Characteristics of Refugee Children Receiving Dental Care in the State of Washington

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Abstract

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Purpose: Investigate characteristics of refugee children who received oral health care and determine factors associated with dental utilization.

Methods: Our population included refugees (≤ 21 years old) resettled in WA in 2015. We analyzed Medicaid data collected by three State Agencies including demographics (age, sex, country of origin, races, language spoken), disabled status, dates of dental encounter, dental visits (with relevant Medicaid dental codes). Descriptive analyses and ANOVA were performed to summarize different dental services utilized and to check if utilization differed across groups respectively with critical values at 5%.

Results: Of 1114 children, 870 received dental care. Majority were males (55.57%) with 13 to 20 years (37.34%) being the largest group. About a third was white (33.12%), black (18.85%), Pacific Islander (6.91%), Asian (2.78%), and other (15.8%). Only 1.44% of the children had disabled status. Children of 7-12 years of age had most dental utilization overall ($p = 0.0144$) but younger children had more preventative ($p < 0.0001$) and older children had more restorative visits ($p < 0.0001$). Females had more overall ($p < 0.0001$) and restorative visits ($p < 0.0001$). Children with

disabled status had more dental visits ($p < 0.0001$) but less restorative visits than those without such status ($p < 0.0001$). Different utilizations from different races, countries of origins and languages spoken were noticed (not statistically significant).

Conclusions: One in five refugee children did not utilize any dental service within the first year of arrival. Age, sex and disability status were relevant characteristics associated with dental utilization. Further measures should be implemented to maximize access in this population

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I. BACKGROUND

The American Immigration and Nationality Act (INA) defines a refugee as a person who is "unable or unwilling to return to, and is unable or unwilling to avail himself or herself of the protection of, that country because of persecution or a well-founded fear of persecution on account of race, religion, nationality, membership in a particular social group, or political opinion".[1] By the middle of 2020, the United Nations High Commissioner for Refugees reported that 80 millions worldwide were forcibly displaced, with 38-43% of them (approximately 30-34 millions) being children.[2] Since the INA declaration, more than 3.4 million refugees have been admitted in American soil and the United States resettled 11814 refugees in 2020.[3] In 2018, the WA state resettled approximately 1544 refugees[4] with Iraq, Ukraine, Somalia, Afghanistan, and Burma being the major countries of origin.[5]

Refugees originate from regions where health care systems are disrupted due to unrest and war[6]. As a result many pediatric refugees arrive with prominent medical and mental health issues, disabilities, and chronic disorders.[7] Oral health is not only essential to overall wellbeing but a fundamental human right.[8] Oral diseases can lead to systemic consequences such as pre-term birth, low birth weight, heart disease, and several other preventable diseases.[8] However, treatment is very costly. The World Health Organization (WHO) estimated oral diseases to be most prevalent non-communicable diseases in the world. Among children, untreated caries in deciduous teeth affected 573 million worldwide.[8,9] At the global scale, the overall prevalence of dental caries in refugee children ranged from 15.1 to 85%.[10] Most refugees perceived their oral health status as poor and thought to be in need of dental intervention.[11] In Sweden, over the years 1975 to 1985, only 38% of the refugees had visited a dentist over a 10-year period.[12] However, they had high dental consumption, especially oral surgery and endodontic therapy, irrespective of their home

countries.[12] In that same study it took an average 4.5 years between application for refugee status and the first dental visit.[12] In another study of pediatric refugees in Sweden, half of the resettled children had untreated dental caries.[7] In Canada, in the years 2013 to middle of 2016, most of the refugee children had never seen a dentist prior to their settlement in the country and had higher DMFT scores than Canadian children (7.29±5.1 vs 4.47±5, respectively).[13] In addition, these children had more malocclusion, especially anterior cross bite, than their native counterparts. In Massachusetts, refugee children had four time more urgent dental care needs than US-born children.[6] In that same state, untreated caries rates for refugee children of certain origins (particularly Eastern Europe), was found to be more than nine times (9.32) than American white children.[6] Refugee children from different countries of origin may also have different oral disease burdens. More Asian refugees had moderate to high caries risk (64% vs 30.7%) as compared to African refugees.[14] More adolescents (13-18 years old) missed their dental appointments, and younger children (2-5 years old) were more likely to require general anesthesia for dental treatment according to that same study.[14] In Australia, African born refugee children were more likely to be referred to obtain further dental care than Australian born children.[10] The US Federal Refugee Act of 1980 mandates that all newly arrived refugees are entitled to a comprehensive health assessment upon arrival, but this does not include oral assessment.[15] Understanding the burden of oral diseases of newly resettled refugees will assist policy makers in advocating for providing appropriate funding towards oral health and allowing refugees to establish a dental home. This will in turn help the development of effective policies and practices suited to their needs.[13]

