Longitudinal assessment of dental utilization in pediatric refugees resettled in Washington state

Tung Le Nguyen

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Committee:

Ana Lucia Seminario

Frank Roberts

Yan Wang

Program Authorized to Offer Degree:

University of Washington Department of Pediatric Dentistry

University of Washington

Abstract

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Tung Le Nguyen

Chair of the Supervisory Committee:

Ana Lucia Seminario

Department of Pediatric Dentistry

Purpose: Existing literature surrounding pediatric refugee oral health is limited. Further understanding of dental utilization in this population is necessary for driving policy and resources to support pediatric refugee oral health. This study compares dental utilization between pediatric refugees resettled in Washington (WA) State and Medicaid eligible pediatric non-refugee residents.

Methods: This retrospective longitudinal study utilized a dataset generated from a collaborative effort between the Washington State Health Care Authority, the Department of Health, and the Department of Social and Health Services. The 1,125 pediatric refugees were matched based on sex, age, and Medicaid enrollment date in an approximate ratio of 1:3 with 3,462 pediatric non-refugees. Both groups were followed over 36 months from 2015-2018. Medicaid data including

demographics, disability status, dental claims dates and codes were analyzed using descriptive statistics and ANOVA.

Results: Of the 1,125 pediatric refugees settled in WA State in 2015 most refugee children were non-disabled, reported White race, and were between 0-6 years of age. From 2015-2018, 90% of pediatric refugees utilized dental services compared to 81% of pediatric non-refugees. Over the 36 months, refugee children had 1.4 times more overall mean claims, 1.3 times more diagnostic mean claims, 1.9 times more surgery mean claims and 2.4 times more restorative mean claims than non-refugee children. In Year One, pediatric refugees showed higher overall mean claims and mean claims by individual categories than pediatric non-refugees except for orthodontics and miscellaneous. There was a year over year decrease for pediatric refugees in overall mean claims and mean claims in all individual categories except for orthodontics which showed an increase.

Conclusion: From 2015-2018 newly resettled pediatric refugees utilized dental care at a higher rate than non-refugees and consumed more dental services. Pediatric refugees initially had greater acute dental needs than pediatric non-refugees and consumed more restorative and surgical services. This trended lower year by year and was ultimately comparable to levels observed in pediatric non-refugees by Year Three.

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I. INTRODUCTION

Across the globe there is an ongoing crisis of people being forced from their homes in record numbers due to conflict, violence, national instabilities, human rights violations, food insecurities, and political persecutions.[1] At the close of 2020 there were a staggering 82.4 million forcibly displaced peoples, including an estimated 35 million children.[2] While children make up roughly 30% of the total world population, they account for 42% of all forcibly displaced peoples.[1] Refugees represent a diverse and vulnerable group whose exposure to disrupted healthcare systems in their countries of origin place them at risk for poorer health status and outcomes.[3] There is also evidence that refugee families commonly experience barriers to accessing appropriate and meaningful health services.[4]

Oral health is a key component and indicator for overall health and wellbeing.[5] Oral diseases are the most common non-communicable diseases worldwide and present a significant challenge for many countries, causing pain, discomfort, disfigurement, death, and financial burden.[6] The literature surrounding pediatric refugee oral health is particularly limited. Refugee children are at increased risk for poor health due to adversity experienced early in life that may impact long-term health, development, and wellbeing.[4] A study in Montreal demonstrated refugee status as a risk factor for poorer oral health. Specifically, refugee children had higher caries experience, more untreated caries, and worse oral hygiene scores compared to Canadian (host country) children.[7] A separate Canadian study noted that among refugees, over 75% of teeth affected by caries remained untreated, highlighting the considerable oral disease burden in this population.[8] Meanwhile in Europe, German based studies concluded that newly arrived refugees showed higher prevalence of untreated caries, poorer oral hygiene and that 84% of refugee study participants had not visited a dentist during their childhood.[9,10] Current pediatric

refugee oral health data within the United States does not address large populations, but rather random community samples.

