REFUGEE ORAL HEALTH: AN OVERVIEW FOR U.S. PRIMARY CARE PROVIDERS

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Abstract

Refugee populations are disproportionately affected by common oral diseases, including dental caries and periodontal disease. This paper seeks to synthesize the currently available literature on oral health in refugee populations and to identify key knowledge gaps. The paper specifically discusses the multifactorial causes of oral health disparities seen in refugee populations, and outlines the known barriers to dental care for refugees resettled in the United States. The paper additionally discusses the negative consequences of poor oral health in refugee populations, and identifies the role general medical practitioners can play in addressing oral health disparities, including recommendations on oral health preventive practices for U.S. primary care physicians caring for refugee patients and families.

Introduction:

The total number of displaced persons has continued to grow; as of 2018, there were an estimated 70.8 million displaced persons, 25.9 million refugees, and 3.5 million asylum seekers worldwide.[1] Refugees – persons forced to flee their respective countries of origin because of persecution, war, or violence – face unique challenges when attempting to meet their healthcare needs. They face challenges both during their migration trajectory as well as upon arrival to their host countries.[2] Refugee populations have demonstrated a particularly high burden of oral disease.[3-5]

The World Health Organization (WHO) defines oral health as: "a state of being free from chronic mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing."[6] Oral diseases affect approximately half of the world's population (3.58 billion) and untreated dental caries are the most prevalent non-communicable disease worldwide,[7] affecting an estimated 2.4 billion people.[8] Poor dentition is known to negatively impact nutritional status and child development.[9] Via inflammatory pathways, poor oral health status is also linked to many other chronic health conditions, including diabetes and cardiovascular disease.[10-13]

Article 12 of the United Nation's International Covenant on Economic Social and Cultural Rights calls on member states to "recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health."[14] However, dental care availability and provision for refugees is highly variable among nations, and even within certain nations, as is the case in the United States.[3] Health conditions deemed more urgent, such as communicable diseases, have historically taken precedence.[15] As the prevalence of oral diseases continues to rise in much of the developing world,[6] there is a growing appreciation of the need to study and allocate resources dedicated to oral disease prevention in refugee populations.[6,15]

The vast majority of the oral disease burden consists of dental caries, periodontal disease, and oral cancer, all of which have known risk factors and are considered largely preventable.[6] In the United States, primary care providers play key roles in oral disease prevention[17] and can help to address the oral health disparities seen in refugee populations.[18]

This paper will address the following questions:

- What is currently known about the oral health of refugees?
- What are the consequences of poor oral health in refugee populations?
- What are common barriers to accessing dental care among refugee populations in the United States?
- What role can primary care providers play in addressing oral health needs in U.S. refugee populations?
- Are there are any structural or public health interventions that have been shown to make a difference in the oral health outcomes of refugee populations?

Oral Health in Refugee Populations

Most of the available literature on refugee oral health comes from developed nations. Studies on tooth decay and gum disease predominate.[3] The high prevalence of dental caries and periodontal disease among refugees is well-recognized.[3-5] Refugee populations have consistently been shown to have worse oral health even when compared to traditionally disadvantaged and underserved populations in their host country. Factors contributing to this health care disparity include: lack of oral health care infrastructure in source countries, challenging migration trajectories, difficulty accessing care upon arrival to host countries, and individual health beliefs and practices.[3, 19]

Impact of Country of Origin:

Source countries for refugees are more likely to be considered low-income or middle-income countries. The World Health Organization recognizes a rise in the oral disease burden in these countries.[8] This rise is largely attributed to changes related to increasing urbanization – including wider availability and marketing of high-sugar foods, tobacco products, and alcohol – and is compounded by inadequate existing dental care infrastructure and insufficient fluoride consumption.[8, 15]

