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IMPACTO DE LA MIGRACIÓN LOCAL EN LA UTILIZACIÓN DE
SERVICIOS DENTALES EN REFUGIADOS DEL ESTADO DE
WASHINGTON, USA

MIGRATION IMPACTS DENTAL UTILIZATION OF REFUGEE CHILDREN
RESETTLED IN WASHINGTON STATE

TESIS PARA OPTAR POR EL TÍTULO DE SEGUNDA ESPECIALIDAD
PROFESIONAL EN ODONTOPEDIATRÍA

AUTOR

JOHANNA BELEN JUAREZ REATEGUI

ASESOR

JORGE LUIS CASTILLO CEVALLOS

CO-ASESOR

ANA LUCIA SEMINARIO ANTUNEZ DE MAYOLO

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Presidente: Dra Jennifer Ricaldi Camahuali
Vocal: Dra Maria Claudia Garces Elias
Secretario: Dra Jenniffer Miriam Quiroz Torres

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ASESORES DE TESIS

ASESOR

Doctor JORGE LUIS CASTILLO CEVALLOS
Departamento Académico del Niño y Adolescente - UPCH

ORCID: 0000-0003-2497-3520

CO-ASESOR

Doctor ANA LUCIA SEMINARIO ANTUNEZ DE MAYOLO
Departamento Académico de Odontología Pediátrica - UW

ORCID: 0000-0001-9742-136X

DEDICATORIA

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ABSTRACT

Background: Refugee children are particularly at risk of disease, malnutrition, and physical injury with a higher risk for poor oral health. Relocation processes in their adopted country of residency might affect their ability to access to proper care.

Objective: To determine whether the number of relocations is associated with dental utilization among newly resettled refugee children.

Methods: A descriptive study was conducted using Medicaid data from newly arrived refugee children (<21 years) who immigrated to WA in 2015. The claims were grouped by area and month, corresponding to where and when the refugee children resided. We used ANOVA to assess differences in the utilization of dental services across age groups, sex, race, area in Seattle, and groups by the number of refugees. We also used a NB model. We reported the incident rate ratios (IRR) and the 95% confidence intervals as well as p-values. Critical value was set at 5%.

Results: Of 1,114 children resettled in WA state in 2015 and followed up for 3 years, 953 (86%) received at least one oral health service. The majority were 0-6 years old (41%), male (54%), of White race (36%), spoke Arabic (20%) and nation of origin groups that included ≥ 150 refugee children represent 70%. Refugee children who moved once had 0.84, children who moved twice had 0.8 and those who moved three times or more had 0.7 times the incidence rate ratio of those who did not change in zip code address ($p=0.0008$, $p=0.0044$ and $p=0.0004$, respectively). Dental claims varied by demographics.

Conclusion: Refugee children and family that move more than 3 times had a lower frequency of dental utilization. Data from this study will provide evidence to advocate to state health agencies for increasing efforts in access to dental care.

Key words: Refugees, children, Medicaid, dental utilization, local migration.

RESUMEN

Antecedentes: Los niños refugiados corren un riesgo particular de sufrir enfermedades, desnutrición y lesiones físicas, con un mayor riesgo de mala salud bucodental. Los procesos de reubicación en su país adoptivo pueden afectar su capacidad para acceder a una atención adecuada.

Objetivo: Determinar si el número de reubicaciones está asociado con la utilización de servicios dentales entre los niños refugiados recién reubicados.

Métodos: Se realizó un estudio descriptivo utilizando datos de Medicaid de niños refugiados (<21 años) que emigraron a WA en 2015. Las atenciones se agruparon por zona y mes, correspondientes al lugar y el momento en que residían los niños refugiados. Se utilizó el ANOVA para evaluar las diferencias en la utilización de los servicios dentales entre los grupos de edad, sexo, raza, área en Seattle y grupos según el número de refugiados. También utilizamos un modelo NB. Se informaron las tasas de incidencias (IRR) y los intervalos de confianza del 95%, así como los valores de p.

Resultados: De los 1.114 niños reubicados en el estado de WA en 2015 y a los que se les dio seguimiento durante 3 años, 953 (86%) recibieron al menos un servicio de salud bucal. La mayoría eran de 0 a 6 años (41%), hombres (54%), de raza blanca

(36%), hablaban árabe (20%) y los grupos de nación de origen que incluían ≥ 150 niños refugiados representan el 70%. Los niños refugiados que se mudaron una vez tuvieron 0,84, los niños que se mudaron dos veces tuvieron 0,8 y los que se mudaron tres veces o más tuvieron 0,7 veces la tasa de incidencia de los que no cambiaron de dirección de código postal ($p=0,0008$, $p=0,0044$ y $p=0,0004$, respectivamente). Las atenciones dentales variaron según la demografía.

Conclusión: Los niños refugiados y sus familias que se mudan más de 3 veces tuvieron una menor frecuencia de atenciones dentales. Los datos de este estudio proporcionarán evidencia para abogar ante las agencias estatales de salud para aumentar los esfuerzos en el acceso a una correcta atención dental.

