifiable,

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behavioral risk factors, including dietary factors, and it disproportionately affects persons of lower socioeconomic status [1]. As the vast majority of individuals are exposed to so-called food environments that predispose them to unhealthy food choices [2],[1] it is important to supplement individual responsibility. Food environments are created by commercial drivers, rather than the objective to improve health [4–6]. The current focus on individual intervention and the lack of a focus on prevention policies at the population level exacerbate existing inequalities. Preventive policies at the population level are necessary to protect all individuals. Dental researchers have also recognized the need for a government-led strategy and submitted that it is "time for radical action" and that protecting oral health goes "beyond the chair" [7, 8]. The momentum for change is current, as the first global strategy on oral health has been adopted by the WHO in May 2022, underlining the need for upstream policies on oral health protection [9, 10].

Comprehensive disease control at population level, which consists of risk factor regulation and secondary prevention, is essential to protect the most vulnerable persons in society effectively from poor oral health and the experience of, among other conditions, dental caries. Human rights law, a body of law that has at its core the protection of human dignity, has proven to be a powerful tool in informing public health and prevention policies, for instance, in the area of tobacco control [11, 12]. Unfortunately, the concept of oral health as a matter of human rights (law) and the right to oral health itself have been little researched and developed [13, 14].

This article introduces a simplified framework of how the right to health requires the adoption of a more comprehensive prevention strategy to address dental caries, including not only dental care attendance, but also sugar consumption, fluoride exposure, and oral health literacy.[2] This framework is a simplification in the sense that the right to health is taken as the core of the analysis, whereas the right to oral health in its complete form is connected to numerous other rights, such as the right to adequate nutrition and the child's right to life, survival, and development. The paper first introduces human rights law; then, the basics of the right to health are explained further. Finally, the article aims to clarify how a right to health-based approach to dental caries informs a comprehensive prevention strategy that stretches beyond oral healthcare. Besides secondary prevention, i.e., access to healthcare and mitigating the consequences of caries experience, the right to health prescribes States to ensure primary prevention and address other risk factors reducing the development of dental caries.

What Is Human Rights Law?

Human rights are stipulated in human rights treaties (for clarification of legal terms, consult the glossary in Table 1): international "contracts" among States that create obligations for States vis-à-vis individuals [15]. These treaties mandate governments to protect and promote a number of rights, including the right to health. Besides the fact that the treaties and the standards they prescribe are legally binding to the States parties, they also have strong moral value, as all human rights "derive from the inherent dignity of the human person," the protection of which is also a core objective of human rights [16, 17].

Under the United Nations (UN) system, a total of nine binding human rights instruments exist [18, 19]. Of these treaties, two are general in nature and award rights to all individuals, namely, the International Covenant on Civil and Political Rights (ICCPR) and the International Covenant on Economic, Social and Cultural Rights (ICESCR) [16, 20]. Additionally, the other seven cover distinct themes or provide special protection for vulnerable groups, such as the UN Convention on the Rights of the Child (CRC) [21].

Human rights treaties do not stipulate concrete standards, but rather provide broadly phrased standards. Such broadly phrased norms are consequently interpreted by the treaty bodies that are authorized, among other competences, to produce authoritative guidance on the content of and obligations arising from these provisions, in so-called General Comments [22]. The treaty bodies thereby clarify the norms prescribed and offer guidance for the implementation into the prevailing national circumstances. General Comments sometimes concretize measures to be taken, but may also require States to rely on international standards, such as those set by specialized international organizations including the WHO [23].

Although there are concerns about a lack of implementation and enforcement of socioeconomic rights, a rights-based approach to health and NCD prevention

[1]Food environments are defined as "the physical, economic, political, and sociocultural context in which consumers engage with the food system to make decisions on acquiring, preparing, and consuming food" [3].

[2]Importantly, the development of a right to health-based approach and narrative is also relevant for other oral diseases, such as periodontal disease, oral cancer, and Noma. This, however, falls outside the scope of the present review and should be subject of subsequent studies.