Available literature from common refugee source countries supports this. Much of this literature focuses on early childhood caries, using the Decayed, Missing, and Filled Teeth (DMFT) index. Studies among Nepalese,[20, 21] Syrian,[22] and Afghani[23] school-age children have all found higher DMFT indices and caries prevalence than stated international goals.[20-23] In Afghanistan, water tested did not have sufficient fluoride levels to prevent caries, and the fluoride content of commercially available toothpaste products frequently failed to meet internationally recommended standards.[23] Urban Nepali families reported higher levels of sugar consumption than their rural counterparts (despite having better overall knowledge of the cause of caries) and there was a higher burden of early childhood caries in urban Nepali populations compared to rural populations.[20]

Conflict in source countries also plays a role.[23, 24] In Middle Eastern countries there has been a known upward trend in caries and periodontal disease prevalence since 1990.[19] Following the outbreak of war-time conflict, more recent population studies in Syrian children have indicated DMFT indices even higher than would be expected based on prior trends.[24]

Multiple studies have found differences in caries prevalence in refugee populations arriving from different geographic regions, signifying the importance of pre-arrival health practices and environmental experiences on oral health.[5, 25-27] Refugee children arriving from Eastern and Central African nations were overall less likely to have dental caries compared to refugee children from Eastern European, Middle Eastern, and Asian countries. For example, the 2004 Cote et al study found that refugee children from Eastern Europe were 5.4 times more likely to have caries and 4.6 times more likely to have unmet dental needs when compared to refugee children arriving from Africa, despite fewer African refugee children ever having gone to a

dentist.[25] A 2019 study similarly found a higher risk of dental caries and significantly more urgent unmet dental needs in non-African refugees.[27] A 2019 study by Høyvik et al included adult populations; among refugees arriving in Norway, those originally from the Middle East had a significantly higher average number of decayed teeth and higher DMFT scores than refugees arriving from Africa.[5]

Diet is thought to account for most of these observed differences. Local foods and traditional diets in Eastern and Central Africa are naturally low in sugar.[28] Traditional oral health practices, such as the use of chewing or tooth-cleaning sticks, have also been proposed as another contributing factor.[3] However, many Islamic-based and Middle Eastern cultures also share in this tradition.[19, 25, 28] The Prophet Muhammad specifically calls for and supports the use of the miswak, a tooth cleaning stick derived from the *Salvadora persica* tree, in his teachings. Wood from this tree has been shown to possess antimicrobial and ant-inflammatory properties, and there is evidence supporting its use for oral hygiene purposes, with some studies even showing superiority to the modern toothbrush.[28] The cumulative effects of diet, fluoride exposure, and adherence to oral hygiene practices are likely more important than the type of tooth cleaning device used.[3, 25, 28] Interestingly, in the population studied in Norway, refugees from African nations did report higher rates of regular tooth-brushing.[5]

There may be additional, as-of-yet unidentified genetic, environmental and/or cultural factors contributing to the overall lower burden of tooth decay and periodontal disease in Eastern and Central African refugee populations compared to other refugee populations. Research studies further elucidating protective factors against the development of oral disease are needed.

Ultimately, cultural practices and norms in the source country will have a strong impact on the oral health of refugees coming to the United States, and it is important to be aware of prevailing cultural practices when addressing the health of refugees originating from a particular country or region. Another strong example of this is the widespread use of betel quid and areca nut in certain Asian-Pacific countries (Cambodia, Bangladesh, India, Myanmar, Malaysia, Papua New Guinea, and Sri Lanka).[30] Betel quid and areca nut use contributes to very high rates of oral cancer, with oral cancer achieving the third highest incidence of all cancers in some of these countries.[8, 30]

Effects of Displacement and Migration Trajectory:

Refugees fleeing their country may experience highly variable migration trajectories.[3] During periods of displacement, relocation, and adaptation, refugees are often forced to prioritize other immediate needs – such as food, shelter and safety – before addressing oral health concerns.[31] A study of Syrian children prior to and after the outbreak of conflict, suggests that the degree of displacement correlates with oral health outcomes. Syrian children externally displaced to neighboring countries had the worst oral health measures (had the highest DMFT scores), followed by Syrian children who were internally displaced; Syrian children who had never been displaced had the lowest, or most favorable DMFT scores.[24]