Palabras clave: Refugiados, niño, Medicaid, atención odontológica, migración interna.

I. BACKGROUND

Oral diseases are among the most prevalent chronic diseases worldwide and access to an appropriate care is a known gap in public health, especially among minority communities.¹ There are several categories of immigrants in the US considered humanitarian entrants under the immigration laws. According to the United Nations High Commissioner for Refugees (UNHCR) key legal document, the 1951 Refugee Convention, a refugee is defined as: “someone owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it.”² A person must apply for refugee status outside the United States. This differs from an asylee who is a person who meet eligibility criteria for refugee status but apply within the U.S.⁷ The UNHCR estimates that by the middle of 2022, 103 million refugee men, women and children were forcibly displaced worldwide, and 41% are children below 18 years of age.³ Since 1975, the U.S. has welcomed more than three million refugees from all over the world, and these refugees have built new lives for their families in all 50 states⁴. Washington (WA) state had resettled 1,500 to 3,500 refugees on average annually with Ukraine, Irak, Iran, Syria, Afghanistan, Somalia and Burma among the top countries of origin.⁵ WA is among the top three states relocating refugees in the United States of America (USA).⁶ The office in charge of giving the migration status in Washington State is DSHS (Department of Social and Health Services),

following current immigration laws. Humanitarian entrants are eligible to get these benefits for up to 8 months after entering the U.S. The refugees may be eligible to get some federal benefits, including: Temporary assistance, housing and Medicaid, among others.⁷

In that order, refugee children are particularly at risk of disease, malnutrition and physical injury with the uncertainty and unprecedented upheavals.⁸ They also are at higher risk for poor oral health due to multiple factors that include, but are not limited to, home country, cultural influences containing diet and health beliefs, as well as time spent in refugee camps where cariogenic foods have historically been available⁹. In the United States, 77% of school-aged refugee children needed dental treatment versus 25% of U.S. born children.¹⁰ The state of Washington have advocated on achieving that all refugees have the opportunity to apply for medical assistance.¹¹ Specifically, every refugee has a thorough medical checkup that includes testing for numerous infectious and non-communicable diseases. The domestic medical screening provides clinicians with an opportunity to follow-up on or identify new health concerns that may hinder successful resettlement and self-sufficiency, to promote wellbeing, and to connect refugees with routine and specialty care.¹²

The goal of this study was to determine whether the area of residency is associated with dental utilization among newly resettled refugee children. We hypothesized that refugees with a high level of domestic migration (as determined by zip codes) have low numbers of Medicaid dental claims. Using dental claims from Medicaid data, we aimed to increase the existing body of knowledge of the impact of domestic migration on utilization of dental services at state level.

II. MATERIALS AND METHODS

Study Population

We assessed dental claims of recently arrived, refugees who were aged 0 to 20 years relocated in the state of Washington between January 1, 2015, and December 31, 2015. Immigrant status was provided by the state of WA and all refugees were enrolled in WA Medicaid health insurance immediately after relocation¹³.

Data sources and variables

Refugees are entitled to a medical examination within 90 days of appearance to WA. We use the the Automated Customer Authentication System “ACES”, according to the Department of Social Health Services (DSHS). We revealed with Health Care Authority (HCA) some ACES identification figures registered to help to remove Medicaid data elements. Matching between RHSD, ACES and HCA records redounded in a comprehensive de-identified dataset. As part of HCA’s Secure File Transfer (SFT) process, unidentifiable data was disclosed to the investigative team. Variables included the following Medicaid data elements: sex, race, country of origin, language, zip codes and dental claims with claim codes.

Age was calculated at the time of a child’s first Medicaid plan registration month in 2015. The first-reported sex was the determined sex for each child. Race categories were the ones by the Medicaid dataset. Country of origin groups were determined by the number of refugee children originated in any given nation: Group 1 (>150 children), Group 2 (50-150 children), and Group 3 (<50 children). The

State's Apple Health (Medicaid) program covers oral health care under the age of 21. There were no changes in dental coverage for children enrolled in Medicaid during the 12 months of data presented in this study.

We presented data clustered by the five most typical types of pediatric dental services in addition to overall dental claims.: diagnostic, preventive, restorative, surgical, and orthodontics. The Current Dental Terminology (CDT-9) codes were used to define the dental service type. Specifically, diagnostic – examinations, radiographs, other diagnostic imaging, and diagnostic tests – were defined as codes D0120 to D0470; preventive care included dental prophylaxis, topical fluoride placement, nutritional/tobacco/hygiene counseling, pit-and-fissure sealants, preventative restoration, caries arresting medicament, 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 crown, provisional restorations, interim therapeutic restorations, protective restoration, and core build-ups (D2710 to D2954); pulp therapy comprised of pulp capping, pulpotomy, pulpectomy, root canal treatment, and endodontic surgeries (D3110 to D3470). Surgery included extractions, manipulation of bone and soft tissues, biopsies, and fracture repairs (D7111 to D7999). Orthodontics included D8660, D8060, D8030, D8680, D8690 and D8080.

