



Understanding oral health disparities in children as a global public health issue: how dental health professionals can make a difference

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Abstract

Oral disease in children is an urgent public health issue worldwide. Early childhood caries (ECC) affects 600 million children globally, yet it is entirely preventable. Dental health professionals around the world need to act to improve use of measures to prevent ECC and of quality dental health care to improve oral health worldwide. The University of California/Los Angeles (UCLA) Center for Children's Oral Health hosted an interprofessional innovation forum to discuss and recommend options. We present the policy, educational, and public health-related suggestions for improving outcomes and professional collaboration and five key areas for action: (1) increase advocacy efforts, (2) support interprofessional education and practice, (3) promote oral health education and increase health literacy, (4) increase collaboration with community and school-based oral health care workers, and (5) use of technology to increase access to dental care and health information.

Keywords Early childhood caries · Oral health disparities · Advocacy · Interprofessional education · Oral health education

Oral disease in children is an urgent public health issue worldwide. Early childhood caries (ECC) affects 600 million children globally, yet it is entirely preventable [1]. When left untreated, ECC can lead to pain and infection as well as to difficulty in eating, speaking, and learning—with detrimental and long ranging effects on cognitive development, school readiness, self-esteem, and lead to a diminished quality of life [1, 2].

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A systematic review of 72 studies worldwide showed the prevalence of ECC in children 4 years of age ranged from 12 to 98% [1]. In the United States (US), 23% of children between 2 and 5 years of age have ECC, and 80% percent of dental disease (including ECC) is concentrated in just 20–25% of the country’s children, primarily those of low socioeconomic and/or minority racial/ethnic backgrounds (African-Americans and Latinos are the largest racial/ethnic minority populations in the US) [3–5]. Oral health disparities are universal [6]. A comprehensive review of studies from North America, Europe, Asia, Africa, and the Middle East showed the prevalence of ECC in socio-economically disadvantaged groups as high as 70% [7].

According to a recent news release by *The Lancet*, dentistry is in crisis worldwide. “Current dental care and public health responses have been largely inadequate, inequitable and costly, leaving billions of people without access to even basic oral health care” [8]. In high-resource countries, dentistry increasingly focuses on technology and emphasizes treatment over prevention, thus failing to address the underlying causes of oral disease. In middle-resource countries, the considerable burden of oral disease occurs where oral health care systems are often underdeveloped and unaffordable to most people. The situation is most bleak in low-resource countries where basic dental care is unavailable and most oral disease remains untreated [8].

Dental health professionals around the world need to act to increase preventive oral health knowledge among parents/caregivers, improve availability and affordability of quality dental health care, and strengthen the interprofessional healthcare workforce (specifically among dentists, pediatricians, and other primary care providers) to help close the gap between dental healthcare and medical healthcare [8].

The World Health Organization (WHO) has the following key recommendations and policies for public health intervention against ECC worldwide:

- (1) implementing a sugar tax on sugar-sweetened drinks and food,
- (2) promoting water fluoridation or use of other fluoridated dental products in countries/areas with non-fluoridated water,
- (3) implementing oral hygiene measures/policies no later than the time of eruption of the first primary tooth (such as mandatory tooth-brushing performed for children by a parent twice daily using the correct amount of fluoride-containing toothpaste [1000–1500 ppm] in all children under the age of 6), and
- (4) integrating ECC prevention using an IPE approach [9, 10].

While many countries, and states within them, have successfully implemented these policies and recommendations, dental and medical health professionals, public health practitioners, and policy makers need to take further action to ensure implementation of these recommendations and policies worldwide to help prevent and control ECC.

The University of California/Los Angeles (UCLA) Center for Children’s Oral Health hosted a 2-day interprofessional innovation forum in 2018 to: (1) discuss how to expand the implementation of currently recommended ECC-related oral health policies and programs to meet the needs of all children worldwide, and (2) propose and recommend strategies, public health policy suggestions,



and systems-change approaches for delivery of oral health care focused on ECC through a lens of social justice, health equity, and human rights that would be relevant to children in both US and non-US countries.