Table 1. Glossary: legal terms relevant for the paper, explained by the authors

Term	Explanation
Core rights	The minimum core content of rights that must be protected to guarantee the right. They can be found, among other places, in General Comments
Core obligations	The States' obligations to protect the minimum core content to ensure the enjoyment of a right. They can be found, among other places, in General Comments
General Comments	Document in which treaty bodies interpret, among other things, specific rights. These documents are highly authoritative in the interpretation of right, but they are not binding
Guiding principles	Concepts or frameworks that guide the proper implementation of (components of) rights. They can be found, among other places, in General Comments
Interference with a right	Limitation of a right, which does not necessarily amount to a violation
ICESCR	Treaty stipulating generally applicable economic, social, and cultural rights, including the right to health
Participation	Principle of human rights law that prescribes the right for all persons to be involved in decision-making processes that affect them
Policy recommendations	Nonbinding recommendations for policies to adopt
Progressive realization	Concept that acknowledges difficulties and limitations of implementing socioeconomic rights and requires the content of rights beyond their core to be implemented continuously and effectively, but not necessarily immediately
Rights	Rights are stipulated in human rights treaties and apply to all persons that fall within the scope of the treaty
Rights-based approach	An approach to (societal) matters that is normatively based on human rights law and aims to promote and protect human rights
Socioeconomic rights	Human rights that refer to social and economic conditions that are necessary to ensure human dignity and sustainable lives
Standard	Rules set by human rights treaties
Treaty	A legally binding agreement between two or more countries, governed by international law
Treaty bodies	Bodies endowed with competences to interpret the content of human rights treaties
Tripartite division of obligations	Categorization of human rights obligations, divided into obligations to respect, protect, and fulfill. This division also exists for the obligations under the right to health
UN CRC	Widely accepted treaty that stipulates the rights of children, including the right to health

strategies offers several advantages. The legally binding nature of human rights law adds weight to health as a value: the right to health as stipulated in human rights treaties establishes legally binding standards, rather than a set of nonbinding policy recommendations for States to adopt [24]. Moreover, human rights law offers a strong accountability mechanism for States to take measures [24, 25]. As participation is one of the key principles of human rights law, a rights-based approach also emphasizes the role of civil society organizations in policy-making processes, thereby enhancing policy outcomes [24, 25]. Furthermore, in a world where commercial and economic interests tend to prevail, human rights law offers a stronger response in favor of human dignity [25]. Finally, if governments or third parties continue to act in breach with human rights, this breach can provide grounds for strategic litigation in some jurisdictions [26, 27].

What Does the Right to Health Entail?

The right to the highest attainable standard of health lies at the base of framing oral health as a matter of human rights and children's rights. Both the ICESCR and the CRC stipulate this right, in Articles 12 and 24, respectively [16, 21]. The ICESCR specifies that the right to health covers both physical and mental health [16]. Given

that oral health forms an integral part of general health and is inherently connected to general health [28, 29], it is clear that the rights and obligations arising from the right to health apply to the specific context of oral health [14].

The right to health qualifies as a socioeconomic right, the reason for which the ICESCR is an important source substantiating the argument conveyed in the present article. The CRC is a pertinent treaty to rely on as well, as a children's rights approach to oral health is pivotal in framing oral health as a human rights matter. In fact, such an approach should be awarded particular importance in the discourse on dental caries and oral health inequalities, as children are considered a vulnerable group when it comes to dental caries [30]. In addition to this, patterns established in childhood are constitutive for a person's later life and the consequences of poor child oral health do not end at adolescence [11, 31]. The consequences are rather serious and far-reaching: there are clear intergenerational as well as intragenerational links related to poor child oral health given the persistence of habits established in childhood [31]. In practice, this means that not only are children with high caries experience more likely to be at increased risk of dental caries in their later lives themselves, but they also have a higher chance of vicariously passing this risk on to their own children via socio-behavioral factors [32]. Besides substantive reasons to base the analysis on the CRC, it also offers a strong accountability tool: with 196 States having signed the CRC, it is the most widely accepted treaty [33]. Additionally, children's rights strategies are firmly rooted in policy-making processes, including at the European Union level [34]. These facts strongly emphasize the moral and universal value and weight of the CRC's norms.

It is important to emphasize that the right to health has a dual structure and extends to both the provision of healthcare and the underlying determinants of health [35]. This means that beyond the provision of healthcare, States must also ensure, among other things, the provision of adequately nutritious food, as well as circumstances in which all individuals and communities can enjoy their right to health [35]. In this regard, the right to health includes the right to the prevention of diseases [16, 21, 35]. In order to ensure this right, States must put in place disease prevention programs and promote the social determinants of good health [35].