Data Analysis Plan

The de-identified data in Excel format was shared with the research team. There are two data sets for each year. A data set included Medicaid eligibility from

January 2015 to December 2015 and January 2016 to December 2016, while other set include dental claims in 2015 and 2016. Because we are collecting 36 months of data for everyone, we merged the two datasets that included all children aged 0 to 20 years. The procedure codes were categorized into various dental services, including diagnostics, preventive care, restorative procedures, and surgery. Additionally, the claims were grouped by area and month, corresponding to where and when the refugee children resided. The number of claims per person and per month were plotted by area. We used a one-way ANOVA to assess differences in the utilization of dental services across age groups, sex, race, area in Seattle, and groups by the number of refugees.

Lastly, we used the negative binomial analysis for repeated measures to model the number of claims, all types of claims, diagnostics, prevention, restoratives, and surgery. This model was chosen due to the variance being much larger than the mean and the count nature of the number of claims. We reported the incident rate ratios (IRR) and the 95% confidence intervals as well as p-values. Critical value was set at 5%.

III. RESULTS

Cohort Characteristics

Our study population consists of 953 refugee children and adolescents (aged 0-20 years), relocated in the state of Washington in 2015 and followed up for 36 months. The majority were 0-6 years old (40.5%), male (54.4%), and of White race (35.8%). Nation of origin groups that included ≥ 150 refugee children represent 70% of our population, nations with 50-100 refugee children 16.5%, and countries with < 50 refugee children 13.5%. The spoken leading language was Arabic (25.1%) followed by Russian (17.3%) and Ukrainian (10.3%). Refugee children mainly relocated in the geographical areas of King County (52%) and Spokane County (17.8%), the area with less refugee children were Optum Pierce/Thurston – Mason (4.7%) (Table 1) (Figure 1).

Bivariate associations of claims by demographic variables and type of dental service

Our unit of analysis for bivariate associations was person-month. On average, children aged 6 years or less had a greater number of dental claims (30.2 ± 21.9) compared to children 7 -12 years old (26.6 ± 17.8) and significantly higher than 13 -20 years old (20.1 ± 16.7) ($p < 0.0001$). There was no difference in the mean number of dental claims between females and males (27.0 ± 18.0 vs 25.4 ± 21.0) ($p = 0.2013$). Children who originated from nations with ≥ 150 refugee children had higher number of dental claims (28.9 ± 20.7) compared to country of origin with 50 to 100 refugees (21.7 ± 14.5) and with less than 50 refugee (16.8 ± 15.5) ($p < 0.0001$). Children who reported to be of White race had the greatest mean number of dental claims by person-month (31.4 ± 21.2), whereas Black

children had the least mean number of dental claims (18.4 ± 14.6) ($p < 0.0001$). We also found differences by area of relocation within the state of WA. Children relocated in North Sound had a greater mean number of dental claims (32.1 ± 22.1) followed by refugee children in Southwest Washington (27.2 ± 28.1), refugee children resettle in Optum Pierce/Thurston-Mason had the least mean number of dental claims (24.1 ± 19.9) ($p = 0.0073$) (Table 2) (Figure 2).

Regression Analyses of Dental Utilization by Dental Claims

We created a model to investigate the impact of migration on utilization of dental services within the state of Washington. After adjusting for age, sex, race, country of origin, the more changes in zip codes, the lower number of dental claims. Refugee children who moved once had 0.84, children who moved twice had 0.8 and those who moved three times or more had 0.7 times dental claims of those who did not change in zip code address ($p = 0.0008$, $p = 0.0044$ and $p = 0.0004$, respectively) (Table 3).

While sex was not found to be associated with dental utilization ($p = 0.1307$), dental claims varied by age group. Compared to children 13-20 years of age (reference group), those aged 7-12 years had 1.34 times higher probabilities of having a dental claim ($p < 0.0001$), children aged 0-6 years had 1.44 times the incidence rate of having a dental claim ($p < 0.0001$) compared to the reference group. When analyzed by type of claim, significant associations were found in diagnostic, preventive, and surgical procedures (Table 3).

With respect to race, compared to White refugee children, Black refugees had 0.69 times the odds of having a dental claim ($p < 0.001$), Asian children had 0.85 times the incidence rate of having a dental claim ($p = 0.2734$) and Pacific Islander

refugee children had 0.81 times the odds ($p=0.0256$) for all types of dental claim. Additionally, children reported to be Black significant lower incidence rate ratio by type of procedure (Table 3). In relation to the country-of-origin group with ≥ 150 refugees resettled, countries with 50-150 refugees had 0.85 times the incidence rate ratio of having a dental claim and countries with < 50 refugee children had 0.65 times the odds of having a dental claim ($p=0.0047$ and $p<0.0001$ respectively). Country of origin group with < 50 was significantly associated with the rate of having a dental claim after resettlement in any claims category (Table 3).