At the end of their migration trajectory, refugees may settle in refugee camps, integrate into the larger society of a neighboring country, or relocate to another host country through an established refugee resettlement program.[3] Cariogenic foods are known to be widely available in refugee camps, and thus those living in refugee camps for extended periods of time may have an increased risk of developing tooth decay and periodontal disease.[28] Additionally, dental care in refugee camps tends to be limited to emergency dental care, chiefly tooth extractions.[3] Those who integrate into the larger society of a neighboring country face different challenges. When faced with an influx of refugees, neighboring countries' healthcare systems may be overburdened. Availability of dental care in neighboring countries may still be very limited. Government and healthcare policy may be overtly hostile to refugee populations, resulting in negative experiences when

attempting to access medical or dental care; the Syrian refugee experience in Lebanon is one such example of this.[32, 33] Though cost remains a significant barrier, refugee families resettled in industrialized, highly-developed nations are more likely to have access to high-quality dental care.[3] Only 16% of refugees ultimately resettle in industrialized, developed nations.[1]

Impact of Trauma on Oral Health Outcomes:

Compared to the general population, refugees are more likely to have experienced violence directed towards themselves or their families, including sexual violence and assault.[34] A study by Fazel et al estimated that refugees suffered from PTSD at a rate approximately ten times higher than their age-matched American counterparts.[35] Prior studies have indicated links between PTSD and poor oral health. Those affected by PTSD tend to demonstrate poor self-care, including neglecting previously learned oral hygiene habits. The role of chronic stress, leading to hyper-inflammatory reactions and poor immune system responses, is also thought to play a role in the development of periodontal disease among those suffering from PTSD. A recent study of Syrian children found, when compared to controls, children who had been formally diagnosed with PTSD had significantly more decayed permanent teeth and significantly higher plaque burdens and gingival index scores. Dental patients with PTSD are also more likely to engage in other negative health habits that impact oral health (e.g., smoking), and muscle tension may contribute to high rates of temporomandibular joint pain in this population.[36]

Traumatic dental injuries are relatively common.[37] Because refugees are more likely to have experienced violence,[34] it stands to reason that the prevalence of oro-dental trauma would be even higher in this population.[3] In one study of refugees coming to the United States, twenty-two percent reported a prior history of orofacial trauma. However, the impact of this trauma on their oral health needs at the time of arrival was unclear, and chronic sequelae related to orofacial trauma were not reported.[38] An oral health assessment of refugees arriving in Germany indicated few acute dental needs related to oro-dental trauma.[4] More studies are needed to better appreciate the prevalence of oro-dental trauma in refugee populations as well as the treatment needs related to oro-dental trauma and its chronic sequelae.[37]

Consequences of Poor Oral Health

While poor mental health may contribute to worse oral health outcomes, the converse is also true. Having poor dentition can negatively impact mental health and result in worse mental health outcomes in an already vulnerable population.[34, 39] There are known links between having missing or decayed teeth and increased self-consciousness, negative self-perception and depression.[40] Symptomatic dental caries in children have been shown to affect self-esteem, speech, and school performance.[41] Dental problems in refugee populations are a significant sources of stress;[42] and, in one study, refugees reported significantly reduced psychological stress and improved sleep following dental treatment.[43]

When refugees are placed in cultures which highly value the cosmetic appearance of teeth, poor dentition can carry a strong social stigma and decrease chances of employability. Frequently missing work because of emergency dental treatment needs could result in employment termination.[39] A study based on data from the National Health Interview Survey, found that approximately 92.4 million hours were lost from work in order to address unplanned, emergency dental needs over the course of one year in the United States. Adults who reported poor oral health and those who were unable to afford regular dental care were more likely to lose one or more hours in unplanned dental visits.[44] Educational opportunities can also be affected. Dental-related concerns lead to the loss of more than 54 million school-hours each year.[41]