As indicated above, the right to health is a socioeconomic right. A characteristic of socioeconomic rights is that, besides prescribing so-called core obligations for States, the majority of the obligations arising from such rights are "to be realized progressively" [35]. The core obligations prescribe minimum obligations "to ensure the satisfaction of [. . .] minimum essential levels of each of the rights" incumbent upon the parties and thereby protect the essential elements providing the substantive significance to each right [36–38]. Beyond the core obligations, the concept of progressive realization embodies the "recognition of the fact that realization of all economic, social and cultural rights will generally not be able to be achieved in a short period of time" [36]. Progressive realization therefore implies that the right does not prescribe static obligations, but it acknowledges restraints of limited available resources [35]. This shapes rather "tailor-made" obligations for States: the precise content of the right to health is adaptable to the existing circumstances in the State concerned in combination with the availability of resources [35].

It is important to emphasize that the progressive realization of the right to health does not reduce the meaningful content of obligations [35]. Unwillingness to invest resources is not in accordance with the progressive realization of the right to health [35]. Rather, States "have a specific and continuing obligation to move as expeditiously and effectively as possible toward the full realization of the right to the highest attainable standard of health" [35]. Progressive realization can thus be interpreted to be "an *immediate* obligation, although *full* implementation will be progressive" [39, 40]. In concrete terms, this means that States must take immediate action to fulfill the core obligations under the right to health, but that such action should not be limited to this. Rather, efforts must be continuous in the sense that they adapt to changing circumstances [35].

An important guiding principle that translates the prescribed rights, and corresponding State obligations, into concrete standards or benchmarks is the so-called AAAQ framework, requiring the availability, accessibility, acceptability, and quality of health facilities, goods, and services [35]. This generic framework applies to all components of which the right to health consists, thus covering not only the provision of healthcare, but also the social determinants of health, which underlie the observed social gradients in diseases, including dental caries, and health determinants, such as consumption of unhealthy food and overall nutrition [35]. The AAAQ framework helps concretize the standards set in human rights treaties as it offers guidance to determine the adequate implementation of the right to health in light of the particular conditions prevailing in States [35]. In order to determine the benchmark for the implementation of the right to health, health facilities, goods, and services must be available sufficiently,

depending on, among other things, the level of development of States [35]. Second, such facilities, goods, and services must be physically and economically accessible in a nondiscriminatory fashion [35]. Third, they must be acceptable in terms of medical ethics, cultural factors, confidentiality and must improve health outcomes [35]. Finally, these facilities, goods, and services must be of scientifically and medically appropriate quality [35]. Altogether, the AAAQ framework offers a comprehensive structure emphasizing States' obligations to ensure favorable circumstances, thereby bypassing individual responsibility.

What Should States Do to Ensure the Enjoyment of the Right to Health in the Context of Dental Caries?

The framework of the right to health is particularly relevant in the context of dental caries. The common prevalence of a largely preventable NCD, in this case dental caries, is per definition an interference with individuals' enjoyment of the right to health and a limiting factor to the full realization of the right to health [35]. This is especially the case when the risk factors are related to behavioral factors, which are strongly influenced by contexts that can be regulated by States [35]. The fact that (untreated) dental caries remains the most common NCD globally, while it is largely preventable, demonstrates that individual responsibility, including for healthy behaviors and seeking (oral) healthcare, should be supplemented. Human rights law, and particularly the right to health, offers a suitable framework for this and mandates States to adopt government measures when individuals are unable to fully enjoy their rights, including the right to health, in prevailing circumstances. Substantively, it complements obligations concerning the provision and access to healthcare facilities with obligations to address an enabling living environment and regulation of industries that promote the consumption of unhealthy foods, such as those high in free sugars.

In setting obligations, the right to health provides States with a framework for implementation. Besides guiding principles such as the AAAQ framework introduced above, the obligations arising from the right to health are interpreted along the lines of three categories of legal obligations: the obligations to respect, protect, and fulfill. The obligation to respect entails a negative obligation for States, i.e., an obligation not to interfere with individuals' enjoyment of rights. The obligation to protect requires States to protect individuals from third parties that may interfere with their rights. Finally, the obligation to fulfill mandates States to create an environment that stimulates the enjoyment of rights [35].