IV. DISCUSSION

Currently, there is insufficient data on how domestic migration impacts dental utilization of newly arrived refugee children in the U.S. The aim of this study was to determine whether the number of relocations is associated with dental utilization among recently resettled refugee children in the in the state of Washington, USA. We hypothesized that refugees with higher number of residential sites (measured by zip codes) are the ones who utilize Medicaid insurance the least. Our findings confirmed that utilization varied by migration patterns of refugees. Specifically, refugee children who change zip codes more than 3 times had a lower rate of dental utilization than those who never moved (Table 3). These results are consistent with prior findings that measured the travel distances by medical enrollees in Wisconsin, where the dental visits decreased significantly as distance increased. While it was not targeting directly to refugees, it concluded that rural residents and racial and ethnic minorities are more likely to experience barriers to transportation and have longer commutes to receive medical and dental care.¹⁴ Additionally, there are national estimates showing that among rural residents, the average travel distance for medical/dental care increased by 17.8% between 2001 and 2017, while no increase was observed among urban residents.¹⁶ At international level, similar findings were discovered when analyzing deficits in human resources for oral health data (HROH) in rural and remote areas in Wales, Scotland and Northern Ireland. Results of this study highlighted the disparities in spatial accessibility to HROH across Health Boards, and further identified disparities in the distribution of dental practices between urban and rural areas and

can promote lead policy in the respective countries¹⁵. We found that how many times you moved can affect access to dental care among newly resettled refugees.

There are 39 counties in the state of Washington. All counties are functioning governmental units and each governed by a board of county commissioners¹⁷ (Figure 1). While there are other systems at the county level, the Rural-Urban Commuting Area (RUCA) system developed by the Federal Office of Rural Health and Policy (FORHP) is the only multilevel classification available at census tract and ZIP code levels of aggregations. The Office of Community Health Systems (OCHS) have documented significant differences in health status indicators between rural and urban residents. Rural areas in Washington State tend to have lower percentages of population with health insurance, a personal healthcare provider, or routine dentistry. In general, the farther away a place of residence is from an urban core area and the lower the levels of commuting, the greater the magnitude of health disparities.¹⁸ Our findings also show that lower level of dental utilizations were in the counties of Greater Columbia and Optum Pierce/Thurston – Mason (Table 2) with large rural geographical areas. Specifically, the Greater Columbia that represents a large rural fraction of Washington State.

Our study population contains all 1,114 refugee children resettled in WA state in 2015. During the 36 months of follow up, 953 (85.5%) had at least one dental claim (using Medicaid insurance data) (Table 1). The majority were younger than 6 years of age, male, White, spoke Arabic, and were mainly located in King County. In our study, nation of origin groups containing ≥ 150 refugee children embodies 70% of our study population. These demographics are a snapshot of the actual global political situation which can fluctuate from year to year. Until early

2022, the number of persons forcibly displaced worldwide exceeded 100 million according to estimates by the United Nations High Commissioner for Refugees (UNHCR).¹⁹ The 2022 population estimate places Washington's population at 7,864,400. This represents an increase of 1.26% since last year. Washington's annual rate of population growth had been below 1.0% from 2009 to 2013 due to the sluggish economy. Economic activity has a strong influence on net migration.²⁰ In Washington state, the population grew 10 percentage points more diverse compared to a decade ago, according to a census metric called the diversity index. Washington's diversity index was 45.4% in 2010 and jumped to 55.9% in 2020. Many of the counties that saw an increase in their diversity index are located in western Washington — like King, Pierce, and Snohomish counties.²¹ In that order, Washington State with the Department of Social and Health Services (DSHS), one of the largest state agencies in Washington, coordinates the medical assistance programs in conjunction with Washington State Health Care Authority.²² Improving local services and adjusting some policies for refugees may reduce the amount of required domestic migration and the gap of access to a proper oral health care for refugee children and their families.

We found that dental utilization of refugee children varied by race. Specifically, White refugee children had the greatest mean number of dental claims by person-month while children who were Black had the least number of dental claims ($p < 0.001$) (Table 2). Previously reviewed papers found similar results. A study just published this year, who evaluate refugee children and their demographic characteristics and if that correlates with dental utilization, established also that White children had, on average, the greatest number of dental claims.²³ Similarly,

an analysis conducted in Wisconsin investigating geographical variations and their relationship to race/ethnicity in dental sealant utilization for first molars among Medicaid enrollees found that Black children had significantly lower preventive dental sealant utilization compared to White children.²⁴ Another study measured utilization of dental services. The data were stratified by race and ethnicity, age, sex, geographic location, and language. Services scores were typically lower for non-Hispanic black and American Indian/ Alaskan Native children and higher for non-Hispanic Asian and Hispanic children compared with non-Hispanic white children.²⁵ There is evidence of associations between race and travel distances. In 2017, urban Blacks, and rural Blacks were less likely to spend ≥ 30 minutes traveling for medical/dental care compared to Whites, using the year 2001 as the baseline. Our results support prior evidence that demographic variables can be interconnected as travel burden among rural and urban Black residents has decreased.¹⁶