Societal systemic factors affecting oral health equity, social justice, and human rights may, for example, include government policies and social and structural influences that foster continuation of privilege for some and discrimination for others based on such characteristics as race and ethnicity, economic status, gender, age, and physical disabilities or behavioral and emotional difficulties. At the individual and family levels, childhood difficulty with speech, attention problems in school, negative social interactions, or lack of social relationships that result from poor oral health can have lifelong impact. Addressing societal forces can have a positive impact on those systemic factors affecting an individual's oral health in addition to overall health [11]. Viewing ECC through a lens of social justice, health equity, and human rights will help providers, public health practitioners, and policy makers target actions consistent with the infrastructure capacity and current oral health situation of the populations they serve to ensure basic oral health-prevention and care for all children [12–14].

The forum attracted close to 200 interdisciplinary and interprofessional attendees representing the US, Asia (Japan, Vietnam), the Middle East (Saudi Arabia), and Latin America. The chief economist and vice president for the American Dental Association's (ADA) Health Policy Institute presented the keynote speech. Additional presenters included the executive director of the ADA (the nation's largest dental association and strong advocate for public health in the US), the dental director from the state of California and Los Angeles-based political representatives. The morning session of the forum's first day focused on the importance of building a multi-cultural movement for oral health equity, and how to transform dentistry from focusing on volume to value-based care where reimbursement to providers is based on the quality of care they provide to patients. We devoted the afternoon to breakout sessions of the following five topics:

- (1) financial issues about ECC,
- (2) policy developments for ECC prevention,
- (3) diversity issues in the dental workforce,
- (4) access to care (defined as the timely use of personal health services to achieve the best outcomes) [15] and barriers to care, and
- (5) emerging technologies for future population and patient-based preventive care and restorative treatments.

Each breakout session had a moderator and 12–15 participants who were experts in their topic areas. After introducing the topics, moderators asked the experts to discuss 3–5 questions. Each moderator had an easel on which to display the thoughts and ideas of the experts in their breakout session. UCLA dental students and staff took notes.

The Center opened the second day of the forum to the public including UCLA students, residents, fellows, and many community partners representing non-profit



organizations advocating for children’s oral health. Participants explored topics pertaining to the importance of advocating for population-based policies and solutions for prevention of ECC, the importance of oral health equity and social justice worldwide, integrating oral health into overall health care through interprofessional collaboration and the use of community-based oral health care workers, and the state of dental insurance and children’s oral health issues. The afternoon featured a panel discussion based on a summary from the breakout sessions from both days of the forum—and led to the creation of a strategic plan for improving children’s oral health locally, nationally, and internationally.

Below, we highlight five key areas from the strategic plan for action where dental professionals can play a role in reducing oral health disparities and promoting social justice, health equity, and human rights in oral health and ECC prevention for children and underserved populations worldwide. As not all policies and recommendations discussed below can be applied in every country due to differences in infrastructure and variations in oral health systems and human resources, we provide context for where and how different approaches can be applied under each of the five key areas below [9].

The path forward: how dental professionals can take action

Increase advocacy efforts

Dental schools, residency programs and professional dental practices and clinics should encourage dental care providers to reach out and partner with local government; schools, universities and research institutions; non-governmental organizations (NGO’s) and other civil society organizations. They can promote and advocate for population-based policies such as fluoridation of public water supplies (considered by the American Dental Association to be the single most effective public health measure to help prevent tooth decay) [16], a tax on sugary drinks to help reduce sugar consumption [15], and ‘mandatory’ age-one dental care visits (a crucial first step in the prevention of ECC).

Fluoridation of public water supplies

The ADA, the United States Public Health Service (USPHS), the American Academy of Pediatrics (AAP), and WHO, among many other national and international organizations, endorse community water fluoridation [9, 10, 17, 18]. Currently, water fluoridation provision reaches about 66% of US residents, 38% of Canadian residents, and only 3% of European residents [19]. Despite the vast number of European countries that do not fluoridate their water, tooth decay rates are no higher than in countries (such as the US) that do so [20]. In countries or areas with non-fluoridated public drinking water supplies, children can get the recommended daily fluoride intake from fluoridated dental products including toothpastes, mouth rinses, fluoride gels, fluoride varnishes, and fluoride supplements (including fluoride tablets,



drops or lozenges) [21]. Only children living in non-fluoridated areas or those who drink only non-fluoridated bottled water should receive fluoride supplements as overexposure to fluoride may result in ‘fluorosis’ (discoloration or mottling of teeth) [9, 10, 17, 18]. Most children take in the recommended fluoride through a combination of fluoridated water (or supplements if in an area with a non-fluoridated water supply) and fluoridated toothpaste [18].

