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Real-world dental health of Ukrainian war refugee children and adolescents in Umbria, Italy: *preliminary data*

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Abstract

Background More than two years of the Russian-Ukrainian war have resulted in widespread human and economic tragedy. This crisis also affects health status, including oral health.

Objective To carry out an exploratory analysis on the extent of caries in Ukrainian war refugee children and adolescents, and in addition to determine whether there was a statistically significant association between caries and age, gender, periodontal health status (using the Periodontal Screening and Recording (PSR) index), self-reported socio-economic status and Italian language speaking skills.

Methods This study used a cross-sectional design, was conducted in Perugia, Italy at the University Dental Clinic (COU) between November 2023 and April 2024 and included 50 children and adolescents between 3 and 18 years old (mean age 9.2 SD 4.6) with Ukrainian citizenship who had left their home country due to the war. The visits were conducted in the presence of a cultural mediator. The visits consisted of two parts: the administration of questionnaires on socio-economic status and communication skills, followed by a dental examination. A logistic regression model was used to identify the factors independently associated (age, sex, PSR, socio-economic status and level of communication) with high DMFT/dmft values.

Results The refugees' mean DMFT/dmft was 3.5 SD 2.5. The multivariate logistic regression model showed that increased PSR (OR 7.71, 95% CI 1.38–22.94, $p=0.020$) and low communication (OR 6.09, 95% CI 1.34–27.69, $p=0.019$) were independently associated with the risk of having a DMFT/dmft > 4.

Conclusions The study findings were worrying in terms of the prevalence and severity of caries, especially in refugee children with a poor level of integration in the host country. This study with its preliminary data provides a starting point to reflect on the need for specific health policies adapted to a complex type of social vulnerability such as refugee children status.

Keywords Refugees, Ukraine, Oral health status, Barriers to dental treatment

Background

The Russian-Ukrainian war has become a tragedy with enormous human and economic impacts. As the war continues, the lives of 6.3 million Ukrainian children are increasingly at risk. According to a recent UNICEF survey, more than 11.3 million people are fleeing, primarily mothers and children, including nearly 5.1 million internally displaced persons and over 6.2 million

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refugees. When war refugees migrate beyond the borders of their own country, their priorities during the resettlement phase are integration into the host nation, learning a new language, seeking sources of socio-economic status, and establishing a normal level of living. Consequently, dental care and hygiene are often subordinated to other urgent needs. Children have been considered to be at high risk, in terms of health conditions, because of the consequences of the war [12]. Indeed, studies conducted on other populations of refugee children (e.g. Iraqi and Syrian children refugees in Turkey or Jordan, as well as refugee children in the USA) highlighted precarious oral health status, a low level of oral hygiene, and a poor attitude to attending dental care services [9, 23, 24]. This oral health trend was confirmed (in terms of severity of caries and need for treatment) in a further study conducted in a large sample of refugee children in Sweden from multiple non-European countries such as Afghanistan, Eritrea, Ethiopia, Iraq, Palestine, Pakistan, Syria and Somalia [11].

However, dental care in children is crucial for both oral and general health, contributing to quality of life (https://www.who.int/docs/default-source/gho-documents/world-health-statistic-reports/world-health-statistics-2012.pdf). Poor oral health indeed does not allow for good mastication, which causes pain, the risk of oral infection and direct negative consequences for the general growth of the organism.

The necessity of receiving people from foreign countries with different cultural backgrounds should lead to a continuous modification of the host healthcare system [18]. Understanding real needs and barriers experienced by refugees could help identify successful strategies for providing adequate changes in their care [25]. The aim of this study was to evaluate the prevalence and severity of caries in a population of refugee children and adolescents who received asylum in the Umbria Region, Italy. An additional aim was to evaluate the relationship in this population between caries and other variables such as age, sex, periodontal health, self-reported socioeconomic status and ability to speak the Italian language.