A significant difference was observed in dental utilization of refugee children by country of origin. Country-of-origin group with ≥ 150 refugees were more likely to experience a dental visit than groups with < 50 refugee children resettled (Table 2). We should understand that arriving refugees are placed in communities based on factors including their needs, family ties, and the receiving community's language²⁶, in that order refugees that arrive to large immigrant communities' benefits on better understanding of the health system of the country they migrate to. When examined by type of claim, diagnostic procedures were most used by our population study, this showed a significant difference with preventive, restorative and surgical claims (Table 2). This correlates with Washington's

investment in oral health programs making progress on dental screenings completed in children.²⁷ These efforts include programs that teach non-dental healthcare professionals on oral health screening and offer recommendations to create dental homes for children.²⁸ In order to prevent dental caries, professionals are encouraged to identify early children who are at risk for oral health issues, connect them to dental care programs, and work with the families of these children.²⁹ Seven Federally Qualified Health Centers (FQHCs) are currently available to help refugees with the required complete medical examination as part of their resettlement procedure. The seven FQHCs and the WA State Offices of Refugee and Immigrant Assistance have actively worked together to promote referrals into dental care in order to construct dental homes.³⁰ The following levels should concentrate on implementation research aimed at the seven FQHCs in WA that relocated refugees and look into their procedures for effectively addressing oral health issues for the community they serve.

Our research contained several limitations. Initially, we were confined by the Medicaid data available from 2015. Our data was restricted by agencies that released complete information by the end of 2021. Medicaid eligibility and benefits have also changed in WA since 2015, with an expansion of types of dental procedures covered and increased benefits during the COVID-19 pandemic. Also, we do not have relevant information on the why for relocation within the follow up of this study. We were not able to acquire data on diagnosis but claims. Unlike the medical field, in the USA, dentists are not required to include diagnosis codes. In order to overcome this challenge, we grouped claims per type of procedure and provided an overall need of oral health. Yet, this study provides a robust dataset of

36 months of follow up and is the first complete valuation of dental utilization of refugee children of its kind. It is important to mention that this is the third manuscript of the large data base that we have, the first publication analyzes the situation that refugee children go through during the first 12 months of arrival in WA, the second is focused on adult refugees so we encourage all our readers to review the previous works.

V. CONCLUSION

Of 1114 refugee children resettled in WA state in 2015, 953 (85.5%) received at least one oral health service between 2015-2018. Refugee children who had more zip codes addresses during the 36 months of follow up had significant lower dental claims than those who did not change area of residency. Being aged from 0-6 years old, of White race, came from a country of origin of ≥ 150 refugees and lived in King County were associated with higher dental utilization. Further development of programs adjusted for specific demographic characteristics could improve dental access to newly resettled refugee children.

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VII. TABLES, GRAPHS AND FIGURES

Table 1. Study Population Characteristics

Variables	Refugees	N (%) Total=953
Age	Group 1: 0 – 6	386 (40.5%)
	Group 2: 7 -12	283 (29.7%)
	Group 3: 13-20	284 (29.8%)
Sex	Male	518 (54.4%)
	Female	435 (45.6%)
Race	White	341 (35.8%)
	Black	217 (22.8%)
	Other	205 (21.5%)
	Not provided	100 (10.5%)
	Asian/Pacific Islander	90 (9.4%)
Country of Origin	≥ 150 refugees	667 (70%)
	50-150 refugees	157 (16.5%)
	< 50 refugees	129 (13.5%)
Languages (top 3)	Arabic	239 (20.1%)
	Russian	165 (17.3%)
	Ukrainian	98 (10.3%)
Zip Code *	King County	549 (52 %)
	Spokane / North Central	187 (17.8%)
	North Sound	140 (13.3%)
	Southwest Washington	77 (7.3%)
	Greater Columbia	52 (4.9%)
	Optum Pierce/ Thurston – Mason	50 (4.7%)

*According to the Washington State Department of Social and Health Services

Table 2. Bivariate associations of claims by demographic variables and type of dental service (person-month)