In order to describe the characteristics of refugee children who received oral health care and to determine factors associated with dental utilization, we proposed a study of oral health in WA refugees aged 0-20. In collaboration with the WA Department of Health (DOH), the WA

Department of Social and Health Services (DSHS), and the WA Health Care Authority (HCA), we collected Medicaid data of refugees who resettled in 2015 in the State of Washington. We hypothesized that dental services requested among refugee children varied based on the region of origin.

II. METHODS

1. Study Population

This cross-sectional study was approved by the Washington State Institutional Review Board (#Project 2019-108). Our population included refugees who were 21 years of age or younger and enrolled in WA Medicaid between January 1, 2015, and December 31, 2015.

2. Data Sources and Data Variables

Upon arrival in Washington State and as part of their Refugee Health Screening Database (RHSD), each refugee was assigned by DOH with a unique ID, also known as an "Alien Number". DSHS then matched that ID to the Medicaid HCA number through the Automated Client Eligibility System (ACES). This allowed HCA to be able to obtain Medicaid data elements for the relevant refugee Medicaid user. This data sharing between DOH, DSHS, and HCA resulted in a comprehensive de-identified dataset that was given to us through HCA's Secure File Transfer (SFT) process. For this study, Medicaid data elements included demographics (consistently available in records: sex, country of origin, country of birth, ethnicity), zip code, special care needs (Y/N), dates of dental encounter, and dental visits (with relevant dental billing codes).

There are many plans under the State's Apple Health (Medicaid) program. The Categorically Needy Program and the Alternative Benefits Plan share most of the benefits where

they are typically covered under the age of 21 (general dental, orthodontics, and vision). The majority of the remaining services do not have any age limit.[16] For this study, all programs under WA Medicaid were included. We then determined the most common dental services accessed by pediatric refugee Medicaid users. We used dental visits with dental procedures from the provided Medicaid data elements. The types of dental procedures were then categorized as Any dental, Preventive, Restorative, or Surgical. Dental procedure billing codes aided in categorizing the various dental visits into the four categories. Specifically, preventive care included diagnostic care (examinations, radiographs, other diagnostic imaging, and diagnostic tests) was defined as Current Dental Terminology (CDT-9) billing codes D0120 to D0470, dental prophylaxis, topical fluoride placement, nutritional/tobacco/hygiene counseling, pit-and-fissure sealants, preventative restorations, caries arresting medicaments, and space maintainers (D1110 to D1575). Restorative care included composite or amalgam fillings (D2140 to D2394), crowns and provisional crowns, resin infiltration, reattachment of tooth fragments, stainless steel crowns, provisional restorations, interim therapeutic restorations, protective restorations, and core build-ups (D2710 to D2954). Endodontic care comprised of pulp capping, pulpotomy, pulpectomy, root canal treatment, and endodontic surgeries (D3110 to D3470). Periodontal care was surgical, non-surgical, and other periodontal services (D4210 to D4910). Surgery included extractions, manipulation of bone and soft tissues, biopsies, and fracture repairs (D7111 to D7999).