The United States has a long track record of welcoming refugees and remains a major resettlement destination.[11] Resettlement is the process of relocating refugees from an asylum nation to a country that grants permanent residence.[12] A scoping review demonstrated that refugee populations suffered a higher burden of oral disease and limited access to oral healthcare compared to even the least privileged populations in the host countries.[13] Dental care is a major unmet health need in refugee children resettling in the United States.[14] Washington State ranks second among U.S states for resettling refugees.[15] While research on refugee caries prevalence is available, information on refugee dental utilization is lacking. A Swedish study highlighted that refugee dental utilization was low compared to a normal Swedish population and concluded that there is a need for further studies on refugee dental utilization.[16] Solid data is needed to drive programs and policy to support and care for this vulnerable pediatric population in Washington State. This study aims to investigate the overall dental utilization and types of dental services accessed by pediatric refugees resettling in Washington State between 2015-2018 compared to Medicaid eligible pediatric non-refugees. Upon resettling in the United States, eligible refugees are enrolled in Medicaid, a government health insurance program available to individuals with limited income. Compared to non-refugee Medicaid enrolled children, we hypothesized that refugee children will have higher overall dental utilization and will utilize more surgical and restorative dental services during the first 12 months after arrival but by the end of the 36-month follow-up, the utilization of dental services will be similar. Results from this study will provide foundational data to construct interventional studies seeking to improve the oral health of pediatric refugees in Washington State.

II. RESEARCH METHODS

Study Design and Sample

This longitudinal study examined data collected over 36 months on pediatric refugees (<21 years of age) newly resettled in Washington State in 2015. The study populations consist of pediatric refugees and pediatric non-refugees younger than 21 years of age enrolled in Medicaid between January 1, 2015 and December 31, 2018. Age of study participants was calculated at the time of Medicaid enrollment in 2015. All 1,125 pediatric refugees resettled in Washington state in 2015 were included and represented in the study group. The control group consisted of 3,462 pediatric non-refugees matched to the refugee group by age, sex, and Medicaid enrollment date in an approximate ratio of 3:1.

Data Source and Study Variables

Upon arrival in Washington State each refugee participates in a health screening as part of the intake process. Refugee health information is compiled into the Refugee Health Screening Database (RHSD) and the Department of Health (DOH) gives each individual a unique ID/Alien Number. Refugees eligible for Medicaid are soon enrolled after their arrival and provided a Medicaid HCA (Health Care Authority) number. The Department of Social and Health Services (DSHS) is able to match DOH ID and Medicaid HCA number using the Automated Client Eligibility System (ACES). Shared data between these three agencies (DOH, HCA, and DSHS) has been sourced to build a comprehensive de-identified dataset. This study draws from the de-identified dataset and utilizes Medicaid data including demographics (age, sex, region of origin, race, language), disability status, dates of dental encounters, and dental claims codes. Age was sorted into several groups: 0-6, 7-12, and 13-20. Sex was labeled as male, female or other (other

category established due to inconsistency in reported sex for some refugees). Refugees were grouped into several regions of origin based on World Health Organization (WHO) established regions: Eastern Mediterranean, European, South-East Asia, African and other.[17] Disability status is based on the Washington DSHS definition of a disabled person as an individual who "must be unable to engage in any substantial gainful work activity because of a medically determined physical or mental impairment which is expected to last for 12 continuous months or result in death."[18]

The study investigated overall dental claims numbers and types of dental claims broken down into several categories based on Current Dental Terminology (CDT) codes. Dental care accessed by pediatric refugees was grouped into each of the following categories based upon CDT-9 codes: diagnostic, preventative, restorative, surgery, orthodontics, and miscellaneous. Diagnostic treatment codes included examinations, radiographs, and other diagnostic imaging/testing (D0120 – D0999). Preventative care included dental prophylaxis/cleanings, topical fluoride treatment, oral hygiene instruction, pit/fissure sealants, caries arresting medicaments, space maintainers, and preventative restorations (D1110 – D1550). Restorative treatments consisted of composite and amalgam restorations, core build-ups, protective restorations, and stainless-steel crowns (D2140 – D2999). Surgical treatments included extractions, biopsies, and fracture repairs (D7111 – D7960). Orthodontic therapy included the following code range D8020A – D8999. In addition, miscellaneous treatments include the following code ranges D4210 – D4355 and D9230 – D9952.