Sugar tax

Sugar consumption, the primary underlying cause of dental caries, is rising rapidly worldwide [1, 8]. While the consumption of sugary drinks (soft drinks or soda, sports drinks, fruit juices) is highest in high-resource countries, growth in sales of sugary drinks in many low- and middle-resource countries is substantial [8]. Countries will need tighter regulation and legislation to restrict marketing by and influence of the sugar industry to tackle the root causes of ECC and oral disease [8]. To date, 28 countries have introduced a sugar tax on food and drinks [15]. In the US, 34 states have implemented sugar taxes or similar measures. In Mexico, a study found a 5% drop in sales of sugary drinks after the first year of the tax followed by a 9% drop in the second year. Saudi Arabia and the United Arab Emirates introduced the highest sugar taxes to date of all gulf countries in the Middle East (50% on soda and 100% of energy drinks in the United Arab Emirates) [15].

Mandatory age 1 dental care visit

The American Academy of Pediatric Dentistry (AAPD) and WHO recommend a child see a dental provider by age 1 or within 6 months after the first tooth erupts. ‘Primary’ teeth (or ‘baby’ teeth) typically begin growing between 6–8 months of age. According to the AAPD, “it is very important to keep primary teeth in place until they are lost naturally.” Primary teeth help children chew properly to maintain good nutrition, contribute to speech development, and help save space for permanent teeth, among other attributes [9, 10, 22].

Other suggested advocacy efforts

Forum participants also discussed other advocacy efforts including improving availability of healthy foods by incentivizing retail outlets to sell them in low-income neighborhoods through tax credits and rebates, implementing healthy vending machine policies, and enacting laws to restrict advertising for unhealthy and highly processed foods [23].

Support interprofessional education and practice (IPE/IPP)

IPE/IPP is a strategy for mitigating the global health workforce crisis due to increased health care costs and shortages of health care workers [24]. IPE is defined as an educational activity designed and implemented around the world to enhance



attitudes, knowledge, skills and behaviors for collaborative practice [24–26]. IPE occurs when health care workers from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes [27, 28]. IPE programs have been implemented worldwide and vary substantially by country [24]. Several dental schools in the US, Canada and Europe have incorporated IPE into their existing curricula and dental programs [24, 28, 29]. Most of these IPE dental programs collaborate with medical, nursing, pharmacy, public health, and social work students. Results of research on interprofessional oral health programs in the US, Canada, Australia, and European countries with IPE programs report positive findings regarding the benefit of IPE programs regarding team work and have shown improvements in primary care providers' oral health knowledge and increased confidence for providing oral health care services to children [29–34]. A few studies in the US showed little or no improvement in oral health-related knowledge and skills among primary care providers [35, 36]. Forum committee members stressed the importance of continued support for IPE/IPP and encouraged collaborative practice between dental, medical, and other pediatric primary care and social service providers as this will be critical to increasing utilization of oral health care services for children in both high-resource and lower resource countries [31, 37, 38].

Promote oral health education and increase oral health literacy

Oral health literacy is defined as the capacity to acquire, process, comprehend and act upon basic oral health information. Most oral health literacy research comes out of the US. These studies have shown an association between low levels of oral health literacy and decreased utilization of preventive dental services and poor oral health outcomes [39–43]. Additionally, there are substantial dental public health implications surrounding oral health literacy. Populations unable to access dental care should be able to easily obtain educational materials regarding preventive dental care that are easy to understand and use. The information should focus on the risk factors and preventive strategies for oral disease and be culturally and linguistically competent [42].

Dental and pediatric primary care providers and community health care workers should be encouraged by residency programs, hospitals and clinics, and NGOs to disseminate oral health information to schools as well as civil, religious, and social service organizations outside of their dental practices. For example, dentists in Peru use mobile dental clinics in poor communities on the outskirts of its Capital (Lima) to educate families about how to maintain proper hygiene in addition to providing restorative procedures. The educational component of the mobile clinics helps to empower communities to take oral health care into their own hands [44].

In South Africa, dental students and nurses use mobile vans in rural areas of South Africa to educate individuals on oral health care and provide treatment as well [45]. A program in India trains primary health care workers to teach oral health care to children and mothers in rural areas using simple and culturally competent educational materials, lectures, slide presentations and flip charts [45].