Washington State defines disabled status as someone who is “unable to engage in any substantially gainful work activity because of a medically determinable physical or mental impairment which is expected to last for 12 continuous months or result in death”.[17] Disabilities could include any disorders affecting neurological, musculoskeletal, organs (respiratory, speech,

cardiovascular, reproductive, digestive, genitor-urinary, hemic and lymphatic, skin and endocrine) or any mental, developmental, traumatic or psychological disorders.[18]

3. Data Analysis

De-identified and password protected data from DSHS was sent out to the research team in spreadsheet format. There were two datasets: one set included the Medicaid eligibility status in 2015 and the other set included dental related claims in 2015 and 2016. We merged the two data sets, including children aged 0 to 20 who had been eligible for Medicaid for at least 12 months. The procedure codes were transformed into dental procedures such as Diagnostic, Preventive, Restorative, Endodontic, Periodontic, Orthodontic, Sedation, and Miscellaneous. The outcomes of this analysis were condensed to four categories: Preventive, Restorative, Surgical, and Any dental service claims. Region of origin was categorized into Africa, Asia, Europe, and the Middle East. Disability status included indicators of disability such as blindness. Descriptive analyses were performed to summarize the different dental services utilized by the Medicaid pediatric refugee patients. One-way ANOVA was performed to check if utilization of dental services differs across age groups, gender, race/ethnicity, region of origin, language, and disability status. Critical values for statistical significance were set at 5%.

III. RESULTS

In 2015 1,114 refugee children resettled in the State of Washington. The majority were males (55.6%) with 13- to 20-year-olds (37.3%) being the largest group. Young children (0-6 years old) represented 35.0% of the population while the percentage of children in the 7 to 12-year-old age group was 27.7%. In term of nationalities, the five countries of origin with the highest

percentage of refugee children were Ukraine (22.5%), Iraq (19.7%), Myanmar (Burma) (12.9%), Somalia (11.3%) and Eritrea (4.2%). We further clustered countries of origin into large geographical regions: thus, 27.5% of the refugee children came from Europe, 26.4% from Africa, 25.1% from the Middle East, 20.6% from Asia, and 0.5% from the Americas. The races of the refugee children were white (33.1%), black (18.9%), Pacific Islander (6.9%), Asian (2.8%), and other (15.8%). Race was not identified in 22.5% of the refugee children. Only 1.4% of the children had the disabled status (Table 1).

From the 1,114 refugee children who arrived to WA State in 2015, 870 had at least one dental visit within 12 months of arrival (data from 2015–2016) (Table 2). The number of refugee children receiving Preventative, Restorative, and Surgery services were 812, 592, and 250, respectively. The mean ± standard deviation and median (interquartile range—IQR) for Any dental visit, Preventative, Restorative, and Surgical visits were 12.19±7.12 and 12 (1-59); 3.13±1.64 and 3 (1-10); 3.83±2.58 and 3 (1-16); 1.44±0.73 and 1 (1-4), respectively. There were 244 children who did not request any dental service in the Medicaid system.

Dental utilization of refugee children significantly varied by age group ($p = 0.0144$, Table 3). Overall, youngsters aged 7-12 years had more dental visits (mean 13.2) compared to the ones aged 13-20 years (12.1) and to 0 to 6 years (11.5). When dental visits were analyzed by type, children aged 0-6 years had the most utilization of preventative treatment (3.4, $p < 0.0001$). On the contrary, the oldest age group 13-20 had the most restorative encounters (4.5, $p < 0.0001$). While the 7-12 age group was the one utilizing the most surgical services (1.5), differences were not statistically significant ($p = 0.11$) when compared with the rest of the age groups.

The number of dental visits differed by sex with females utilizing services the most. Specifically, females had higher Any type of dental visits (mean 12.4, $p < 0.0001$) than their male

counterparts (12.1). Female refugee children also had more restorative visits (3.9, $p < 0.0001$) than males (3.8). Differences between males and females for the mean number of preventative ($p = 0.19$) and surgery ($p=0.52$) visits were observed with higher visits in females.

Utilization of dental services varied by different races/ethnicities. Overall, white refugee children utilized the most dental services (mean 14.2) while black children were the group with the lowest utilization (9.6). In the preventative category, the other race group had highest utilization (3.2) while Asian children had lowest utilization (2.8). White refugee children also utilized the most restorative services (4.4), and black children utilized the least (2.9). In the surgery category, Pacific Islander children utilized the most (1.8) while Asian children utilized the least (1.0). Differences in dental claims by race/ethnicity were not statistically significant ($p = 0.45$).