After an initial dental visit, study participants were entered into the National Health System and booked for caries prophylaxis interventions (e.g. dental sealants, fluoride varnish, application of casein phosphopeptides-amorphous calcium phosphate) and/or treatment of decayed teeth at the Dental Center University. All treatments were free of charge due to the refugee status of the study participants with a specific health code (X22).

Methods

Data collection

This observational, cross-sectional study was conducted at the University Dental Clinic of Perugia, Italy, in a population of Ukrainian child and adolescent refugees between 3 and 18 years old. The study participants attended dental clinics between November 2023 and April 2024, where they were examined by two qualified dentists with more than 20 years of clinical practice and with substantial level of agreement in the caries diagnosis (Cohen's kappa = 0,93). The dental screening was promoted through an agreement between local humanitarian associations and the University Dental Clinic of Perugia, aimed at providing care for the aforementioned socially vulnerable individuals. Written consent was obtained from the parents of the participants. Ethical approval for the study was obtained from the CER Umbria-Regional Ethics Committee of Umbria (4690/24, 20/03/2024). The research presented complies with all ethical statements in humans according to the Declaration of Helsinki.

The inclusion and exclusion criteria

Children and adolescents aged 3–18 years who left Ukraine due to the recent war with Russia and are currently refugees in the Umbria region of Italy were included in this study. Participants affected by general syndromes or diseases were also included, although some of them represent a risk factor for caries by affecting susceptibility to this oral disease (e.g., diabetes) or the patient's compliance with previous dental treatments (e.g., psychological disorders). Conversely, uncooperative participants or those without signed consent from parents and/or legal guardians were excluded. The absence of a radiographic examination was not considered an exclusion criterion.

The dental examination, including anamnesis and oral examination, was performed by a structured dentist with an active dental practice of more than 10 years in the clinic where the study was conducted. A cultural mediator was present during all phases of the dental visit. Anamnesis was performed to obtain the participants' personal data as well as to determine their hygiene and dietary habits, socio-economic status and Italian language speaking skills, representing the independent variables of this study. Oral examination was used to evaluate tooth decay and periodontal diseases, representing the dependent variables. Caries diagnosis was performed according to the criteria of the International Consensus Workshop on Caries Clinical Trials [19] which included the use of a mirror and a caries probe to evaluate the tooth surfaces after drying and illuminating them with

an air spray and a specific chair lamp. This diagnosis, in accordance with the abovementioned criteria, was also performed through two bitewing radiographs (on both sides of the dental arches) in all patients who consented to this latter examination, starting from five years old.

Caries prevalence (the number of participants affected by tooth decay) and caries severity were measured through the mean score of the DMFT/dmft index. In the literature, caries severity in the permanent dentition has been measured with the DMFT index, in the primary dentition with dmft and in the mixed dentition with DMFT/dmft. In the overall population sample of this study, in which each of the three dentitions was present, all three types of caries index should be used, however for simplicity the DMFT/dmft index was used to indicate caries severity regardless of the type of dentition. In addition, an analysis of the single components of DMFT/dmft, decayed teeth (DT/dt), missing teeth (MT/mt) and filled teeth (FT/ft), were also conducted in this study. Finally, in this study the need for dental treatment index was calculated as the ratio between DMT/dmt and DMFT/dmft, calculating the fraction of the entire amount of teeth affected by caries still untreated [1]. For the descriptive analysis, the sample was stratified into two groups: a low-moderate caries group with DMFT/dmft ≤ 4 and a high caries group with DMFT/dmft > 4. It was decided to divide the sample into two groups with a cut-off equal to DMFT/dmft $= 4$ since it is the median of the population under consideration and this value (DMFT/dmft $= 4$) was used to underline the high level of caries [5].