Variab le		All Claims (N)	All Claims Mean (SD)	Diagnostics Mean (SD)	Prevention Mean (SD)	Restoratives Mean (SD)	Surgery Mean (SD)
Age	0-6 y	425	30.2 (21.9)	10.8 (8.0)	8.7 (5.7)	5.7 (5.6)	1.2 (2.2)
	7-12 y	316	26.6 (17.8)	11.0 (8.0)	7.1 (4.8)	5.1 (4.9)	1.3 (2.0)
	13-20 y	314	20.1 (16.7)	8.4 (6.7)	3.6 (3.7)	6.1 (6.4)	0.5 (1.3)
	p-value	<0.0001		<0.0001	<0.0001	0.0808	<0.0001
Sex	Female	474	27.0 (18.0)	10.6 (7.2)	6.9 (5.4)	5.8 (5.6)	1.0 (1.9)
	Male	581	25.4 (21.0)	9.7 (8.0)	6.6 (5.4)	5.6 (5.7)	1.0 (2.0)
	p-value	0.2013		0.0584	0.2790	0.5665	0.5489
Countr y of Origin	< 50	142	16.8 (15.5)	6.8 (6.1)	4.9 (5.3)	3.2 (4.3)	0.6 (1.4)
	50-150	166	21.7 (14.5)	8.4 (6.2)	6.6 (5.0)	4.4 (4.8)	0.6 (1.4)
	≥ 150	747	28.9 (20.7)	11.2 (8.0)	7.1 (5.4)	6.4 (5.9)	1.2 (2.1)
	p-value	<0.0001		<0.0001	<0.0001	<0.0001	0.0003
Race	Asian	32	22.6 (17.9)	7.5 (6.0)	5.6 (4.6)	5.6 (5.5)	0.8 (1.8)
	Black	250	18.4 (14.6)	8.1 (6.8)	5.5 (4.4)	3.1 (4.3)	0.5 (1.3)
	Not provided	115	27.6 (19.6)	11.1 (7.7)	7.2 (6.0)	5.3 (5.7)	1.2 (2.2)
	Other	241	26.1 (20.2)	10.0 (7.4)	6.7 (5.4)	5.7 (5.8)	1.1 (2.1)
	Pacific Islander	61	26.4 (18.1)	8.8 (6.0)	7.9 (6.0)	6.3 (5.2)	1.0 (2.2)
	White	356	31.4 (21.2)	11.8 (8.4)	7.3 (5.5)	7.4 (5.8)	1.2 (2.1)
	p-value	<0.0001		<0.0001	0.0004	<0.0001	0.0002
Zip Code	Greater Columbia	52	24.3 (19.9)	8.5 (6.7)	7.4 (6.6)	5.0 (5.8)	1.0 (1.9)
	King County	549	25.2 (17.4)	9.8 (7.0)	6.8 (5.2)	5.4 (5.4)	1.0 (1.9)
	North Central / Spokane	187	24.9 (19.5)	9.3 (6.6)	5.8 (4.5)	5.7 (6.1)	1.1 (2.2)
	North Sound	140	32.1 (22.1)	13.5 (9.5)	8.0 (5.7)	6.4 (6.0)	1.1 (2.0)
	Optum Pierce/Thurston – Mason	50	24.1 (19.9)	8.7 (7.4)	6.2 (6.1)	5.7 (6.1)	0.7 (1.3)
	Southwest Washington	77	27.2 (28.1)	10.4 (10.5)	6.1 (6.1)	6.1 (5.9)	0.9 (1.9)
	p-value	0.0073		<0.0001	0.0096	0.5473	0.7785

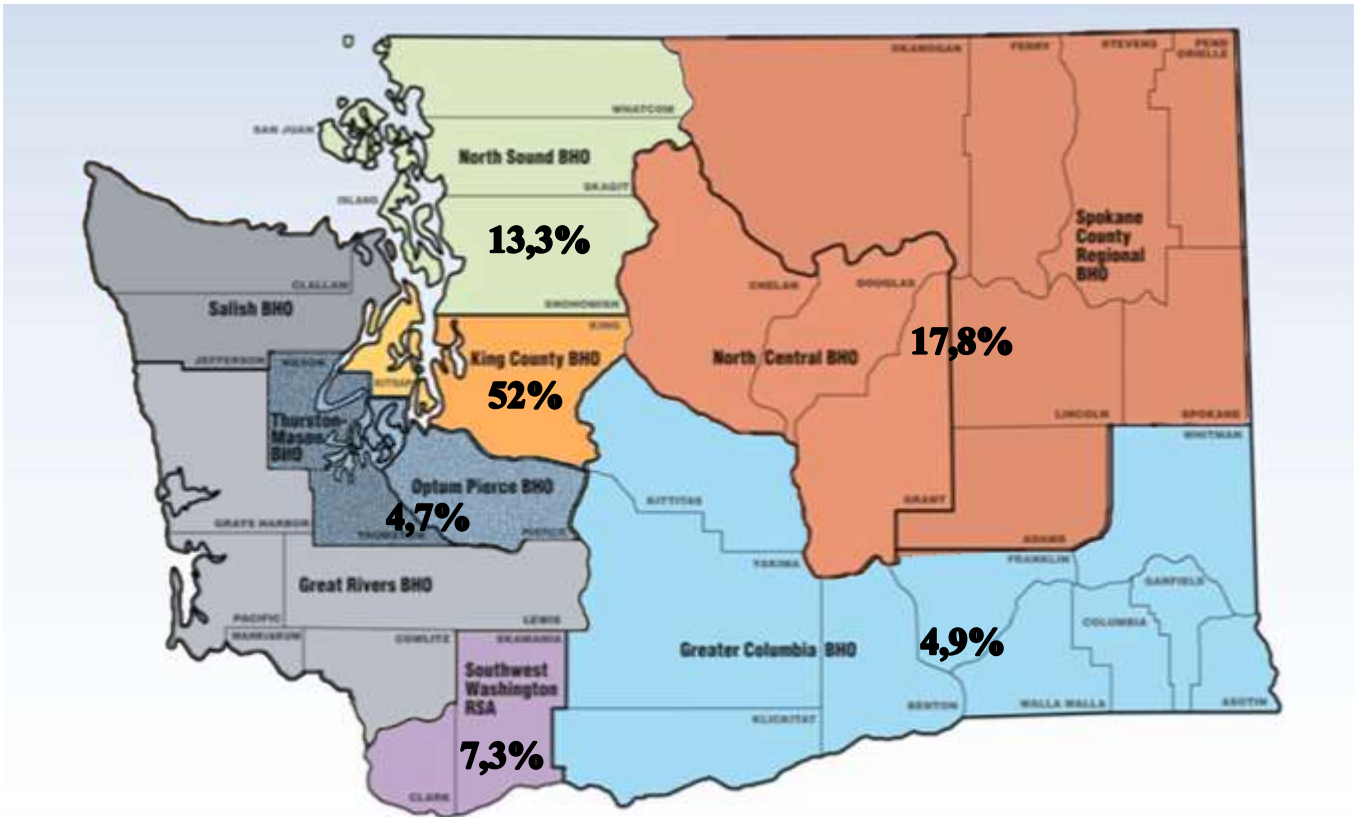
Table 3*. Incidence rate ratio of claims using adjusted negative binomial regression model