With regard to region of origin, refugee children from Europe tended to have the highest of any dental utilization (mean 14.4), and those from the Americas had the lowest (9.6). Middle Eastern children utilized the most preventative service (3.3) while those from Africa utilized the least (2.9). European children also utilized restorative (4.6) and surgery (1.5) the most. Those from the Americas had the lower number of restorative (2.0) as well as surgery visits (1.0).

With respect to language, refugee children speaking any European language had the highest Any type of dental visit (13.8), Restorative utilization (4.4), and Surgery (1.6). A consistent trend was observed for lowest dental utilization in all categories in children speaking any African language: Any dental visit (mean 8.9), Preventative (2.8), Restorative (2.6), Surgery (1.1). None of the findings from race/ethnicity, region of origin, or language was statistically significant.

Refugee children with disabled status had higher dental utilization than non-disabled children (mean 12.5 vs 12.2, $p < 0.0001$). Non-significant differences in mean numbers of preventative (3.2 vs 3.1) and surgery (1 vs 1.5) were observed between refugee children with

disabled status versus non-disabled status. However, disabled children had fewer restorative visits than their non-disabled counterpart (2.9 vs 3.9, $p < 0.0001$).

IV. DISCUSSIONS

Using Medicaid dental claims of Washington state, we aimed at describing characteristics and determining factors associated with dental utilization by refugee children. We hypothesized that dental claims varied based on region of origin. Of the 1,114 refugee children and adolescents (aged 21 years or less) resettled in 2015, 78% accessed dental services within the initial 12 months after arrival. A total of 870 dental claims were registered with an average of 12.2 ± 7.1 per individual with preventive the most common type of services requested. Our findings did not support the hypothesis that region of origin had a significant impact on dental utilization. However, we found that age (p=0.0144), sex (p<0.0001), and disability status (p<0.0001) were relevant characteristics associated with dental claims in our Medicaid database. As these characteristics were not part of our *a priori* study design, these results serve as indicators of possible areas of further research.

Previous studies have found differences in dental caries experience (existing restorations and missing teeth) and untreated caries among refugee children based on regions of origin. Cote *et al.* showed that during initial examination upon arrival in the USA, African children had both significantly less caries experience and untreated caries than European children.[6] Similar findings were discovered in Australia where African refugee children were much less likely to have dental caries as compared to their Asian and Middle Eastern peers.[10] Factors related included but were not restricted to limited access to a western cariogenic diet[6] in addition to the regular use of miswaks chewing sticks[19] as an alternative for conventional toothbrushing. Miswak sticks come

from the *Salvadora persica* plant where one end is cut to form "bristle like" fibers, which is chewed to form a brush[20]. The benefits of miswak chewing include its anti-plaque, anti-gingivitis, and anti-cariogenic (it contains fluoride) effects. In addition, its benefits have been cited as that it stimulates gingival healing, and promotes oral health as well as its affordability and availability.[20] Post resettlement, miswak chewing may gradually decline due to societal norms and lack of availability in the refugee's new location. In our study population, we found that on average refugee children from Africa had fewer dental claims on average than those from Europe in all four visit categories during the first year of resettlement: mean Any dental visits 9.7 ± 8 versus 14.4 ± 14, Preventative 2.9 ± 2 vs 3.2 ± 3, Restorative 2.9 ± 2 vs 4.6 ± 4 and Surgery 1.4 ± 1 versus 1.5 ± 1. However, post-resettlement refugee children may undergo "nutrition transition".[21] This refers to forgoing an old-style, whole-food diet to adopting a greatly processed diet that is high in sugar, fat, and salt. This is commonly known as the "western diet".[21] Studies have shown that the prevalence and severity of dental caries increased with exposure to this diet.[22] Looking more broadly, decreased miswak chewing and dietary changes are only two variables in the acculturation process, which is defined as "cultural adaptation that happens when groups of people from different cultures come into continuous contact with one another".[23] Interestingly, different degrees of acculturation associate with different caries risks: moderate levels of acculturation have worse oral health compared with those with high or low acculturation.[24] Because of the new exposure to a western cariogenic diet, loss of protective effects of miswak chewing, and possible adoption of moderate acculturation, efforts to increase access to a dental home should be prioritized during the resettlement period.