Gingivitis and periodontitis were detected via a periodontal probe inserted into the gingival sulcus, specifically six gingival sites for each tooth [26]. Periodontal disease was recorded via the PSR (Periodontal Screening and Recording) index. PSR, which is usually divided into 4 possible scores, was described as a dichotomous variable. Specifically, we classified periodontal status as healthy or unhealthy. Healthy periodontal status is defined as the absence of gingivitis or periodontitis in all gingival sites of the two dental arches (PSR $= 0$); while unhealthy periodontal status as affected by gingivitis or periodontitis in at least one gingival site (PSR between 1 and 4).

The parents of the participants were interviewed by a researcher asking for a subjective evaluation of their socio-economic status and this data was classified via a self-report questionnaire where two possible levels were described: "temporary difficulty" meaning a socio-economic hardship situation in the country of arrival (Italy), decrease in income solely because of their refugee statusand "discomfort" meaning a socio-economic hardship situation already present in the country of origin, Ukraine, and still present in Italy [2]. Language skills were classified into two levels via self-assessment of language proficiency tool such as a self-assessment questionnaire. This tool can be useful for gathering data directly from individuals about how competent they feel in communicating in Italian in various contexts. (Heritage Languages at the Crossroads: Cultural Contexts, Individual Differences, and Methodologies). All data obtained were reported in Appendix 1 and the questionnaire is reported in Appendix 2.

Statistical analysis

A descriptive analysis of the quantitative and qualitative variables was performed using median values and interquartile range (IQR) for continuous variables and absolute frequencies and percentages for discrete and nominal variables. DMFT/dmft values were used to classify participants in two groups: DMFT/dmft ≤ 4 or DMFT/dmft > 4. Differences between frequencies and percentages, were evaluated with the $\chi 2$ test or Fisher's exact test, as appropriate. Data were analyzed for normality of distribution with the Shapiro–Wilk test. Because the data did not result in a normal distribution, a non-parametric analysis (Wilcoxon rank-sum test) was performed to determine differences between the two groups for continuous variables. In the presence of statistical significance, variables were entered into a multivariate logistic regression model to identify factors independently associated with the presence of high DMFT/dmft values. In the model, the dmft index was placed as the dependent variable, the other variables as independent (age, gender, or self-reported socio-economic status, PSR, and level of communication). The association was expressed as Odds Ratios (ORs), adjusted for the other factors in the model with a 95% confidence interval (CI). The sample size was estimated with reference to the primary point of the study, which aims to detect an average effect size of large (0.50) levels of PSR between two groups. An analysis using Cohen's conventions performed with G power software, with a power greater than 90% (1-β) and a level of significance $\alpha = 0.05$, identified an estimate of the sample size for a cross-sectional design of at least 50 participants. A p-value of < 0.05 was the criterion for statistical significance. The data was processed using the STATA/BE software program, version 18.

Results

The sample of Ukrainian children and adolescents, attending the University Dental Clinic of Perugia during the abovementioned study period, was composed of 50 children, with a mean age of 9.2 SD 4.6. All participants enrolled in this study met the inclusion criteria and completed the dental visit, therefore the study did not present any degree of attrition bias. Eight patients

were not subjected to radiographic examination (bitewings) due to their young age that did not allow the necessary compliance; however, they underwent a visual dental examination (using also the dental probe) and therefore were not excluded. Two of the fifty participants, after the anamnesis, were found affected by a health vulnerability, both with a diagnosis of type I diabetes. To know the oral health status of the studied sample, Table 1 shows the distribution of total mean DMFT/dmft scores (3.54±2.57), DT/dt (2.92±1.93), MT/mt (0.24±0.59), FT/ft (0.40±0.63) and for age. The need for dental treatment (the ratio between DMT/dmt and DMFT/dmft) was 0.83.

The prevalence of children affected by caries was 84% (42/50), of whom 28/42 (66%) had a DMFT/dmft index ≤ 4, whereas 14/42 (34%) had a DMFT/dmft index > 4. The descriptive statistical analysis revealed significant differences between the two groups (DMFT/dmft > 4 vs. ≤4) in terms of the PSR ($p = 0.026$) and communication level ($p = 0.033$) (Table 2).