		All Claims		Diagnostics		Prevention		Restoratives		Surgery	
Variable	Category	Incident rate ratio (95% CI)	P value	Incident rate ratio (95% CI)	P value	Incident rate ratio (95% CI)	P value	Incident rate ratio (95% CI)	P value	Incident rate ratio (95% CI)	P value
Age group (ref: Age 13-20)	Group 1: 0 - 6	1.44 (1.29,1.61)	<0.0001	1.25 (1.12,1.39)	0.0001	2.39 (2.1,2.72)	<0.0001	0.87 (0.74,1.01)	0.0664	2.11 (1.49,2.99)	<0.0001
	Group 2: 7 -12	1.34 (1.2,1.5)	<0.0001	1.33 (1.19,1.49)	<0.0001	2.02 (1.76,2.32)	<0.0001	0.86 (0.74,1.01)	0.07	2.36 (1.66,3.37)	<0.0001
Sex (ref: Male)	Female	1.07 (0.98,1.16)	0.1307	1.1 (1.01,1.2)	0.0309	1.03 (0.94,1.13)	0.4855	1.02 (0.9,1.15)	0.7898	1.13 (0.9,1.44)	0.2957
Race (ref: White)	Asian	0.85 (0.63,1.14)	0.2734	0.74 (0.55,1.01)	0.0604	0.83 (0.64,1.07)	0.1519	0.92 (0.63,1.35)	0.6815	0.81 (0.36,1.79)	0.595
	Black	0.69 (0.61,0.79)	<0.0001	0.79 (0.68,0.91)	0.001	0.83 (0.73,0.95)	0.0057	0.5 (0.41,0.61)	<0.0001	0.59 (0.39,0.89)	0.0128
	Not Provided	0.93 (0.81,1.07)	0.3399	0.99 (0.87,1.14)	0.9404	1.02 (0.88,1.2)	0.7714	0.77 (0.63,0.96)	0.0173	1.24 (0.85,1.83)	0.2666
	Other	0.87 (0.77,0.99)	0.0313	0.88 (0.78,1)	0.0531	0.94 (0.82,1.07)	0.3636	0.83 (0.71,0.97)	0.0187	1.03 (0.75,1.41)	0.863
	Pacific Islander	0.81 (0.68,0.98)	0.0256	0.76 (0.63,0.92)	0.0055	0.93 (0.77,1.11)	0.4169	0.86 (0.68,1.09)	0.2113	0.73 (0.43,1.24)	0.2431
Number refugee (ref:150+)	50-150	0.85 (0.76,0.95)	0.0047	0.81 (0.72,0.92)	0.0012	1.05 (0.92,1.2)	0.4673	0.81 (0.67,0.97)	0.0222	0.64 (0.44,0.92)	0.0173
	<50	0.65 (0.55,0.76)	<0.0001	0.66 (0.56,0.77)	<0.0001	0.75 (0.63,0.9)	0.0018	0.57 (0.45,0.72)	<0.0001	0.66 (0.44,0.97)	0.0346
Move (ref: never move)	1-MOVE 1	0.84 (0.76,0.93)	0.0008	0.87 (0.79,0.97)	0.01	0.87 (0.78,0.96)	0.0074	0.8 (0.7,0.92)	0.0013	0.67 (0.51,0.88)	0.0035
	2-MOVE 2	0.8 (0.69,0.93)	0.0044	0.87 (0.74,1.01)	0.0676	0.81 (0.7,0.94)	0.0057	0.69 (0.57,0.85)	0.0004	0.81 (0.57,1.16)	0.2564