Our results found that refugee children aged 0 to 6 years had the highest number of dental claims with preventative services being the type of service most utilized. A relevant factor could be attributed to Washington Medicaid's Access to Baby and Children Dentistry (ABCD) program.

The program aims at reducing the gaps in oral health for young children by reducing dental disease by early introduction of preventative dental care. The ABCD program places a focus on early intervention, prevention, education, and comprehensive care. The program also offers assistance and case management for families. In addition, the ABCD-qualified providers receive enhanced reimbursement for diagnostic and preventative visits. The program has been a success story in Washington with ABCD-enrolled children being five times more likely to receive any dental care compared with those not in the program.[25] In an interventional study, an enrollment effect was seen in ABCD children (with dental utilization twice as high as in non-ABCD children), but the dissimilarity between groups in that county was not observed in the post enrollment period (2 months) as well as into the end of the second year of the same study.[26] This, however, was considered a positive outcome as the dental utilization in both groups within the county were still higher than the entire Medicaid program in Washington state by nearly 10%.[26] The authors argued that families of non-ABCD children were possibly made aware and responded positively to oral health efforts at the community level. Thus, the overall level of preventive dental activities in the county was also enhanced.[26] This enhancement could potentially dissolve the differences between ABCD and non-ABCD children as mentioned above.[26] In a different study of third graders, children from the county with the ABCD program had better oral health than children from the non-ABCD county with more sound teeth and fewer crowned as well as prematurely missing primary teeth.[25, 27] Of note, the dental education and information that parents of ABCD-enrolled children receive may also be beneficial for and applicable to siblings as well as other family members.

Both females (44.3%) and children with disabled status (1.4%) utilized significantly more dental services than males ($p<0.0001$) and children without the disabled status ($p<0.0001$),

respectively. There is evidence of "greater cultural importance placed on girls' esthetics"[28] as well as a suggested association between such higher caries prevalence in females due to endocrine induced (estrogen) changes that lead to lower quality and quantity of saliva.[29] With respect to children with disabled status, studies have showed that they possess an increased risk for oral diseases[30-32] which can be related to medical morbidities such as compromised immunity (leukemia or other malignancies and HIV) or cardiac conditions associated with endocarditis.[33] Prior to undergoing treatment for some of these conditions (*e.g.* immunosuppressive therapy and/or radiation therapy), children are required to undergo thorough oral health care clearance that includes the treatment of active dental caries to prevent infection that might complicate medical treatment.[34] The medical team recognizes that potential risks in delaying dental care include postponed transplants, critical surgeries, breathing issues, and infections.[30] During and after certain medical therapies the patients can also develop oral sequalae such as mucositis, sensitivity, xerostomia, trismus, and graft versus host disease (GVHD).[34] Additionally, an increased risk of oral disease can also be seen in those patients with congenital oral conditions such as cleft lip and cleft palate, which may not only require medical but also dental therapy of an extended nature and overlap with growth and development.[33] As a result, the children with disabled statuses are often under frequent dental monitoring, which in turn results in higher dental utilization. Current Medicaid coverage in the state of Washington also includes dental treatment under general anesthesia for children with special health care needs where multiple dental therapies can be accomplished in a single visit.

Our project has several limitations. Firstly, it was a cross-sectional study. However, it is the first one describing the characteristics of a large number of children requesting Medicaid dental services and elucidating factors related to dental utilization at the state level. We believe that our

findings will provide much-needed baseline evidence for hypothesis generating and policy making that improves refugees' oral health. Secondly, we were restricted to the variables available from the Medicaid database. Diagnostic codes were not available in our dataset (provided by DSHS). We attempted to overcome this challenge by grouping claims based on the type of services (any, preventive, restorative, and surgical). Finally, the dataset studied was from 2015. While more recent data would have been preferred, our collaborators at the DSHS, HCA and DOH recommended this dataset as it was the one that fully embraced a federal administration welcoming refugees. For the future, our results should permit comparison of demographics and dental utilization in refugee children before and after this policy change.

