

MORE THAN JUST A TOOTHBRUSH: CLOSING CHILDREN'S ORAL HEALTH DISPARITIES

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Abstract

Oral health status has been strongly correlated with other health outcomes as well as educational outcomes for youth. Previous research has shown an extensive body of work on the disparity between youth of color and low SES youth in comparison to their more affluent peers and white youth largely due to the role of social determinants of health. The purpose of this report is to examine the problem through a theoretical framework, to introduce preventive interventions, and to outline policy and programmatic intervention recommendations to further close this disparity.

Introduction

Poor oral health is often a symptom of overall health status and well-being as well as the environment in which a person lives (Oberg, Colianni, & Kin-Schultz, 2016; Patrick et al., 2006). Contextual factors such as living in food deserts, lack of dental care access, and overall family health status can affect the most vulnerable children. These factors can be described as social determinants of health. Disparities in children's oral health is one of the most prevalent health problems facing our nation today (Peterson-Sweeney & Stevens, 2010). Oral health is often overlooked within mainstream U.S. society due to the prevalence of childhood hunger, obesity, hypertension, diabetes, and other health problems. However, these health issues do not exist in a vacuum; they are interconnected in a social system that devalues youth of color and low SES youth.

Poor oral health is described as untreated dental cavities, or caries, within the public health and pediatric literature (Casamassimo et al., 2014; Edelstein & Chinn, 2009; Fisher Owens et al., 2013). The research on children's oral health disparities includes startlingly data—early childhood caries (ECC) affects 23% of preschool-aged children, and 18% of children aged 5 through 18 have untreated caries (Lebrun-Harris, Canto, & Vodicka, 2019). According to Sibley (2018), ECC is now more common than asthma for chronic childhood diseases. Untreated ECC leads to poor adult oral health outcomes as well as severe tooth decay (Oberg, Colianni, & King-Schultz, 2016). Many studies state that poor oral health in children is negatively correlated with academic performance in school as well as absenteeism, which can translate into missed work days for the caregiver(s) of children (Vidrine & Hamrick, 2018; Roygardner, 2019; Lebrun Harris et al., 2019; Como, Duker, Polido, & Cermak, 2019). In fact, the U.S. Department of Health and Human Services reports that across the nation, children miss over 50 million school hours due to problems with oral health (as cited in SCAANY, 2015). The purpose of this study is twofold: (1) to inform readers and stakeholders about the theoretical foundations of prevention and intervention science that explain the persistence of children's oral health disparities, and (2) to inform policy to close this disparity gap.

Theoretical Foundation

By examining oral health disparities in children from a theoretical lens of Life Course Theory (LCT) and the Eco-Development Framework, we can then begin to pursue a path forward for oral health equity. First, life course theory is an approach to understanding the long-term effects of chronic diseases on human development (Northridge et al., 2007). For example, one of the main objectives of this study by Northridge and colleagues (2007) is to illustrate the importance of dental insurance coverage in order for children to have access to preventive dental care, which can alter their oral health trajectory over the course of their adult life. Second, the American Academy of Pediatrics' socio-ecological model of oral health disparities provides a wider examination of the structural and environmental factors that determine children's oral health outcomes (as cited in Fisher-Owens et al., 2018). General research in human development and prevention science uses this framework to examine the context in which you operate to deter negative life outcomes (Pantin et al., 2004), and pediatric oral and public health researchers use it to further understand children's oral health disparities (Fisher-Owens et al., 2012; Northridge et

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al., 2017). Fisher Owens and colleagues (2012) focus their socio-ecological framework of children's oral health by focusing on three dimensions that influence developmental outcomes: child level, family level, and community level.

Social Determinants of Oral Health Disparities

Patrick and colleagues (2006) define social determinants of health as clear and unclear sociocultural factors and pathways that determine health and well-being. In addition, they highlight in their research: "A graded relationship between social position and health status affects all persons in the social hierarchy" (Patrick et al., 2006). There is an extensive body of literature supporting the notion that structural and environmental racism is one of the leading systemic factors in children's oral health disparities in the United States (Como, Stein Duker, Polido, & Cermak, 2019; Matuso, Rozier, & Kranz, 2015; Fisher-Owens et al., 2013; NC DHHS, 2018; Oberg, Colianni, & King-Schultz, 2016). Structural racism is defined by Jones (2000) as a system of historical, cultural, and political dynamics that benefit whites while people of color are disproportionately impacted with negative outcomes (as cited in Oberg, Colianni, & King-Schultz, 2016). Furthermore, Oberg, Colianni, and King-Schultz (2016) argue, "Structural racism is perpetuated when policies are instituted without examining the unintended consequences of such changes that may reinforce or compound existing inequities and health disparities" for people of color.