	MOVE>3	0.7 (0.57,0.85)	0.0004	0.73 (0.59,0.89)	0.0021	0.73 (0.58,0.91)	0.0051	0.61 (0.43,0.88)	0.0075	0.35 (0.16,0.75)	0.0074
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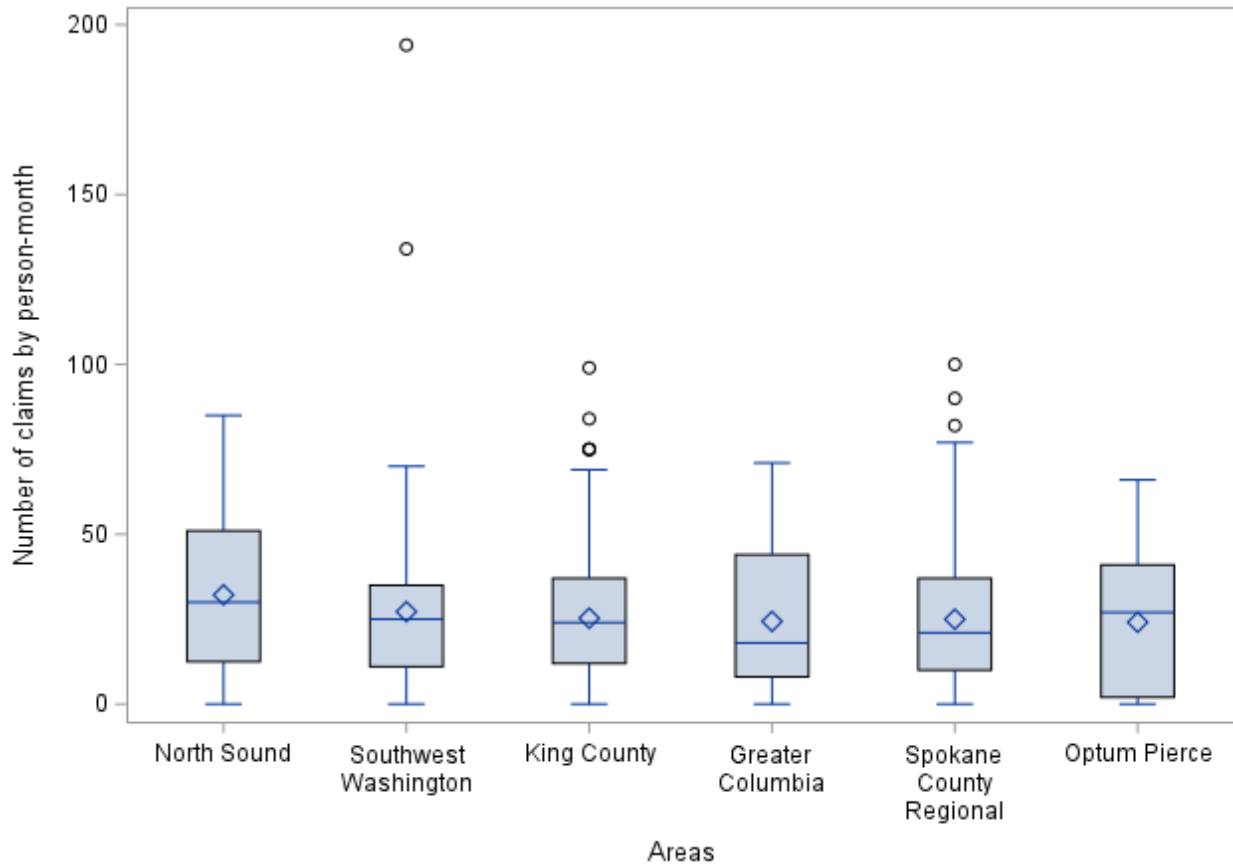
*Adjusted table for age, sex, race, country of origin and changes of zip codes

Figure 1. Refugee children relocated in geographical areas by zip code.



King County	52 %
Spokane / North Central	17.8%
North Sound	13.3%
Southwest Washington	7.3%
Greater Columbia	4.9%
Optum Pierce/ Thurston – Mason	4.7%
No refugees from Salish and Great Rivers area	

Figure 2. Box Plot of number of claims by person-month and areas of resettlement



Box Plot Legend:

The box indicated interquartile range (IQR) from 25th to 75th percentile. The bar inside of the box is the median and diamond inside of the box is the mean for each type of claims. Circles outside the whiskers are potential outliers.