V. CONCLUSIONS

One out of five refugee children did not seek any dental care within one year of arriving in Washington state in 2015. We found significant differences in dental utilization based on age, sex, and disabled status. Refugee children of 0-6 year of age had most dental utilization overall as well as preventative services. Race, region of origin, and language spoken were not found to be significantly associated with dental utilization. Our findings support that integrating oral health within the resettlement process of newly arrived refugees should increase access to oral health care and therefore improves the quality of life of this vulnerable immigrant population.

VI. REFERENCES

1. Code US. Immigration and Nationality Act (INA) 8. *https://www.uscis.gov/laws-and-policy/legislation/immigration-and-nationality-act*; 1952. Access 06/01/2021.
2. United Nations High Commissioner for Refugees TURA. Refugee Data Finder. *https://www.unhcr.org/refugee-statistics/*; Access 01/11/2021.
3. Center RP. Admissions and Arrivals. *https://www.wrapsnet.org/admissions-and-arrivals/*; Access 01/11/2021.
4. National Immigration F. Fact Sheet: U.S. Refugee Resettlement. 2019.
5. Peterson S. Washington State's Refugee Resettlement Program. *https://www.kingcounty.gov/depts/health/locations/health-insurance/access-and-outreach/~/media/depts/health/health-insurance/documents/FFF-2018/FFF-April-2018-DSHS-Refugee-Resettlement.ashx*.
6. Cote S, Geltman P, Nunn M, et al. Dental caries of refugee children compared with US children. Pediatrics. 2004;114(6):e733-e40.
7. Hjern A, Kling S. Health Care Needs in School-Age Refugee Children. International Journal of Environmental Research and Public Health. 2019;16(21).
8. Glick M, Monteiro da Silva O, Seeberger GK, et al. FDI Vision 2020: shaping the future of oral health. International Dental Journal. 2012;62(6):278-91.
9. Kassebaum NJ, Smith AGC, Bernabé E, et al. Global, Regional, and National Prevalence, Incidence, and Disability-Adjusted Life Years for Oral Conditions for 195 Countries, 1990-2015: A Systematic Analysis for the Global Burden of Diseases, Injuries, and Risk Factors. Journal of Dental Research / 2017;96(4):380-87.
10. Quach A, Laemmle-Ruff IL, Polizzi T, Paxton GA. Gaps in smiles and services: a cross-sectional study of dental caries in refugee-background children. BMC Oral Health 2015;15(1):10-10.
11. Høyvik AC, Lie B, Grjibovski AM, Willumsen T. Oral Health Challenges in Refugees from the Middle East and Africa: A Comparative Study. Journal of Immigrant and Minority Health. 2019;21(3):443-50.
12. Zimmerman M, Bornstein R, Martinsson T. Utilization of dental services in refugees in Sweden 1975-1985. Community Dentistry and Oral Epidemiology. 1995;23(2):95-99.
13. Moreau A-M, Hennous F, Dabbagh B, Ferraz Dos Santos B. Oral Health Status of Refugee Children in Montreal. Journal of Immigrant and Minority Health. 2019;21(4):693-98.
14. Ogawa JT, Kiang J, Watts D-J, Hirway P, Lewis C. Oral Health and Dental Clinic Attendance in Pediatric Refugees. Pediatric dentistry. 2019;41(1):31-34.
15. Regulation CoF. Code of Federal Regulation- Refugee Medical Assistance, Scope of Medical Services, Medical screening. 400.107 *https://www.govinfo.gov/content/pkg/CFR-1998-title45-vol2/pdf/CFR-1998-title45-vol2-chapIV.pdf*; 1980.
16. . Washington Apple Health (Medicaid) Program. *https://www.hca.wa.gov/assets/free-or-low-cost/22-315.pdf*.
17. Services WDoHaH. Disability Determination Services Process Review. *https://www.dshs.wa.gov/esa/disability-determination-services/disability-determination-services-process-review*; Accessed 04/02/2021.
18. Legislature WS. Revised Codes of Washington 49.60.040. *https://app.leg.wa.gov/rcw/default.aspx?cite=49.60.040;* Access June 06, 2021.