Increase collaboration with community and school-based oral health care workers

The community health worker (CHW) model has been used worldwide to help increase availability of and access to health care services, especially among hard-to-reach populations. CHWs are selected based on community membership and knowledge of the communities' culture and languages spoken. Their established membership in the community encourages trust and respect [46]. Thus, CHWs are an important link between the community and use of health care services [46]. Forum committee members emphasized the need to establish collaborative partnerships between dental providers and community health workers with oral health training (community oral health workers—COHW) to help improve oral health outcomes and reduce socioeconomic- and/or culture-based disparities. Several countries (including the US, New Zealand, Canada, Great Britain, Netherlands, Switzerland, Malaysia, Thailand, Hong Kong, Singapore, Brunei, Cameroon, Cambodia and Azerbaijan) have established community and school-based dental service programs by using COHWs and dental nurses (also known as dental therapists) to help expand the reach of oral health care (and reduce dental caries and treat dental disease) in children [47–54]. Dental therapists train either in dental specialty programs or in colleges or universities. Program results from these countries have shown dental therapists practicing in schools and these communities have improved availability and use of dental care services. In New Zealand, for example, approximately 600 dental therapists care for the country's 850,000 children [47–49]. Dental therapists assigned to dental clinics in New Zealand's elementary and middle schools provide preventive and rehabilitative dental care annually to 98% of school age children and 60% of preschool children. A recent report on the oral health of New Zealand's school children documented that 52% of school children had no dental caries, and of those who had, over 80% had been treated [47, 48].

In Cameroon (a low-resource country in Africa), mid-level oral health care providers (dental therapists and dental assistants) train to perform restorative dental procedures and provide oral health education through Cameroon's school oral health program [50, 51]. Using dental therapists or dental assistants has proven to be a cost effective strategy for expanding access to dental care across the country, especially in rural areas [50, 51]. Cambodia, in Southeast Asia, uses dental therapists to provide free preventive care and restorative treatment to underserved children in Cambodia through an NGO called Cambodia World Family (CWF) [52]. CWF establishes partnerships with a small number of institutions, orphanages, and schools where they set up on-site dental facilities to provide dental care for those children as well as for children from surrounding community [52].

Technology to increase access to health information and access to dental care

Technology can connect, empower, and support health professionals wherever they practice. Using health information technology [such as smartphone 'apps'



(applications), electronic or ‘E-health’ (electronic health) communication and virtual dental homes or tele-dentistry] can increase access to and use of quality dental health care, thereby improving population health outcomes. However, those without Internet or other technologies may not share the benefits of expanded care due to economic disadvantages. Thus, dental and medical health professionals, public health practitioners and researchers, policymakers and community advocates should work together to develop strategies to help underrepresented populations or countries with poor technological infrastructure obtain the newest technologies in dental care.

Forum members recommended using virtual dental homes or tele-dentistry in countries where the infrastructure exists for the dental home model to extend dentistry to more populations as many who need attention do not visit dental offices for reasons including distance, lack of transportation or inflexible work schedules, or residing in states or countries without dental offices. Dental homes refer to a community-based oral health delivery system in which people receive preventive and simple therapeutic dental services (such as prophylaxis and education about brushing, flossing and nutrition) in community settings where they live or receive educational, social or general health services. It uses the latest technology to link practitioners in the community (including dental hygienists, dental assistants, and dental therapists) with dentists at remote office sites [55]. In countries lacking dental offices at a nearby location, dental home community providers can refer patients who require more complex treatment that only a dentist can provide to mobile dental clinics or other community-based/neighborhood dental centers (if available) where advanced restorative procedures are done [56].

Conclusion

The forum resulted in several key policy recommendations for solutions to overcome barriers to improve oral health where dental professionals can play a role in ECC prevention for children and underserved populations worldwide. These include fluoridation of public water supplies, sugar taxes, mandatory age 1 dental visits, supporting interprofessional education and practice, promoting oral health education by collaborating with community and school-based oral health care workers, relying on mid-level oral health care providers such as dental therapists and dental assistants to perform preventive and restorative dental procedures, and increasing use of technology for future population and patient-based preventive care and restorative treatments. We hope our suggestions will result in further discussion on oral health policies to achieve the best oral health outcomes for the return on investment and meaningful actions to overcome oral health inequalities for children worldwide

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