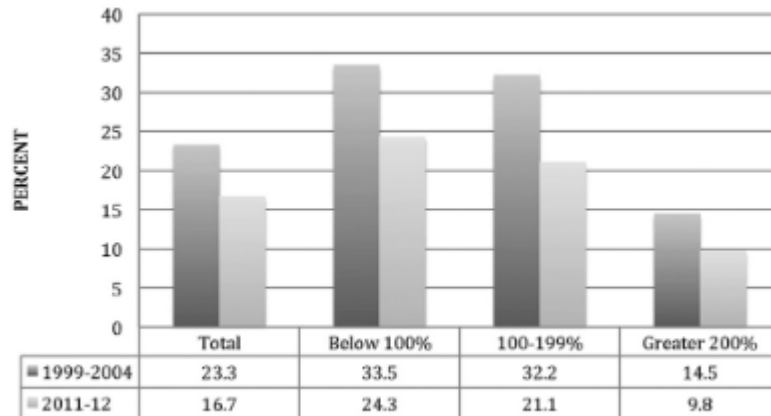
The following statistics will further prove this argument that youth of color are the victims of this inhumane form of injustice. First, NC DHHS (2018, p. 8) focuses on racial equity within closing oral health disparities among a variety of sub-populations at-risk, including the Native American population in North Carolina due to the prevalence of diabetes within this racial group, which is a strong predictor of poor oral health. This finding is consistent with national trends within the U.S. Native American population (Pew Charitable Trusts, 2015). Second, African American and Black children in Como, Stein Duker, Polido, & Cermak (2019) were noted as having ECC and untreated dental caries in adolescence at a disproportionate rate in comparison to Non-Hispanic, White youth. In addition, their systematic review of the literature on oral health disparities in African American and Black children was largely divided into three main categories: familial, sociocultural, and structural (Como, Stein Duker, Polido, & Cermak, 2019). Third, Hispanic youth are also an at-risk group; results from a statewide study in Matsuo, Rozier, & Kranz (2015) showed that roughly half the Hispanic kindergarten students had dental caries. Hallas and colleagues (2015) report that Mexican American children are the highest at-risk group for ECC.

Youth develop and operate within a strong context of school and family regardless of SES. However, oral health can often take a back seat to more pressing matters in low SES families, such as purchasing weekly groceries, affording monthly rent, and navigating a myriad of other financial barriers in order to achieve self-sufficiency. Research from Kelly et al. (2005) reported that low-income caregivers believed that oral health is a priority for older children and is less important than medical visits such as a routine check-up (as cited in Peterson-Sweeney & Stevens, 2010). The research literature often uses the federal poverty measure for determining the classification of low-income families burdened by the costs of dental coverage who are therefore disproportionately impacted by poor oral health. In the illustrations section of this

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report, I have included a graph from Oberg, Colianni, and King-Schultz (2016) that illustrates the percentage of untreated dental caries by income group (federal poverty measure) for 5-to 17-year olds in two comparison time periods. This shows the decline over time due to the implementation effects of the Children's Health Insurance Program to cover routine and preventive dental care.

Figure 1: Percentage of Untreated Dental Cases by Income Group



The percentage of untreated dental cases by income group (federal poverty measure) for 5- to 17-year olds in two comparison time periods. Source: Oberg, Colianni, & King-Schultz (2016).

Two factors that are under-examined in the literature are geographic location and citizenship status. First, geographic location is important due to youth of color predominantly living in urban or rural counties and the sub-factors that come along with it, such as population density, transportation access, number of available dental care providers, and funding for public goods (Matsuo, Rozier, & Kranz, 2015; NC DHHS, 2018, p. 8). Zip-code in the United States is often a predictor of positive or negative life outcomes, and according to Fisher Owens et al. (2016), where a child lives has a significant impact on that child's access to oral health care and health status. Citizenship status is also an important factor within the examination of race and SES; research from Wilson et al. (2018) reported that non-citizen immigrants have significant poor oral health in comparison to documented U.S. citizens due to the 1996 Personal Responsibility and Work Opportunity Reconciliation Act. This law prohibits the use of federal funding in Medicare, Medicaid, or any other federal health related program that states participate in to provide coverage or direct services to undocumented immigrants or people with fewer than 5 years of U.S. residency. Additionally, Wilson et al. (2018) stated that there is no evidence of any states in the nation providing preventive dental care to undocumented immigrants or citizens with less than 5 years of U.S. residency.