When states do not allocate money for routine, preventive dental care in vulnerable populations, the economic ramifications are profound. In 2010, the annual cost of emergency room visits for dental problems was five million dollars and public insurances (e.g., Medicaid)

shouldered half of this cost.[45] Inpatient hospital treatment for emergency dental care is approximately ten times more expensive than routine care provided by a dentist's office.[46] Those with commercial dental insurance or dental insurance that covers preventive care are much less likely to use emergency rooms and hospitals for dental care.[45]

Identified Barriers to Dental Treatment in Refugee Populations

In lower income countries, the availability of dental practitioners and health resources necessary to provide high-quality dental care is often the limiting factor. In higher income countries, cost is the most commonly cited barrier to accessing care.[3] In the United States, private and public insurance regulations differ by state; the cost of insurance plans and level of dental care coverage can be highly variable across the country.[47] However, even when the cost of dental care was covered, refugee populations have demonstrated relatively low utilization of dental services.[48] Additional barriers seen in refugee populations include language barriers, difficulties navigating an unfamiliar healthcare system, and differing cultural norms and beliefs concerning dental care.[3,19]

Dental Care Coverage:

In the United States, all refugees are eligible for Refugee Medical Assistance (RMA) for the first eight months, which provides the same coverage as Medicaid. For children, Medicaid/CHIP covers comprehensive dental services. For adults, states determine whether Medicaid covers comprehensive dental services, limited services, or emergency services only. As of 2019, less than half of states provide comprehensive dental care for adults through Medicaid. Additionally, only 39% of dental clinics in the United States accept Medicaid/CHIP.[49] If extended travel is required to access a dental clinic that accepts Medicaid, this poses a significant challenge for many refugee families, particularly those who have recently arrived and do not yet have a vehicle or valid US driver's license.

Delays in care are common in refugee populations; a study by Zimmerman et al found that time to dental treatment completion was twice as long among refugee populations compared to Swedish nationals.[48] Therefore, even if Medicaid/RMA provided complete coverage of dental services (and Medicaid payments were readily accepted by more dental clinics), it is unlikely that all previously unmet dental needs would be fully addressed in the first eight months in the United States.

Refugees also experience other hurdles with regards to public benefits. Failure to apply for and obtain citizenship within seven years of entering the United States results in the loss of certain public benefits for which refugees would otherwise be eligible, including Medicaid. Exemptions from this rule are rare.[50] The public charge rule proposed under the Trump administration – while not applicable to refugees – engendered fears about remaining on public benefits among immigrant and refugee populations hoping to acquire citizenship, and caused some individuals to avoid assistance from public programs.[18]

Language and Cultural Barriers:

Lack of English proficiency poses a significant barrier to accessing and navigating healthcare.[18] Patients with language barriers experience higher rates of adverse health outcomes and some of the largest health disparities are found in children living in non-English speaking households.[17, 18] Currently, the use of trained interpreters is legally mandated only in medical facilities that receive federal funding. The utilization of trained medical interpreters is best practice; however, without a legal requirement, private practice dental clinics and other specialty oral health clinics may not take on the added expense of paying for interpretation services.[51] Even when interpretation services are available in clinic, language barriers may pose delayed problems. For example, interpreters may effectively convey messages about healthy eating in clinic, but those with poor English proficiency may have more difficulty understanding nutrition information, and may be misled by catch-

phrases purporting the healthiness of sugar-rich foods (e.g., fruit juices).