In the remainder of this section, the tripartite division of obligations serves as the framework under which we analyze a right to health-based approach to dental caries. These categories of legal obligations are supplemented with guiding principles of human rights law, and their interpretation is guided by the authoritative General Comments on the right to health. Accordingly, CESCR General Comment No. 14 on the right to health under the ICESCR and General Comment No. 15 by the Committee on the Rights of the Child on the CRC's right to health (i.e., the child's right to health) constitute the base of guidance for interpretation [35, 40]. To ensure a good flow of analysis, we first discuss the obligations to respect and fulfill, and then move to the obligation to protect.

The Obligation to Respect

Interpreting the three types of obligations under the right to health in light of the current state of regulation in most States, the obligation to respect is rather straightforward and does not require (much) further discussion: States should not interfere with individuals' enjoyment of the right to health, by restricting access to, for instance, (available) oral healthcare facilities or oral hygiene products [35]. This (also) includes that available care should be provided in a nondiscriminatory fashion, which means that the State cannot adopt laws restricting healthcare or medication for certain groups or individuals [35].

The Obligation to Fulfill

The obligation to fulfill the right to health mandates States to recognize the right to health in domestic laws and policies [35]. It is subdivided into three obligations, namely, the obligation to *facilitate* individuals' enjoyment of the right to health; the obligation to *provide* the enjoyment of a right when individuals are unable to do so by themselves; and the obligation to *promote* the right via "actions that create, maintain, and restore" health [35]. The obligation to fulfill the right to health thus prescribes that States must create a domestic context in which all individuals can enjoy their rights. It requires States to adopt positive measures enabling individuals to enjoy their rights, facilitate and promote rights among individuals, and provide them with the required means to make use of their rights [35]. Substantively, this means that States must ensure that oral healthcare facilities meet the AAAQ standard, but it also extends to broader, programmatic obligations that facilitate the prevention of NCDs.

The obligation to fulfill requires States to develop a national health policy and establish a healthcare system [35]. The healthcare system must be in accordance with the AAAQ standards, and the obligation to fulfill provides additional guidance as to how this can be ensured. To guarantee adequate quality of care, States must ensure that medical personnel is skilled and it is the State's core obligation to provide for appropriate training and education [35]. Another core "to fulfill" obligation entails ensuring the nondiscriminatory access to health facilities for all [35]. In this vein, States must safeguard the physical accessibility of oral healthcare facilities by ensuring that enough clinics are available and that they are equally distributed throughout the territory [35]. Finally, to ensure the economic availability of oral healthcare facilities, States must establish a healthcare insurance system; such a system may be public, private, or mixed, but must be "affordable for all" [35].

In addition to this, the obligation to fulfill encompasses the duty to ensure access to essential medicines. This obligation qualifies as a core obligation, and noncompliance is therefore in breach of the right to health. This is particularly relevant in the context of dental caries, given that fluoride has been added to the WHO Model List of Essential Medicines, as well as the WHO Model List of Essential Medicines for Children in 2021 [41, 42]. Accordingly, with this newly acquired status of an essential medicine, the right to health mandates States to ensure the availability of fluoride [35]. The recent elevation of the status of fluoride as an essential medicine, and therefore as part of the core of the right to health, indicates the pertinence of good oral health as a component of the right to health, as well as the importance of preventive practices.

In addition to ensuring access to healthcare and essential medicines, the obligation to fulfill the right to health also concerns enabling individuals to enjoy their right to health through informing and assisting [35]. This dimension is especially relevant when it comes to individuals' interaction with the (food) environment. Enabling individuals to achieve their fullest health potential has been recognized as a key concept in health promotion [43]. The concept focuses on capacitating individuals to be in charge of factors that determine their health outcomes through, for example, an environment that supports healthy options [43].

Connecting this to the State obligations under the right to health, States have a core obligation to "ensure access to the minimum essential food which is nutritionally adequate and safe" [35]. In addition, the dissemination of information concerning health problems and methods of prevention also qualifies as a core obligation [35]. An example of a positive measure in line with the obligation to fulfill the right to health is building (oral) health literacy, thereby enabling individuals to make informed oral health decisions and enhancing health outcomes after treatment [35]. This is particularly relevant for child oral health, given that parental oral health literacy can be associated with caries experience in their children's teeth [44]. Similarly, the obligation to fulfill the right to health mandates States to "(disseminate) appropriate information relating to healthy lifestyles (and nutrition)" [35]. Accordingly, this could, among other things, require States to adopt educational measures on oral health and hygiene, although evidential support on the effectiveness of such measures remains limited [45]. Besides enabling individuals directly, the obligation to fulfill furthermore mandates States to foster research that can further positive health outcomes [35]. Although not explicitly listed in the General Comments, other policies that may be adopted in light of the obligation to fulfill include those that create a supportive environment in which consumers are informed about their choices, including labeling requirements for food products and food procurement policies favoring healthy options for public institutions.