The multivariate logistic regression model revealed that children with more caries were more likely to have periodontal disease (OR 7.71, 95% CI 1.38–22.94, $p = 0.020$)

Table 1 Distribution of mean DMFT/dmft, D/d, M/m and F/f values for age

Age (years)	*N*	DMFT/dmft (±SD)	DT/dt (±SD)	MT/mt (±SD)	FT/ft (±SD)
< 6	9	1.55 (±1.94)	1.33 (±1.58)	0.00 (±0.00)	0.22 (±0.66)
6	11	4.45 (±2.38)	3.90 (±2.02)	0.36 (±0.67)	0.27 (±0.46)
7–11	12	3.91 (±2.10)	3.41 (±1.72)	0.16 (±0.38)	0.33 (±0.49)
12	5	2.40 (±1.14)	2.0 (±0.70)	0.2 (±0.44)	0.20 (±0.44)
> 12	13	4.23 (±3.19)	3.07 (±1.97)	0.38 (±0.86)	0.76 (±0.83)
Total	*50*	*3.54 (±2.57)*	*2.92 (±1.93)*	*0.24(±0.59)*	*0.40 (±0.63)*

Table 2 Description of the characteristics of the study sample, stratified for DMFT/dmft ≤ 4 or DMFT/dmft > 4 groups

	DMFT/dmft			
	TOT ***N*** **= 50**	**DMFT/dmft ≤ 4** **n (%)** **33 (66.00)**	**DMFT/dmft > 4** **n (%)** **17 (34.00)**	***p*-value**
Age (years), median (IQR)	7.5 (6 13)	7 (6 12)	8 (6 13)	0.5636*
Age Classes, median (IQR)				
≤7 *n* = 25	6 (4 6)	6 (4 6)	6 (6 6.5)	0.1662*
>7; *n* = 25	13 (11 16)	12 (11.5 16.5)	13 (9 15)	0.6869*
Sex, n (%)				0.361 **
Male	28 (56.00)	20 (60.61)	8 (47.06)	
Female	22 (44.00)	13 (39.39)	9 (52.94)	
Socio-economic status, n (%)				0.350***
Temporary difficulty	38 (76.00)	24 (72.73)	14 (82.35)	
Discomfort	12 (24.00)	9 (27.27)	3 (17.65)	
Level of communication (%)				**0.033*** **
High (good, sufficient, acceptable)	19 (38.00)	16 (48.48)	3 (17.65)	
Low (Almost nonexistent, barely acceptable, poor)	31 (62.00)	17 (51.52)	14 (82.35)	
PSR, n (%)				**0.026*** **
Healthy (score 0)	16 (32.00)	14 (42.42)	2 (11.76)	
Unhealthy (score 1.2.3.4)	34 (68.00)	19 (57.58)	15 (88.24)	

Children who were dental caries-free, dmft ≤ 4

Children with dental caries experience, dmft > 4

*Wilcoxon Mann-Whitney test

**χ^2 test

***Fisher's exact test

and to have a low level of communication (OR 6.09, 95% CI 1.34–27.69, $p=0.019$). From the multivariate logistic regression model, corrected for the other factors in the model, it was found that increased Periodontal Screening and Recording index (PSR) and low communication were independently associated with the risk of having a DMFT/dmft > 4 (Table 3).