Data Analysis

Datasets for pediatric refugees and Medicaid eligible pediatric non-refugees were merged. The three state agencies defined the pediatric age range to be from ages 0 to 20. For the

purposes of this study, dental claims were defined as a request for payment for services and benefits received.[19] Descriptive analyses were utilized to examine demographics and summarize different dental services accessed by pediatric refugees and non-refugees. ANOVA was used to assess for differences between pediatric refugees and Medicaid eligible pediatric non-refugees. The significance level for the study was set at 5%.

III. RESULTS

Demographics Data

In 2015 1,125 pediatric refugees resettled in the state of Washington. Additionally, 3,462 matched pediatric non-refugees Medicaid-users were included in this study. Among the study refugee population, the majority of children were in the 0-6 age group (37%) and males (55%). White race (32%) was the most self-reported, followed by Other (23%), Black (9%), Not Provided (6%), and Asian/Pacific Islander (3%). Based on DSHS criteria, nearly all refugees reported non-disability status (98%). The primary regions of origin for refugees were Eastern Mediterranean (41%) followed by European (28%), South-East Asian (18%), African (12%) and other (1%). The top five self-reported spoken languages by region were European (76%), Multi-language (8%), Middle Eastern (6%), African (4%), and Asian (4%). When comparing the refugee and non-refugee groups, age groupings ($p=0.09$) and sex distribution (sex $p=0.21$) did not show significant differences due to the matching protocol employed. With regards to race demographics and disability status, there was a significant difference between refugees and non-refugees ($p<0.0001$). (Table 1)

3-Year Dental Utilization

Of the 1,125 pediatric refugees included in the study, 1,012 (90%) were classified as utilizers (those who had filed at least one dental claim between 2015-2018) while 2,809 (81%) pediatric non-refugees had filed a claim over the same period. There is a statistically significant difference in the percentage of utilizers between the two groups ($p<0.0001$). From 2015-2018, mean number of overall claims was 1.4 times higher for pediatric refugees than pediatric non-refugees ($p<0.0001$). Mean number of claims by categories was also higher for pediatric refugees than pediatric non-refugees in all areas except for orthodontics and miscellaneous. Differences in mean number of claims for all categories except for miscellaneous ($p=0.12$) were statistically significant ($p<0.05$) between pediatric refugees and pediatric non-refugees. Notably, from 2015-2018 the pediatric refugee group had 1.3 times more diagnostic mean claims, 2.4 times more restorative mean claims, and 1.9 times more surgery mean claims than pediatric non-refugees. (Table 2).

Dental Utilization Trends Within 3 Years After Resettlement

In Year One, pediatric refugees showed higher mean number of claims than pediatric non-refugees in both overall claims and by individual categories except for orthodontics and miscellaneous. Year One differences between pediatric refugees and pediatric non-refugees were statistically significant in all categories except miscellaneous ($p=0.07$). Notably at Year One, pediatric refugees had 1.8 times more overall mean claims, 3.6 times more restorative mean claims, and 3.6 times more surgery mean claims than pediatric non-refugees. In Year Two, refugee children showed higher mean number of claims than non-refugee children in both overall claims and in the categories of diagnostics, restorative, and surgery. Differences between pediatric refugees and non-refugees were significant in all categories except preventative ($p=0.97$), surgery ($p=0.07$) and miscellaneous ($p=0.16$). In Year Three, pediatric refugees

displayed higher mean number of claims than non-refugees overall and in the diagnostic and restorative categories. Differences in Year Three were significant for diagnostic ($p<0.0001$) and restorative ($p=0.001$) claims.

In the pediatric refugee group there is an observable year over year decrease in both mean total claims and mean claims by categories in all areas except for orthodontics, which showed an increase each year for refugees. Initially at Year One the number of total claims for refugee children is nearly twice that of non-refugee children. This discrepancy lessens each year, and the number of total claims between the two groups is comparable at year three. Interestingly, restorative and surgical claims are substantially higher for pediatric refugees at Year One but reduce by Year Three to be similar to that of pediatric non-refugees. (Table 3).