Overview of Preventive Interventions

There are many effective preventive interventions in dental care service delivery (direct and indirect) that can effectively narrow or close the oral health disparity gap among children.

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For this section of the paper, I will focus on universal, selective, and indicated levels of preventive. First, at the universal level, protecting and expanding community water fluoridation is an effective method of increasing water justice for everyone. Second, at the selective level, expanding Medicaid and continuing the Children's Health Insurance Program can close the dental insurance gap. Lack of dental insurance is one of the largest barriers to achieving dental care for at-risk populations. Third, at the indicated level, advancing school-based dental programs, increasing intergenerational education and expanding the dental workforce will effectively reach low SES youth.

Universal Level

Several studies address the public health achievement of community water fluoridation in the mid-1900s; this gave communities widespread access to fluoridated water, which is a protective factor against tooth decay (SCAANY, 2015; Sibley, 2018; Fisher-Owens et al., 2018; Northridge et al., 2017; Peterson-Sweeney & Stevens, 2010). Across the nation, there is a wide range of publicly accessible fluoridated water. According to the CDC (2014), the national average is 74%, yet there are states that have low rates: Arizona (57.8%), Alaska (49.3%), California (63.7%), Louisiana (44.2%), Oregon (22.6%), and New Jersey (14.6%). Most importantly, community water fluoridation is the leading cost savings preventive measure to reducing tooth decay; for every \$1 spent in expanding water fluoridation, \$38 is saved in treatment costs (SCAANY, 2015).

Selective Level

Low SES families trying to obtain dental care are often faced with the following barriers: lack of dental offices that accept Medicaid as payment, reported feelings of discrimination against Medicaid patients, lack of transportation to dental offices, and structural barriers including the length of time required for appointments, difficulty coordinating with employment, and child care for other children (Peterson-Sweeney & Stevens, 2010). Many of these barriers can be eliminated with policy-focused interventions. Medicaid and the Child Health Insurance Program (CHIP) serve as the primary health care financing source for the majority of low SES youth in the United States. Yet there is a strong number of states that have failed to expand Medicaid, including North Carolina, Texas, Georgia, Wisconsin, and Missouri (Alker & Roygardner, 2019). As the income and wealth inequality has grown in the United States over the past decade and many families are still recovering after the Great Recession of 2007-08, the lack of Medicaid expansion has hit many families that live paycheck to paycheck and need the coverage for their children to have access to preventive dental care. The federal Children's Health Insurance Program (CHIP) was reauthorized by Congress in 2018 and will continue until 2023. With this renewed funding, we hope to see gains in children's oral health outcomes paired with expansion of other preventive interventions across the next 10 years.

Lastly, intergenerational education is a component of selective level of prevention. As previously stated in the theoretical foundations section, the family level system cited in the

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socio-ecological framework highlights intergenerational influences. Northridge and colleagues (2017) expand on the intergenerational influence by stating that the caregivers' attitudes and knowledge are intermediary mechanisms which affect children's oral health. Specifically, perinatal oral health refers to the oral health of a pregnant mother. Research shows that due to the hormonal and physiological changes that occur during pregnancy, pregnant women are at-risk of gum disease and tooth decay (NC DHHS, 2018). In addition, oral disease can be hereditary and may increase the likelihood of preterm birth, low birthweight, and ECC for the child (NC DHHS, 2018). Intergenerational education is a great preventive approach before, during, and after pregnancy to reduce the likelihood of dental caries in both the mother and child. Hallas et al. (2015) supports the creation of an oral health educational program designed for mothers before discharge from the hospital to increase their knowledge about oral health care and prevention of ECC.