19. Darout IA, Albandar JM, Skaug N, Ali RW. Salivary microbiota levels in relation to periodontal status, experience of caries and miswak use in Sudanese adults. Journal of Clinical Periodontology. 2002;29(5):411-20.
20. Nordin A, Bin Saim A, Ramli R, et al. Miswak and oral health: An evidence-based review. Saudi Journal of Biological Sciences. 2020;27(7):1801-10.
21. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. Nutrition Reviews. 2012;70(1):3-21.
22. Mascarenhas AK. Determinants of caries prevalence and severity in higher SES Indian children. Community Dental Health. 1999;16(2):107-13.
23. Beck CT, Froman RD, Bernal H. Acculturation level and postpartum depression in Hispanic mothers. MCN, the American Journal of Maternal Child Nursing.;30(5):299-304.
24. Hunter-Adams J, Cochran J, Laird LD, Paasche-Orlow MK, Geltman PL. Acculturation and a Potential Relationship with Oral Health Outcomes Among Somali Refugees in Massachusetts. Journal of Immigrant and Minority Health. 2018;20(2):351-59.
25. Grembowski D, Milgrom PM. Increasing access to dental care for medicaid preschool children: the Access to Baby and Child Dentistry (ABCD) program. Public health reports.;115(5):448-59.
26. Kaakko T, Skaret E, Getz T, et al. An ABCD program to increase access to dental care for children enrolled in Medicaid in a rural county. Journal of Public Dealth Dentistry. 2002;62(1):45-50.
27. Kobayashi M, Chi D, Coldwell SE, Domoto P, Milgrom P. The effectiveness and estimated costs of the access to baby and child dentistry program in Washington State. The Journal of the American Dental Association : JADA. 2005;136(9):1257-63.
28. Shaffer JR, Leslie EJ, Feingold E, et al. Caries Experience Differs between Females and Males across Age Groups in Northern Appalachia. International Journal of Dentistry. 2015;2015:938213.
29. Lukacs JR, Largaespada LL. Explaining sex differences in dental caries prevalence: saliva, hormones, and "life-history" etiologies. American Journal of Human Biology : the Official Journal of the Human Biology Council.;18(4):540-55.
30. Mouradian WE, Wehr E, Crall JJ. Disparities in children's oral health and access to dental care. JAMA : the Journal of the American Medical Association.;284(20):2625-31.
31. Oral health in America: a report of the Surgeon General. Journal of the California Dental Association. 2000;28(9):685-95.
32. Foster H, Fitzgerald J. Dental disease in children with chronic illness. Archives of Disease in Childhood. 2005;90(7):703-08.
33. Management of Dental Patients with Special Health Care Needs. Pediatric Dentistry. 2017;39(6):229-34.
34. Dental Management of Pediatric Patients Receiving Immunosuppressive Therapy and/or Radiation Therapy. Pediatric Dentistry. 2018;40(6):392-400.

Table 1: Demographics of refugee children enrolled in Washington's Medicaid program in 2015.

Variable	Group	N (%)
Age group	**Group 1: 0-6**	390 (35.01%)
	Group 2: 7-12	308 (27.65%)
	Group 3: 13-20	416 (37.34%)
Sex	**Female**	495 (44.43%)
	Male	619 (55.57%)
Race/Ethnicity	**Asian**	31 (2.78%)
	Black	210 (18.85%)
	Not Provided	251 (22.53%)
	Other	176 (15.8%)
	Pacific Islander	77 (6.91%)
	White	369 (33.12%)
Country of origin	**Africa: Burundi, Congo, Congo DR, Egypt, Eritrea, Ethiopia, Rwanda, Somalia, Sudan, Tanzania United Rep, Uganda, Zambia**	294 (26.39%)
	Americas: Columbia, Cuba	5 (0.45%)
	Asia: Afghanistan, Bhutan, Burma, Kazakhstan, Nepal , Sri Lanka, Vietnam	229 (20.56%)
	Europe: Belarus, Georgia, Moldova, Russia, Ukraine	306 (27.47%)
	Middle East: Iran , Iraq, Kuwait, Syria	280 (25.13%)
Language	**African: Amharic, Oromo, Swahili**	181 (16.25%)
	Asian: Burmese, Dari, Malay, Tamil, Tigrinya, Vietnamese	156 (14%)
	European: English, French, Romanian, Russian, Spanish Castilian, Ukrainian	386 (34.65%)
	Middle Eastern: Arabic, Farsi, Persian, Turkish	294 (26.39%)
	Other Language	97 (8.71%)
Disabled	**No**	1098 (98.56%)
	Yes	16 (1.44%)