IV. DISCUSSION

An ongoing crisis of displacement has contributed to over 82.4 million documented refugees worldwide by the end of 2020.[2] Refugees flee from circumstances of insecurity and disrupted healthcare systems that place them at risk for poorer health.[3] Though some research on pediatric refugee caries prevalence is available, this data has been reported about random communities rather than large population groups, and reports on dental utilization remains lacking. As Washington is a leader in resettling refugees within the United States, it is critical to assess pediatric refugee dental utilization to support development of future programs and policies aimed at improving oral health for this vulnerable population. This study aimed to analyze overall dental utilization and types of dental services accessed by pediatric refugees resettling in Washington State between 2015-2018 compared to Medicaid eligible pediatric non-refugees. We hypothesized that compared to pediatric non-refugees, refugee children would initially have

higher overall utilization, with specifically higher restorative and surgical needs during Year One, and that dental utilization would be comparable between refugees and non-refugees by the end of the 3-year study period. Results from this study confirm the hypothesis that newly resettled pediatric refugees utilize dental services more than non-refugees, with a markedly higher initial consumption of restorative and surgical services that decreased over time to be on par with pediatric non-refugees. These findings on pediatric refugee dental utilization and comparisons with pediatric non-refugees may help drive future interventional studies aimed at supporting pediatrics refugees resettling in Washington State.

Under the Refugee Act in 2015 the United States resettled roughly 70,000 refugees with the leading origin countries being Burma (26%), Iraq (18%), Somalia (13%), Democratic Republic of Congo (11%), Bhutan (8.3%), and Iran (4.4%).[20] Our refugee cohort consisted of 1,125 resettled children with the majority hailing from the Eastern Mediterranean Region (41%), European Region (28%), South-East Asia Region (18%), and African Region (12%). With the exception of refugees originating from the European Region, our pediatric refugee group was representative of the origin region distribution of refugees resettled in the United States in 2015. Most pediatric refugees were non-disabled, reported White race, and were between 0-6 years old. Pediatric non-refugees were individually matched with pediatric refugees based on sex, age, and Medicaid enrollment date in an approximate ratio of 3:1 with notable differences observed in race and disability status reported ($p<.0001$). Race and disability status are significant factors to consider in supporting newly resettled refugees. A study comparing prevalence of caries experience and untreated decay between US children and refugee children found that caries experience in refugees varied by region of origin and race.[14] Furthermore, refugees may experience barriers to dental care relating to their race and country of origin including limited

language skills, cultural norms/influences, oral health beliefs, and perceived discrimination.[21] Impact of disability status on accessing dental care is highly relevant. A study assessing barriers to dental care for disabled schoolchildren found that only 31.8% of parents/caregivers did not encounter problems with accessing dental care and that only 42.1% of respondents were satisfied with their children's dental care.[22] Compounded with possible barriers related to race, disability status in pediatric refugees may further increase the challenges for this subset population to establish future dental homes.

Over the 36 months of follow-up most of the pediatric refugees (90%) resettled in WA state in 2015 accessed dental care and did so at a significantly higher percentage ($p<0.0001$) than pediatric non-refugees (81%). This finding contrasted with existing literature demonstrating low dental utilization in refugee populations. A study on Tibetan pediatric refugee in India highlighted that roughly 60% of the children had never received dental care[23], while a Swedish study found that only 38% of refugees residing in Sweden had ever accessed dental services.[16] High dental utilization in our pediatric refugee group may be explained by reviewing existing systems in WA State supporting the oral health of underserved communities. Washington State Medicaid dental coverage for children from birth to age 20 is robust, covering a wide range of services including exams, X-rays, cleanings, restorative treatment (fillings/crowns), fluoride treatments, extractions and orthodontics (with prior authorization).[24] Washington state continually demonstrates commitment to pediatric oral health with recent legislation in 2022 allocating $21.1 million in additional funding to increase pediatric dental reimbursement rates starting January 2023 with the goal of further increasing access to care.[25] In addition to Medicaid dental coverage, in 1995, the nationally recognized Access to Baby and Child Dentistry (ABCD) program was launched to connect Medicaid insured children from birth to age six with trained