Indicated Level

At the indicated level of prevention, direct dental care services need a range of collective capital (human, social, financial, intellectual) to change oral health outcomes. First, school-based programs are important for providing services such as sealant programs, fluoride rinses, and oral health practitioners on site. Many studies cite that the application of fluoride varnish in a children's dental care setting is an effective solution to preventing dental caries (Sibley, 2018; SCAANY, 2014; NC DHHS, 2018; Oberg, Colianni, & King-Schultz, 2016). Sibley (2018) explains how the current shortage of pediatric dental providers has created a lack of access to preventive dental care for the birth to 5 age group of children. However, research states that primary care providers such as pediatricians and family physicians would be able to provide fluoride treatment to at-risk patients (SCAANY, 2014; Sibley, 2018). In addition, SCAANY (2014) reports that dental sealants can be another effective preventive dental measure for at-risk children. Dental sealants are clear plastic coatings that are applied to the chewing surfaces of permanent molars, the most cavity-prone teeth. On average, the cost of sealing one molar is less than one-third the cost of filling a cavity, and a single application of sealants has been shown to reduce cavities by 60% in a four-year period of time (SCAANY, 2014).

Vidrick & Hamrick (2019) emphasize the CDC's recommendation of school-based sealant programs (SBSPs), an effective prevention measure against dental caries. Dental sealants are a low cost, evidence-based measure in preventing tooth decay and dental caries. Sealants have been shown to severely delay cavities by 80% in a two-year period and 50% in a four-year period. SBSPs close the access-to-care gap by giving school age children direct access to preventive dental care. School-based sealant programs serve schools that have at or more than 50% of students who meet the Free & Reduced Meals Program (FRMP) eligibility at no-cost to families (NC DHHS, 2018).

A second school-based program targeting students at-risk for poor oral health outcomes is a fluoride mouth rinse program. This program provides students with supervised weekly rinsing of sodium fluoride solution at schools who have at or more than 60% FRMP eligible students (NC DHHS, 2018). Data has shown that this intervention averages about a quarter reduction in tooth decay and is recognized by the American Society of State and Territorial Dental Directors (NC DHHS, 2018).

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A third program involves expanding the dental workforce specifically with a focus on increasing dental positions that will serve low-income and underserved populations. Nash (2009) emphasizes the importance of the retiring Baby Boomer population of dentists and the rising need for more dentists in the field to serve high-need communities starting in the 2020s. There are two approaches for expanding the human capital of dentists for underserved communities: implementing more Dental Therapists and Community Dental Health Coordinators (CDHCs), which have been recommended in Nash (2009), Koppelman (2016), NCDHHS (2018), and Corr (2019).

First, Dental Therapists are mid-level providers and are supervised by dentists. They are uniquely positioned to expand direct care to more patients and provide treatment to underserved, at-risk populations in a variety of settings clinics, as well as community and school-based health centers. Starting in 2004, Native communities have seen tremendous gains in positive results in oral health care treatment. The following states have enacted laws allowing for dental therapists over the past decade: Minnesota, Maine, Vermont, Oregon, Washington, Arizona, and Michigan (Corr, 2019).

Second, the American Dental Association has also created a model for addressing social determinants of oral health via community-based prevention, patient navigation, and care coordination called Community Dental Health Coordinators (CDHCs). CDHCs are located in underserved communities where access to care is limited, and they are trained and practicing dental hygienists with the skills of a community health practitioner. CDHCs provide lots of benefits toward the communities they serve. Two of the hallmarks of this model are patient navigation and care coordination. CDHCs are able to provide support and guidance with the complexities of dental insurance as well as direct clients to oral healthcare providers. Lastly, the CDHCs close the gap between mental and dental care by connecting clients to both providers as needed.

Policy Recommendations

One of the big takeaways of this report is meeting children where they are. An asset-based community development approach to this is expanding funding for school-based and community health centers. Children spend much of their time within the walls of a school, and having a health service delivery model within this structure has shown to be an effective, evidence-based prevention (Scrudder, Papa, & Brey, 2007). School-based health centers bring effective health practitioners into schools in high need communities to serve children's health needs before, during, and after the school day. A tangible policy intervention that I recommend is the expansion of funding for school-based health centers as well as federally qualified community health centers, especially for oral health.