The Obligation to Protect

The obligation to protect proves to be of particular importance in framing a right to health-based approach in the context of dental caries. This obligation requires States to protect individuals from interferences with their right to health by third parties [35, 46, 47]. The Committee on the Rights of the Child interprets this obligation to include the protection from "both freedoms and entitlements from third parties or from social or environmental threats" [40]. More concretely, this can thus be interpreted to mean that States must protect individuals from, among other things, harmful medical practices by third parties or marketing practices by businesses.

This obligation is, however, not unlimited, as it cannot be interpreted to oblige States to protect individuals "against every possible cause of human ill health" including the adoption of unhealthy lifestyles [35]. Nevertheless, it is clear that in some circumstances the obligation to protect requires direct regulation and intervention to protect public health and prevent the occurrence of NCDs [35, 40]. The phrasings adopted by both the CESCR and the Committee on the Rights of the Child indicate that the obligation extends to protecting individuals from actors that create environments that

Table 2. Illustrative representation of the simplified framework of State obligations under the right to health in the context of dental caries

Obligations	Dimensions	Illustrations
Obligation to respect	Refrain from interfering with the enjoyment of the right to health	Refrain from restricting access to oral healthcare facilities, services, and goods Refrain from adopting discriminatory laws restricting oral healthcare facilities, services, and goods
Obligation to fulfill	Establish a national healthcare system	Ensure medical personnel is skilled Ensure nondiscriminatory access to health facilities for all Establish a healthcare insurance system affordable for all
	Ensure access to essential medicines	Ensure access to fluoride
	Enabling individuals to enjoy their right to health (underlying determinants of health)	Ensure access to nutritionally safe food Dissemination of information concerning (oral) health, favourable (oral) health practices, healthy lifestyles and disease prevention
Obligation to protect	Protect individuals' access to oral healthcare from actors in privately regulated oral healthcare systems	Ensure that the provision of (privately provided) health facilities and services is based on the principle of equity and affordable for all Provide necessary health insurances, especially to protect the equal treatment of those lacking economic access to health facilities
	Protect individuals from harmful marketing practices	Regulating the marketing of harmful substances When it comes to children, appropriate protection may amount to an outright prohibition of unhealthy food advertising

predispose the adoption of unhealthy lifestyles, such as food and beverages industries, and actors that can greatly influence individual health decisions, such as private healthcare facilities and insurance schemes [35, 40, 47]. The analysis below considers two relevant dimensions in the caries prevention discourse under the obligation to protect: first, individuals' (equal) access to oral healthcare services provided by third parties must be ensured, and secondly, they must be protected from certain marketing practices of food and beverages business operators creating a "cariogenic living environment."

First, the obligation to protect is of relevance in the context of the oral healthcare system. States have an obligation to ensure that all individuals, including vulnerable groups, have equal access to healthcare and health-related services provided by third parties [35]. Under the obligation to protect, States are mandated to ensure that the so-called AAAQ of care is realized in the case of health sector privatization [35]. Particularly, States must ensure equal access to healthcare facilities for all, including marginalized groups [35]. For instance, in cases of denial of access to dental healthcare for HIV-infected patients or hesitant attitudes among dentists to treat HIV-infected patients [46, 48, 50], the State must protect such patients. It must do so by regulating third parties that can limit equal access to oral healthcare, ensuring access to oral healthcare for all [35].

The obligation to protect is particularly relevant in light of the existing oral healthcare financing and care models that are known for their private nature. A recent publication by the European Observatory on Health Systems and Policies on the financing of, access to, and provision of oral healthcare in 22 European countries demonstrates that, on average, the oral healthcare system, largely run by private healthcare providers, is 68% funded by private spending, namely, voluntary health insurance premiums and out-of-pocket payments, making it the most privately funded area of healthcare providers [49]. This comes with serious potential consequences: dental attendance appears to be lower in States with non-publicly funded oral healthcare systems, and unmet oral health needs are higher in States where oral healthcare is not covered by any sort of insurance [49]. Additionally, in most States a large gap exists between the rates of unmet oral healthcare needs caused by financial reasons among individuals with the lowest incomes (22 percent) and the highest incomes (7 percent), a gap that is significantly larger than the same gaps in publicly regulated areas of healthcare, such as medical care and prescribed medicines [49]. As oral health is an integral

component of health, these statistics indicate that the right to access to health facilities, a core right, is not met when it comes to oral healthcare. States retain responsibility for realizing healthcare services as a core obligation of the right to health, even when services are provided privately.