dental providers in their communities with the ultimate goal of increasing dental utilization. Most recent reports highlight that 54% of Washington's Medicaid eligible young children are receiving ABCD's core preventative care and restorative services, making Washington State a national leader in access to dental care for low-income children. [26] Multiple studies have supported ABCD's effectiveness in increasing dental utilization and improving oral health in young children. A study on Washington pre-school aged children revealed higher dental utilization, lower reported dental fear, and higher parental satisfaction in the ABCD enrolled group compared to the non-ABCD group.[27] Another study found the ABCD program to be relatively inexpensive and effective in improving the oral health of third grade students in Eastern Washington.[28] Additionally, the University of Washington School of Dentistry Regional Initiatives in Dental Education (RIDE) program was launched in 2009 to train dentists tailored toward increasing access to rural and underserved populations in Washington.[29] Since the program's inception, over 70% of RIDE dental graduates have returned to rural and underserved communities in Washington State and the Pacific Northwest.[30] Beyond these existing measures, refugees may need additional support during the period immediately following resettlement.

From 2015-2018, pediatric refugees showed higher mean claims than pediatric non-refugees in both total claims and in all individual claims categories except for orthodontics and miscellaneous. This difference highlights the significant disparities in dental needs between newly resettled refugee children and Medicaid eligible non-refugee children in Washington. Our results were consistent with existing literature showing higher oral disease burden and prevalence in refugees compared to even the least privileged populations in the host country with the exception of orthodontic treatment needs.[13] Initially at Year One, pediatric refugees had nearly double the mean overall claims compared to pediatric non-refugees. Pediatric refugee

mean overall claims decreases year over year, and by Year Three is comparable to pediatric non-refugees (1.1 times as much). This trend reveals that newly resettled refugees overall dental consumption starts very high and requires a period of three years to decrease to a comparable level to that of non-refugees. It is critical to highlight that pediatric refugees initially have drastically higher restorative and surgical mean claims than non-refugees which reflects a high level of acute oral health needs. By Year Three consumption of restorative and surgical services decreases to be on par with pediatric non-refugees. Orthodontics stands apart as a unique category, showing a year over year increase in the pediatric refugee group. This may suggest as pediatric refugees become more settled and have addressed urgent/acute needs, they are able to explore more elective dental needs. As a whole, the aforementioned trends highlight that pediatric refugees may benefit from more initial support and resources to address high acute disease burden upon resettlement. Bolstering early intervention could target this vulnerable period after resettlement and help decrease the duration of time required for refugee dental consumption to align with non-refugee dental consumption.

There are several limitations to this study. The study relies heavily on Medicaid dental claims data that does not include oral health diagnoses. Within medicine, the International Classifications of Diseases (ICD-10) system is employed by physicians to classify diagnoses, symptoms, and procedures, providing them with the ability to clearly track diagnoses/morbidity associated with procedures.[31] ICD-10 codes are not routinely used within dentistry, so we are unable to assess specific oral disease burden in our study populations. To address this constraint, we collected CDT codes into like categories to serve as a proxy to compare the oral health needs in pediatric refugees vs non-refugees. Secondly, the matching protocol used in this study did not factor in race or disability status. However, we were able to compare large numbers of pediatric

non-refugees (3,462) to pediatric refugees (1,125) in an approximate ratio of 3:1 to produce our results. Lastly, our longitudinal data ends after 3 years of follow-up. An extended longitudinal assessment may provide additional insight on long-term trends of how pediatric refugees continue to access dental services as they become further settled. Nonetheless, our study was sourced from a robust dataset and provides solid foundational information by being the first multi-year comparison of dental utilization between pediatric refugees and pediatric non-refugees in the United States. Most importantly, our three-year study period adequately draws attention to the period following resettlement as a target for future interventional studies aimed at further supporting pediatric refugee oral health during this vulnerable time.

V. CONCLUSIONS

This study provides the first longitudinal comparison of dental utilization between newly resettled pediatric refugees and Medicaid eligible pediatric non-refugees in the United States. From 2015-2018, pediatric refugees utilized dental care at a higher rate and consumed more dental services than pediatric non-refugees, reflected in the higher number of mean claims. Initially at Year One, pediatric refugees demonstrated significantly higher restorative and surgical mean claims than pediatric non-refugees, indicating greater acute dental needs in the refugee group. By Year Three, mean overall claims, restorative claims and surgical claims decreased in pediatric refugees to be comparable to that of pediatric non-refugees.