Earlier this year, the U.S. Human Resources & Services Administration awarded \$11 million in funding to 120 school-based health centers to increase access to mental health, substance abuse, and childhood obesity-related services in school-based health centers (HRSA, 2019). However, there were no funds allocated for oral health access due to the lack of a dental workforce in school-based health centers; I will expand on this in the next section. Second, there is bipartisan legislation in Congress to address this problem: the Community Health Investment, Modernization, and Excellence (CHIME) Act of 2019. This legislation would provide access to

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low-cost preventive dental care for children and families across the nation in over 1,400 community health centers. In addition, the CHIME Act supports the Community Health Centers Fund (CHCF), which extends \$5 billion until 2024, and the National Health Service Corps, which closes the workforce gap in underserved communities across the nation. The CHCF fiscal funding stream has expired as of September 30th, which will cause a bind to many federally qualified CHCs (NAHC, 2019).

Conclusion

The investment of children's oral health cannot be understated at a time when our state and federal legislative bodies critically examine fiscal funds to allocate in the area of children's health. When our children grow up to become fully functioning adults, they will smile when they walk across the stage with their diploma, when they meet with an executive for a job interview, and more. In addition, a part of investing in children's oral health comes with investing in the young adults who are currently eager to join the dental workforce yet face the challenge of meeting today's rising tuition costs. No one should have to enter into a promising, altruistic, and honorable career of increasing a person's health outcomes with the burden of six-figure student debt. Lastly, as we enter into a new year and decade, Healthy People 2020—a health promotion initiative set by the Office of Disease Prevention and Health Promotion—has set a goal to improve access to preventive services and dental care. The wide variety of policy and programmatic actions I have outlined in the later section of this paper is a pathway to achieving that goal and reaching a state of oral health equity across our nation.

References

- Alker, J., & Roygardner, L. (2019). The Number of Uninsured Children Is On the Rise. *Georgetown University Health Policy Institute: Center for Children and Families*, 1–19. Retrieved from <https://ccf.georgetown.edu/2019/10/29/the-number-of-uninsured-children-in-on-the-rise-acf/>
- Burgette, J., Preisser, J., & Rozier, R. (2018). Access to preventive services after the integration of oral health care into early childhood education and medical care. *Journal of the American Dental Association*, 149(12), 1024–1031. doi: 10.1016/j.adaj.2018.07.019

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- Casamassimo, P., Lee, J., Marazita, M., Milgram, P., Chi, D., & Divaris, K. (2014). Improving Children's Oral Health: An Interdisciplinary Research Framework. *Journal of Dental Research*, 93(10), 938–942.
- Centers for Disease Control and Prevention. (2014). 2014 Water Fluoridation Statistics. Retrieved from <https://www.cdc.gov/fluoridation/statistics/2014stats.ht>
- Como, D. H., Stein Duker, L. I., Polido, J. C., & Cermak, S. A. (2019). The Persistence of Oral Health Disparities for African American Children: A Scoping Review. *International journal of environmental research and public health*, 16(5), 710. doi:10.3390/ijerph16050710
- Corr, A. (2019). What Are Dental Therapists? FAQs about practitioners who provide routine care in a growing number of states. Retrieved from <https://www.pewtrusts.org/en/research-and-analysis/articles/2019/10/09/what-are-dental-therapists>
- Dougherty, D., Chen, X., Gray, D., & Simon, A. (2014). Child and Adolescent Health Care Quality and Disparities: Are We Making Progress? *American Pediatrics*, 14(2), 137–148. doi: 10.1016/j.acap.2013.11.008
- Edelstein, B., & Chinn, C. (2009). Access and Barriers To Care: Update on Disparities in Oral Health and Access to Dental Care for America's Children. *Academic Pediatrics*, 9(6), 415–419. doi:<https://doi.org/10.1016/j.acap.2009.09.010>
- Emmanuel, M., Thompson, L., & Catalanotto, F. (2018). The Role of Pediatric Trainees in Addressing Oral Health Disparities in Children. *Pediatrics*, 141(5), 1–4. doi:<https://doi.org/10.1542/peds.201>
- Fisher-Owens, S., Isong, I., Soobader, M., Gansky, S., Weintraub, J., Platt, L., & Newacheck, P. (2013). An examination of racial/ethnic disparities in children's oral health in the United States. *Journal of Public Health Dentistry*, 73, 166–174. doi:10.1111/j.1752-7325.2012.00367.x
- Fisher-Owens, S. A., Soobader, M. J., Gansky, S. A., Isong, I. A., Weintraub, J. A., Platt, L. J., & Newacheck, P. W. (2016). Geography matters: state-level variation in children's oral health care access and oral health status. *Journal of Public Health*, 34(1), 54–63. doi: 10.1016/j.puhe.2015.04.024
- Hallas, D., & Shelley, D. (2009). Role of Pediatric Nurse Practitioners in Oral Health Care. *Academic Pediatrics*, 9(6), 462–466.
- HRSA: Health Resources & Services Administration. (2019). HRSA awards \$11 million to increase access to critical services at school-based health centers. Retrieved from <https://www.hrsa.gov/about/news/press-releases/hrsa-awards-11-million-school-based-health-centers>