Refugee populations in the United States come from highly varied cultural, educational, and socioeconomic backgrounds. A 2016 review by Keboa et al found oral health knowledge, beliefs and practices among refugee populations to be similarly diverse. However, there were certain identified patterns of belief that contributed to a lower likelihood of accessing dental care.[3] Older immigrants who reported low confidence in their ability to control oral health were less likely to value their natural teeth or attempts to save them.[52] Parents who possessed fatalistic beliefs – for example, believing that primary teeth are unimportant and caries of primary teeth are inevitable– were less likely to highly prioritize dental appointments for their children.[18, 53, 54]

In refugee groups studied, many perceived there was no need to access dental care until they felt pain or experienced a serious dental problem.[18, 19] This appeared to be based on the cultural norms in their source country, with many source countries having relatively limited access to dental care for the general population. Certain studied groups felt that dental treatment in their host country was a lengthier, more involved process with longer wait times compared to the dental care they had accessed previously.[3, 52] A 2014 qualitative study by Bochi supports these assertions, describing a pluralistic dental care system along the Syrian and Lebanese border.[33] In this region, in addition to formally trained dentists, there were informally trained dental practitioners who provided tooth extractions and gold tooth restorations. Most of these informal practitioners belonged to the Dom ethnic group. The Dom dentists learned the trade from each other over a relatively short period of time with no formal schooling. While the inferior quality of treatment and the more temporary nature of their tooth restorations was widely acknowledged, many living in the region appreciated the lower cost and accessibility of the informally-trained Dom dentists (who traveled to their patients' homes), and rationalized their dental care choices based on these factors. Traditionally trained dentists in this region acknowledged that many of their own patients also opted for tooth extraction over restorative care because it represented the quicker and cheaper option.[33]

Upon arrival to the United States, refugees experience a cultural shift, with increased emphasis on the importance of primary teeth, as well as increased emphasis on restorative and preventive dental care.[18] Multigenerational households can pose a barrier to improving children's oral health outcomes when family elders fail to adopt protective oral health practices or insist on and perpetuate behaviors that contribute to the development of tooth decay and dental caries.[18] Higher levels of acculturation are associated with increased likelihood to access care, and younger generations are more likely to follow the oral health practices and norms of their host country.[55, 56]

Considerations for Primary Care Providers

There is a divide between dental and medical care provision in the United States.[57] When 181 million Americans report not going to the dentist annually, general medical practitioners have an essential role to play in preventive oral health care practices.[58] Additionally, for children who went to a preventive dental visit in the past year, this visit was not synonymous with receiving all recommended preventive services.[17] The primary care provider's role is particularly pertinent to refugee populations arriving in the United States, as refugees typically establish with a medical provider prior to a dental provider.[2] Primary care providers should strive to reduce knowledge gaps and promote healthy behaviors, and should recognize refugee populations as a high-risk group and provide recommended preventive oral health services accordingly (see Table 1 for oral health items to address during routine well-child visits).[18]

Table 1. Summary of Recommendations to Improve the Oral Health of Refugee Children [18*]

1.1	Ask about diet – specifically exposure to cariogenic foods and drinks – as well as the frequency of snacking between mealtimes.
1.2	Ask about extended bottle use practices. Ask whether children take bottles with juice or milk to bed with them at night.
1.3	Ask about frequency of toothbrushing and flossing. Elicit information regarding any other traditional oral health practices performed at home.
1.4	Determine the main drinking and cooking water sources (tap water vs bottled water vs well water), and ask about water filtration systems used in the home. Consider providing fluoride supplementation (drops or chews) if the typical fluoride content does not meet the recommended 0.7 ppm.
1.5	Counsel families on the importance of daily oral hygiene practices, and on use and amount of fluoridated toothpaste.
1.6	Examine the teeth of refugee children, assessing for white spot lesions and dental caries.
1.7	Apply fluoride varnish during well-child visits (from first tooth eruption to 5 years of age). Note that fluoride varnish can be applied 2-4 times a year; even children with a dental home may not be achieving this frequency.
1.8	Maintain a low threshold for dental referral, recognizing that treatment delays are common in this population, and that starting the referral process early can allow for restorative treatment rather than tooth extraction(s).