VI. TABLES & FIGURES

Table 1: Demographic Characteristics of Refugee and Non-Refugee Groups

Variables		Refugee	Non-Refugee	p-value
Age group	Group 1: 0 - 6	417 (37.07%)	1249 (36.08%)	0.0848
	Group 2: 7 -12	307 (27.29%)	1062 (30.68%)	
	Group 3: 13-20	401 (35.64%)	1151 (33.25%)	
Sex	Female	494 (43.91%)	1567 (45.26%)	0.2140
	Male	623 (55.38%)	1883 (54.39%)	
	Other	8 (0.71%)	12 (0.35%)	
Race/Ethnicity	Asian/Pacific Islander	105 (9.33%)	159 (4.59%)	<.0001
	Black	209 (18.58%)	419 (12.10%)	
	Other	176 (15.64%)	739 (21.35%)	
	White	350 (31.11%)	1553 (44.86%)	
	Not Provided	250 (22.22%)	275 (7.94%)	
Disability	N	1106 (98.31%)	3115 (89.98%)	<.0001
	Y	19 (1.69%)	347 (10.02%)	

Table 2: Totals over 2015-2018. Number and % of utilizers (defined as having any dental claim within the 3-year study period). Means and standard deviations for all claims and by individual categories

Claims	Refugee (N=1125)	Control (N=3462)	p-value
Utilizer (N, %)	1012(89.96%)	2809(81.14%)	<.0001
All claims	29.92(18.26)	21.42(13.55)	<.0001
Diagnostic	11.60(7.26)	8.68(5.85)	<.0001
Preventive	7.55(5.15)	7.13(5.05)	0.0232
Restorative	6.75(5.78)	2.83(4.02)	<.0001
Surgery	1.19(2.08)	0.61(1.36)	<.0001
Orthodontics	0.15(0.88)	0.31(1.36)	0.0003
Miscellaneous	0.61(2.27)	0.71(1.60)	0.1215

Table 3: Claims data examined by year 1, 2 and 3. Means and standard deviations shown for each claims category

Claims By Years	Year 1			Year 2			Year 3		
	Refugee	Control	p-value	Refugee	Control	p-value	Refugee	Control	p-value
All claims	13.98(11.77)	7.67(7.34)	<.0001	8.66(8.82)	7.15(6.99)	<.0001	7.28(7.21)	6.59(6.86)	0.0070
Diagnostic	4.81(3.89)	3.02(2.78)	<.0001	3.48(3.50)	2.88(2.88)	<.0001	3.30(3.28)	2.78(2.96)	<.0001
Preventive	3.02(2.73)	2.56(2.62)	<.0001	2.38(2.53)	2.39(2.46)	0.9687	2.15(2.30)	2.19(2.48)	0.6521
Restorative	3.91(4.71)	1.08(2.57)	<.0001	1.77(3.31)	0.95(2.30)	<.0001	1.07(2.44)	0.80(2.17)	0.0013
Surgery	0.75(1.71)	0.21(0.79)	<.0001	0.25(0.89)	0.20(0.77)	0.0705	0.20(0.67)	0.20(0.81)	0.7686
Orthodontics	0.03(0.24)	0.11(0.55)	<.0001	0.05(0.36)	0.11(0.55)	0.0017	0.07(0.45)	0.10(0.54)	0.1245
Miscellaneous	0.24(1.18)	0.30(0.75)	0.0739	0.20(0.78)	0.24(0.68)	0.1562	0.17(0.68)	0.18(0.55)	0.7275