MORE THAN JUST A TOOTHBRUSH

- Koppelman. (2016). States Expand the Use of Dental Therapy: Access to care increases when dentists are authorized to hire midlevel providers. Retrieved from <https://www.pewtrusts.org/en/research-and-analysis/articles/2016/09/28/states-expand-the-use-of-dental-therapy>
- NACHC: National Association of Community Health Centers. (2019). Bipartisan Legislation Introduced to Secure Long-Term Funding for Health Centers. Retrieved from <http://www.nachc.org/bipartisan-legislation-introduced-to-secure-long-term-funding-for-health-centers/>
- Nash, D. (2009). Adding Dental Therapists to the Health Care Team to Improve Access to Oral Health Care for Children. *Academic Pediatrics*, 9(6), 446–451. doi: 10.1016/j.acap.2009.08.005
- Northridge, M., Schrimshaw, E., Estrada, I., Greenblatt, A., Metcalf, S., & Kunzel, C. (2017). Intergenerational and Social Interventions to Improve Children's Oral Health. *Dental Clinics of North America*, 61(3), 533–548. doi: 10.1016/j.cden.2017.02.003.
- Oberg, C., Colianni, S., & King-Schultz, L. (2016). Child Health Disparities in the 21st Century. *Current Problems in Pediatric and Adolescent Health Care*, 46(9), 291–312. doi: 10.1016/j.cppeds.2016.07.001
- Patrick, D., Yin Lee, R., Nucci, M., Grembowski, D., Jolles, C., & Milgrom, P. (2006). Reducing Oral Health Disparities: A Focus on Social and Cultural Determinants. *BMC Oral Health*, 6(1), 1–17. doi:10.1186/1472-6831-6-S1-S4
- Pew Charitable Trusts. (2015). The Oral Health Crisis Among Native Americans. Retrieved from <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2015/06/the-oral-health-crisis-among-native-americans>
- SCAANY. (2014). Issue Brief: Successful Strategies for Keeping Kids Cavity-Free. *Schuyler Center for Analysis and Advocacy*, (2), 1–4. Retrieved from <https://www.scaany.org/wp-content/uploads/2014/07/Issue-Brief-2-Successful-Strategies-Keeping-Kids-Cavity-Free.pdf>
- SCANNY. (2015). The Power of Prevention: The Potential for a Generation of Cavity Free Kids. *Schuyler Center for Analysis and Advocacy*, 1–24. Retrieved from https://www.scaany.org/wp-content/uploads/2015/02/The_Power_of_Prevention_Jan.20151.pdf
- Scudder, L., Papa, P., & Brey, L. (2007). School-Based Health Centers: A Model for Improving the Health of the Nation's Children. *Journal for Nurse Practitioners*, 3(10), 712–720.
- Sibley, J. (2018). Cost-Benefit Analysis of Providing Fluoride Varnish in a Pediatric Primary Care Office. *Journal of Pediatric Health Care*, 32(6), 620–626. doi:10.1016/j.pedhc.2018.05.007

MORE THAN JUST A TOOTHBRUSH

NC DHHS (2018). The Road to Oral Health Equity in North Carolina. *NC Department of Health and Human Services and the Office of Minority Health and Health Disparities*, 1–20. Retrieved from <https://www.ncminorityhealth.org/data/documents/OralHealthEquity-9.24.18-WEB.pdf>

Wilson, F., Wang, Y., Borrell, L., Bae, S., & Stimpson, J. (2018). Disparities in oral health by immigration status in the United States. *Journal of the American Dental Association*, 149(6), 414–421. doi: 10.1016/j.adaj.2018.01.024