*(Table modified from Crespo, 2019)

Addressing Common Knowledge Gaps and Health Misconceptions:

Studies among refugee populations have shown a generally good understanding of the direct link between sugar and tooth decay. Refugee caregivers were less likely to recognize frequent snacking as a potential cause of tooth decay, and were less likely to understand that other carbohydrate-rich foods (such as bread and crackers) would also contribute to tooth decay.[18] The importance of fluoride use for caries prevention, and the importance of flossing for periodontal disease prevention were not universally recognized, representing important knowledge gaps in certain refugee populations.[3,19,21] The age at which toothbrushing practices should start was also not universally agreed upon; one refugee group studied did not initiate any dental hygiene practices for their children until the start of elementary school.[3]

In certain immigrant and refugee populations, extended breastfeeding and bottle-feeding are common practices, as well as putting infants and children to bed at night with bottles containing milk or fruit juice.[18,20,53] These practices are particularly wide-spread in many Latin American cultures, and are thought to contribute to the especially high burden of early childhood caries seen in immigrants and refugees from Latin American countries living in the United States.[18,59] When providing educational interventions aimed at improving oral health outcomes in children, buy-in from the primary caregiver is the most important factor.[19,60]

A recent Australian study indicated that pregnant refugee populations may have misconceptions about the importance and safety of dental care during pregnancy. Many believed that dental care was unsafe during pregnancy and were unaware of the links between poor oral health, poor nutrition and overall worse birth and perinatal outcomes.[61] Their beliefs may be based on prior experiences in their respective home countries.[61,62] A study from Iran showed that dental providers there frequently declined to treat pregnant patients. Those that did treat pregnant patients often required written permission from an obstetrician and/or other family members prior to providing care, out of fear that they would be blamed for miscarriages or other poor birth outcomes.[62]

Addressing Shared Risk Factors:

The underlying risk factors for dental caries, periodontal diseases and oral cancer have considerable overlap with the risk factors for other common chronic medical conditions. These risk factors include high-sugar diets as

well as tobacco and alcohol use. Primary care providers have a key role in providing counseling regarding these modifiable risk factors, and can serve to widen the scope of such counseling to include oral health, particularly if a dental or oral health concern is relevant to the patient and is likely to resonate with him or her.[8]

Motivational interviewing, a patient-centered approach that focuses on eliciting and promoting intrinsic motivation for behavioral changes, has been found particularly helpful when addressing unhealthy lifestyle behaviors.[52] In one study, mothers had greater uptake of caries preventive practices for their children after motivational interviewing techniques were employed in the clinic.[9] In refugee populations, motivational interviewing techniques may be helpful in eliciting traditional beliefs and practices as well as barriers to care, allowing the provider to offer more culturally competent care and improve overall adherence.[52]

Preventive Practices Provided by General Practitioners:

Important preventive services provided by general practitioners include the topical application of fluoride varnish, prescriptions for fluoride supplementation, and education on the correct means of personal topical application of fluoride (i.e., type and amount of toothpaste, frequency of brushing). Topical fluoride application has the greatest impact, inhibiting bacterial metabolism and slowing tooth decay. When ingested in drinking water, fluoride is incorporated into the teeth and reduces enamel solubility; an additional topical benefit is also seen when systemic fluoride is excreted in saliva.[58]

The United States Preventive Services Task Force (USPSTF) recommends that primary care physicians apply fluoride varnish to all children from the time of first tooth eruption up to five years of age. Medicaid reimburses clinicians in 47 states and the District of Columbia for varnish application. There are no absolute contraindications to fluoride varnish application and the practice is associated with a 37-63% reduction in caries. The recommended time interval is biannually, but fluoride varnish can be applied up to four times a year in those deemed particularly high-risk for developing caries.[58]

The USPSTF, the American Academy of Family Physicians (AAFP), and the American Academy of Pediatricians (AAP) also recommend fluoride supplementation for children aged 6 months to 16 years who do not have optimally fluoridated drinking water. The U.S. Department of Health and Human Services has set the optimal fluoride concentration at 0.7 ppm for caries prevention.[58] Fluoride supplementation – usually in the form of fluoride drops or chews – should be prescribed only after determining the fluoride content of the child's usual water supply. The dosing is based on the child's age and the concentration of fluoride in their normal drinking water (see Table 2 for dosing).[63]