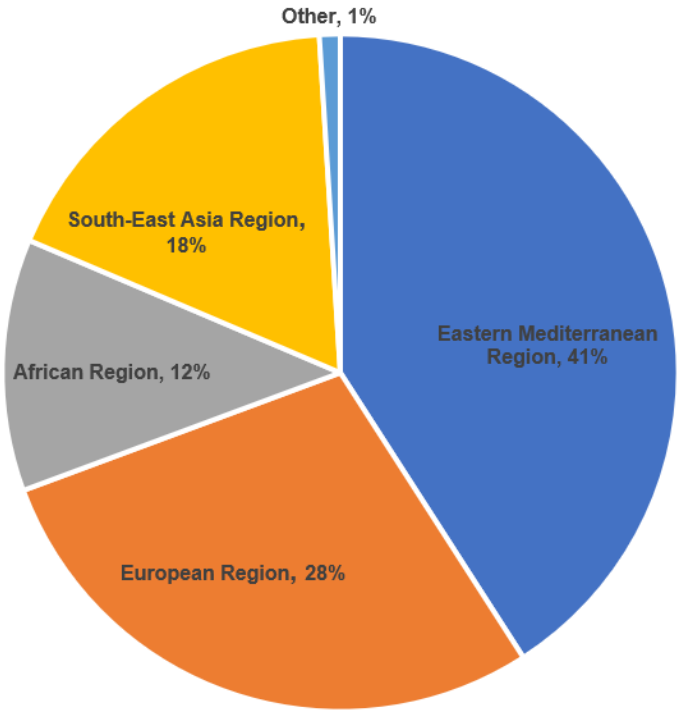

Figure 1: Pie chart of refugee regions of origin

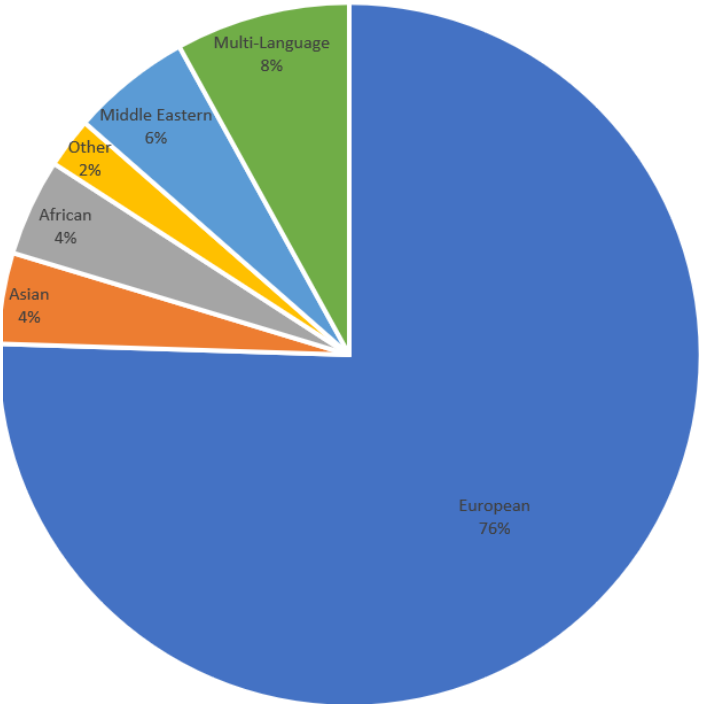

Figure 2: Pie chart of top five spoken languages by region

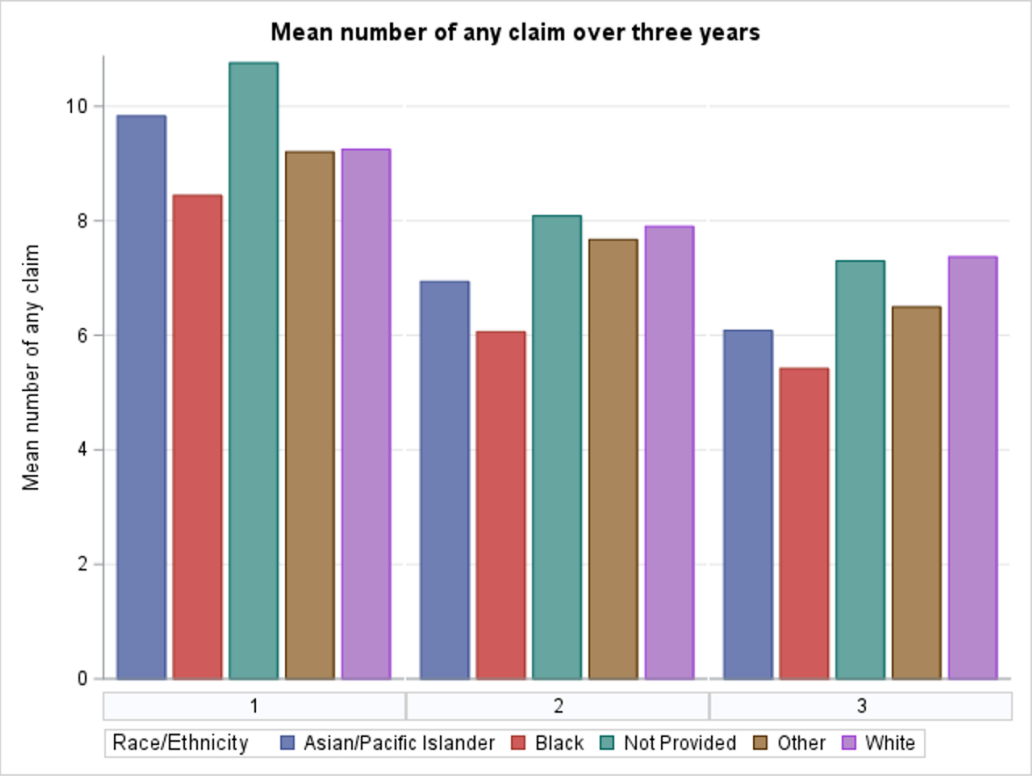

Figure 3: Pediatric refugees mean number of any claim over 3 years by race