Table 2: Requested Dental Services of refugee children in Washington enrolled in Medicaid in 2015 - 2016.

Variable	Any dental visit	Preventative	Restorative	Surgery
N	870	812	592	250
Mean (Std Dev) *	12.19 (7.12)	3.13 (1.64)	3.83 (2.58)	1.44 (0.73)
Median (IQR)**	12 (1-59)	3 (1-10)	3 (1-16)	1 (1-4)
Quartile Range	9	2	3	1
Non-utilized	244			

Non-utilized + N = total number of refugee children (1114).
* Standard Deviation, *** Interquartile Range

Table 3: Mean and median dental visits by the characteristics of the refugee children enrolled in Medicaid in Washington in 2015

		Any dental visit			Preventative			Restorative			Surgery		
Variable	**Group**	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**
Age group	**Group 1: 0-6**	317	11.45	11	308	3.41	3	166	3.12	3	87	1.32	1
	Group 2: 7-12	267	13.16	12	261	3.38	3	194	3.69	3	110	1.54	1
	Group 3: 13-20	286	12.1	11.5	243	2.5	2	232	4.45	4	53	1.42	1
	***p*-value**	0.0144			<0.0001			<0.0001			0.1169		
Sex	**Female**	392	12.36	12	368	3.18	3	271	3.85	3	115	1.46	1
	Male	478	12.05	11.5	444	3.08	3	321	3.82	3	135	1.41	1
	***p*-value**	<0.0001			0.1948			<0.0001			0.5185		
Race/Ethnicity	**Asian**	19	10.89	11	19	2.84	3	14	2.93	3	7	1	1
	Black	175	9.64	8	164	2.92	2	92	2.85	2.5	31	1.35	1
	Not Provided	198	12.13	12	186	3.19	3	131	3.63	3	55	1.51	1
	Other	145	11.93	11	128	3.22	3	98	3.88	3	44	1.32	1
	Pacific Islander	54	11.5	12	54	3.17	2	36	3.89	4	16	1.81	2
	White	279	14.18	13	261	3.18	3	221	4.38	4	97	1.44	1
	***p*-value**	0.4512			0.9604			0.2855			0.2271		
Region of origin	**Africa**	224	9.67	8	209	2.89	2	117	2.86	2	42	1.4	1
	Americas	5	9.6	10	5	3.2	4	4	2	1	1	1	1
	Asia	169	11.15	11	154	3.2	3	114	3.68	3	53	1.3	1
	Europe	242	14.43	14	226	3.17	3	190	4.58	4	79	1.51	1
	Middle East	230	13.1	12	218	3.25	3	167	3.8	3	75	1.48	1
	***p*-value**	0.8685			0.8383			0.2514			0.0845		
Language	**African**	134	8.85	8	124	2.77	2	61	2.61	2	18	1.11	1
	Asian	133	11.22	11	127	3.26	3	91	3.52	3	37	1.3	1
	European	311	13.83	13	289	3.24	3	230	4.43	4	99	1.55	1
	Middle Eastern	239	12.62	12	222	3.07	3	177	3.69	3	78	1.44	1
	Other Language	53	11.47	10	50	3.24	3	33	3.48	3	18	1.44	1
	***p*-value**	0.5243			0.3492			0.8925			0.6184		
Disabled	**N**	856	12.18	12	798	3.12	3	582	3.85	3	242	1.45	1
	Y	14	12.5	11.5	14	3.21	2	10	2.9	2	8	1	1
	***p*-value**	<0.0001			0.0771			<0.0001			0.1251		