In fact, the above circumstances trigger State obligations under the principles of accessibility to health facilities and equal treatment. The principle of accessibility under the AAAQ contains an economic component: the provision of all health facilities and services, whether they are publicly or privately provided, must be based on the principle of equity and must be affordable for all [35]. Remarkably, especially against the backdrop of the limited coverage of oral healthcare in most national health systems, in order to protect the equal treatment of those lacking economic access to health facilities and services, States have a special obligation to provide necessary health insurances [35]. In other words, this obligation implies that States remain ultimately responsible for realizing the right to health, irrespective of whether the services are provided publicly or privately: healthcare privatization does not remove the State's responsibility. Connecting this to the prevailing domestic contexts of oral health inequalities and unmet needs as indicated by Winkelman et al., the obligation to protect the right to health requires States to ensure equal access to healthcare services, including oral healthcare services.

Additionally, the marketing of food products high in free sugars can contribute to the creation of a cariogenic environment [51, 52, 53, 54]. By cariogenic environment, we do not refer to the oral environment, but rather to the larger social and food environment in which cariogenic foods are widely promoted, readily available, easily accessible, and socially embedded in daily life. States have an obligation to protect individuals from this [35]. In fact, the CESCR has qualified as a violation of the obligation to protect the right to health:

"[. . .] the failure to protect consumers [. . .] from practices detrimental to health, [. . .] [and] the failure to discourage [. . .] marketing, and consumption of [. . .] harmful substances" [35].

For States to fulfill their obligations under the right to health, they must protect individuals from marketing strategies and adopt national policies regulating the marketing of harmful substances, which could be interpreted to include foods high in sugars [55]. This obligation has been phrased more explicitly when it comes to marketing aimed at children. In this context, it has even been submitted that appropriate protection in such cases may amount to an outright prohibition of advertising stimulating children to consume foods high in sugars, sodium, and saturated fats [55].

Conclusion

The WHO has recognized that "[a]chieving the highest attainable standard of oral health is a fundamental right of every human being" [58]. This status is undisputed: oral health clearly is a matter of human dignity and, therefore, a matter of human rights. However, what the right to oral health requires in practice remains unspecified by human rights bodies and under-researched in the literature. The above analysis has signaled the relevant dimensions of the right to health, the most fundamental right in the area of public health, and identified the legal rights and obligations resulting from this in the context of dental caries. Based on this identification, multiple facets of legal obligations for States to adopt action have been signaled. Given that dental caries is largely preventable through behavioral modifications and scientific findings clearly point out that living environments drive individuals' behavior, prevention measures at the population level incorporating the underlying determinants to enable all people to make healthier choices are necessary.

The simplified model of the obligations under the right to oral health in the context of dental caries introduced in this paper is shown schematically in Table 2. The model illustrates how a right to health-based approach requires a comprehensive prevention strategy to address dental caries. The human rights General Comments analyzed point out that, besides measures related to access to oral healthcare, the adoption of measures addressing the underlying determinants of health, i.e., a more comprehensive prevention strategy, is necessary. However, they do not list concrete measures besides the regulation of the marketing and advertising of unhealthy food products including those high in free sugars, particularly to children, as well as ensuring access to fluoride. Recommendations by the WHO, such as the upcoming Best Buys in oral health [59, 60], and previous studies can supplement the General Comments here. Previous research suggests, among other measures, the adoption of a combination of measures, including sugar taxes, food reformulation, food labeling, as well as educational programs [8, 61].

Given the alarming statistics and the increased attention for oral health, it is time to no longer ignore the right to oral health on the agenda, advocate for upstream policies, and bring the discourse to a multidisciplinary platform and audience. It is time to recognize that oral health, and particularly the prevention of dental caries, is a matter of human rights.

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The authors declare that they have no competing interests.

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Author Contributions

All authors contributed to the conception of this work. Dominique Mollet drafted the manuscript and was responsible for the design and analysis. David Manton, Jan Wollgast, and Brigit Toebes contributed to the structure and revised the manuscript critically.

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