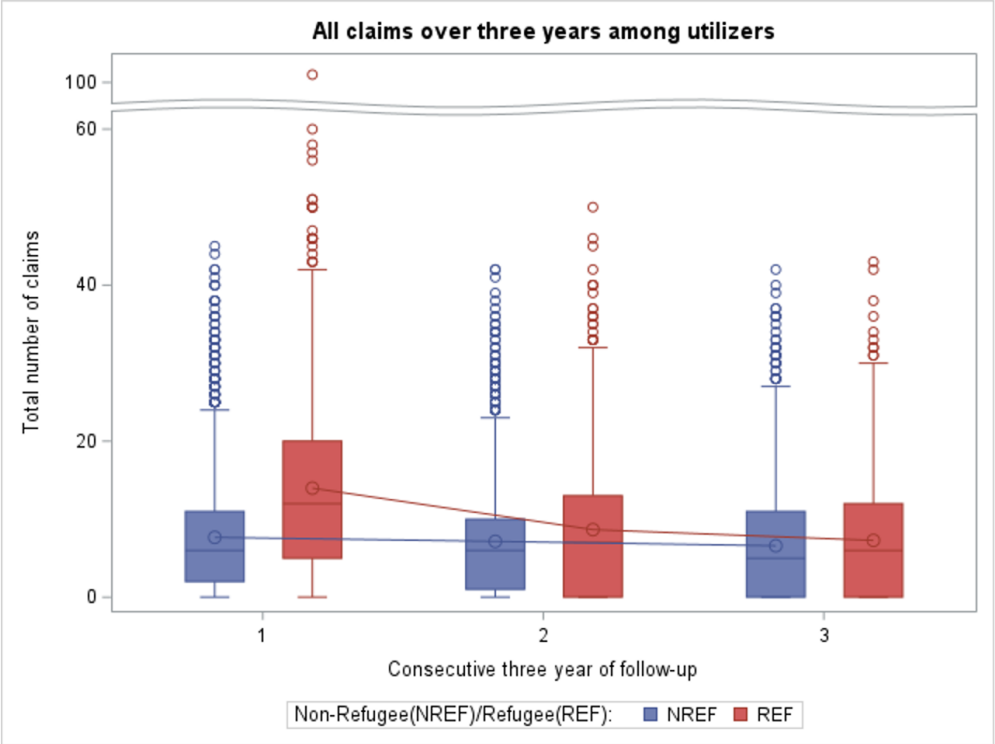

Figure 4: Mean number of claims among utilizers (who have at least one claim between 2015-2018). All comparisons between Refugees (REF) and non-Refugee (NREF) are significant at each year

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