Whether the predominant source is tap water, well-water or bottled water will affect systemic fluoride exposure levels. Fluoride levels in tap water can be found on the CDC website: (https://nccd.cdc.gov/DOH_MWF/Default/Default.aspx) or by looking up city water quality studies. Most states and counties have programs to test well water for fluoride content. Refugee families may be less likely to trust the local tap water and it is important to ask families about their sources of drinking and cooking water. Up to 80% of bottled water brands contain suboptimal levels of fluoride, and fluoride content is not routinely written on bottle labels. Water filtration systems can also impact fluoride exposure. While many commonly used filters (such Brita filters) do not filter off fluoride, reverse osmosis filters do lower fluoride levels.[58]

The main risk associated with systemic fluoride exposure is fluorosis, a cosmetic issue manifesting as speckled discoloration of the teeth. Early fluoride exposure, usually a result of constituting infant formula with tap water, is known to cause fluorosis, though the level of fluorosis is usually mild. This can be avoided by reconstituting formula with distilled water for infants less than six months of age.[58]

The vast majority of superfluous fluoride ingestion – and therefore the main cause of fluorosis – is from toothpaste ingestion.[58] For

this reason, fluoridated toothpaste is not recommended for children <2 years of age.[62] It is important to counsel parents about the correct amount of toothpaste for young children as well as the importance of spitting out and rinsing the mouth of fluoridated toothpaste after brushing. A grain-of-rice-sized amount of non-fluoridated toothpaste can be used upon tooth eruption; no more than a pea-sized amount of fluoridated toothpaste should be used for children two to six years of age. It is recommended that parents or caregivers brush children's teeth for them until at least 2 years of age, and observe their brushing until at least 6 years of age, in order to enforce correct toothbrushing practices.[62]

The USPSTF and AAFP conclude there is currently insufficient evidence to recommend routine screening examinations for dental caries in children from birth to 5 years of age.[41] However, children in refugee populations generally have a higher prevalence of dental caries.[3] Prior studies have indicated a mismatch between parental oral health concerns (as well as self-oral health assessments) and practitioner assessments in refugee populations; a lack of expressed dental concerns was not reassuring.[26,64] Treatment delays are also more common in refugee groups.[3] While not currently recommended by general USPSTF guidelines, routine screening examination and early referral to dental care is more likely to provide benefit in refugee populations and should be performed.

Table 2. Suggested Fluoride Supplementation Based on Age and Drinking Water Fluoridation Level[62]

Age	<0.3ppm	0.3-0.6 ppm	>0.6 ppm
0-6 months	None	None	None
6 months – 3 years	0.25 mg/day	None	None
3 - 6 years	0.5 mg/day	0.25 mg/day	None
6-16 years	1.0 mg/day	0.5 mg/day	None

Medical Management of Co-Morbidities and Direct Management of Oral Diseases:

Oral health cannot be wholly separated from other pre-existing medical conditions. Due to chronic stress experienced both pre- and post-migration, mental health and other chronic medical conditions are highly prevalent in refugee groups.[15, 34] Management of comorbid mental health conditions, such as major depression and PTSD, should improve the ability of patients to perform self-care, including oral hygiene practices and thus improve overall oral health.[36]

Following dental caries, periodontal disease and oral cancer, the next most common oral diseases worldwide include oral manifestations of HIV, oro-dental trauma, congenital maxillofacial abnormalities, and noma (orofacial gangrene).[8] Refugee populations arriving to the United States are routinely screened for HIV by local health departments, facilitating recognition of HIV-related oral illnesses.[2, 34] In theory, early detection and treatment of HIV should serve to lower the burden of HIV-related oral diseases among US refugee populations, however, this does not appear to have been specifically studied. In general, there is a more definitive role for medical (and surgical) management of all of the above listed oral health conditions. For example, noma is a life-threatening necrotizing infection requiring rapid antibiotic treatment. Surgical management in order to preserve facial structure may also be required. While a full discussion of the medical management of each of the above listed conditions is beyond the scope of this paper, it is important to note there is currently limited information concerning the prevalence and impact of these conditions in refugee populations.[3]

Clinic-Based and Structural Strategies to Improve Oral Health in Refugee Populations:

Multiple studies have called for improved connectivity between the dental and medical professions in order to improve health outcomes in underserved, vulnerable populations. Suggested improvements to the current status quo include: adapting medical case-management to dental establishments, co-location of dental and medical offices, creating patient-centered medical homes with established lines of communication between medical and dental providers, improving referral procedures, creating more interface between electronic medical record systems, and improvements in inter-professional education.[65-70] However, no papers were found that had

studied and applied such interventions specifically in refugee populations.

Public Health Strategies to Improve Oral Health in Refugee Populations:

Public health interventions directed toward refugee populations have included non-governmental organization (NGO) sponsored provision of emergency dental care, as well as provision of basic dental care training to overcome provider shortages in refugee camps. In Ghana and Tanzania, refugees were trained in basic dental care, and in turn provided dental care to other refugees living in the camp. Specific examples of NGO-sponsored care included mobile dental units; often the scope of care was limited to extractions, however some programs were also able to provide more extensive care through this approach.[3]

The Centers for Disease Control and Prevention (CDC) has called water fluoridation one of top ten greatest public health achievements of the 20th century; for every dollar spent on fluoridation, it is estimated that $38 is saved in dental treatment costs.[58] The WHO also endorses expanding fluoridation programs across the globe and considers water fluoridation an important component of non-communicable disease prevention. Various countries are in the process of developing or improving fluoridation programs.[71] In addition to fluoridation programs, creation of public awareness campaigns to address shared risk factors are also needed.[72] Such campaigns should strive to provide health education and encourage healthy diets, tobacco cessation, and safe levels of alcohol consumption.[8, 72]

It is unclear the exact extent to which refugee populations – often representing marginalized, persecuted or otherwise threatened groups in their home country – will share in the benefits of expanding fluoridation programs and public awareness campaigns. More research is needed to demonstrate the overall efficacy and cost-effectiveness of public health interventions, as well as the extent to which refugee populations stand to benefit.

Discussion:

Refugee populations are greatly impacted by dental caries and periodontal disease. Refugees experience a high burden of oral diseases even when compared to the least privileged populations in their host countries. Lack of oral health care infrastructure in source countries, challenging migration trajectories, and difficulties accessing and navigating care in host countries all contribute to this health care disparity.[3] Existing research outlines the negative physical, emotional and financial consequences of poor dentition, and also points to the potentially cyclical, compounding nature of such effects in vulnerable populations living in the United States.[39]

In the US, comprehensive dental care coverage is currently far from universal, and accessing dental care is difficult for many refugee families.[47, 49] Primary care doctors can play key roles in confronting oral health disparities and addressing oral health needs in refugee populations.[17, 18] Primary care providers should recognize refugee populations as a high-risk group for dental caries and periodontal disease, and implement preventive oral health measures accordingly. In addition to recognizing common dental conditions and making appropriate, timely referrals, general practitioners should also strive to address knowledge gaps and barriers to care.[18]

Interventions on a larger scale are also needed to improve oral health status in refugee populations.[8] There are relatively few public health strategies specifically targeting oral health in refugee populations; however, the results of some existing interventions have been promising. In order to better inform and advance public policy, more research is needed from source countries and developing nations with large refugee populations.

Addendum:
Special thanks to Colleen Little from the Community Dental Center for providing additional insight about common challenges and barriers to care for refugee populations in Charlottesville, VA.

Noted challenges include:

- A lack of translation services at local specialty clinics. This creates problems when referring for braces or oral surgery.
- Transportation barriers. Missed appointments due to lack of transportation particularly causes problems when trying to carry out a course of restorative treatments (treatment may delayed to the point that tooth extraction is required).
- Knowledge gaps about nutrition, and difficulty interpreting food labels for those with less English proficiency.

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