Discussion

In this study of Ukrainian war refugee children, a high level of caries severity was observed, with four out of five children affected and an average DMFT/dmft score of nearly four, peaking at age six with a score of 4.5 and reaching a minimum value (still high) of 2.5 at age 12. When the need for dental treatment was assessed in this population, untreated decayed teeth represented almost the total of the teeth affected by this disease, underlining an evident state of need in terms of dental health. In addition, children with a high caries index also exhibited poor periodontal status. These data, when compared to those of children living in the host country, were significantly higher. In Italy, according to the latest national epidemiological survey commissioned by WHO, the prevalence of caries ranged from 21.6% at age 4 to 43.1% at age 12, with a DMFT/dmft score just above one in adolescents around age 12 [6]. Additionally, when comparing the untreated caries data (DT index) of the 12-year-old subjects in this Ukrainian population with the literature on the European population of the same age (ranging from 0.42 to 1.67), the data from our study were significantly more severe [27].

The life circumstances related to ongoing war in the country of origin and adaptation to a new country could represent the most relevant and plausible explanation for the poor oral health status. Indeed, the condition of refugees is often hampered by several barriers to health care, such as financial problems, linguistic difficulties and the perception of the host health system as complicated because it is different from the one of origin [15]. Linguistic difficulties as an item related to oral diseases (i.e., caries) was also found in our study. In addition, although most participants already had active health insurance in many countries (i.e., in Italy), owing to their refugee status, long waiting lists and limited knowledge of public facilities hindered access to health care, particularly dental care [13]. However, since tooth decay is a chronic disease, the ongoing war could not be the only explanation for the poor oral health of Ukrainian children. Before the war, the Ukrainian dental healthcare system was characterized by inadequate coverage [22]. Despite having both public and private dental facilities, Ukraine suffered from an uneven distribution of services and insufficient resources. The system was primarily based on private clinics, which, however, did not sufficiently replace the reduction in public dental facilities due to the profound transformation of the Ukrainian national health system that occurred over the last decade. Overall, this transformation led to a reduction in preventive and dental care policies for the population, to the detriment of their general oral health status, including that of children [16, 17]. The onset of war has exacerbated this fragility.

In the literature, only one study was found to be similar to ours, discussing Ukrainian refugees, although it was carried out in adult populations. In that study, almost eight hundred Ukrainian refugees were evaluated via a self-report questionnaire without performing clinical visits due to a lack of funding [20]. That study, unlike our study, showed that the majority of refugees reported that their oral health status was good in terms of both caries and gingivitis, with a level of perceived disease in fewer than 20% of the cases. This difference could be explained by the fact that a self-reported evaluation of oral health is necessarily less accurate than an objective visit performed by a specialist in this matter. Indeed, the literature has demonstrated that self-evaluations of oral health status might vary in terms of sensitivity and specificity among individuals, with a certain limit of accuracy [21]. However, the Ponomarenko study agreed with our findings when it considered language as a barrier to accessing dental care, with the difference that it highlighted the role of the low socio-economic status of refugees and the complexity of the host health care system in hindering their attendance in dental services, which is closely related to oral well-being [10]. A second recent systematic review of the literature on social vulnerabilities, like the previous study conducted in an adult population, was in full agreement with our results, showing that the refugee population is more affected by poor oral health than the general population of the host countries. Child status, when combined with refugee (and often

Table 3 Logistic model of factors associated with a DMFT/dmft > 4

	OR#	IC 95%	*p*-value
PSR			
Absent[a]	1		
Present	7.71	1.38–22.94	**0.020**
Level of communication			
High (good, sufficient, acceptable)	1		
Low (Almost nonexistent, barely acceptable, poor)[a]	6.09	1.34–27.69	**0.019**

$p<0.05$, statistically significant difference between DMFT/dmft ≤ 4 or > 4

#corrected for the other factors in the model

[a] reference category

low-socio-economic status) status, results in a combination of multiple vulnerabilities, with a higher risk of poor oral health than for individuals with single vulnerabilities or the native population [8].

In the literature, some studies have addressed the dental health status of refugee children, providing data that align with the findings of the present analysis. The first study, conducted on a population of Syrian refugee children in Jordan, reported a high need for emergency interventions to manage pain and oral infections caused by tooth decay [23]. The second study, analyzing a population of Iraqi and Syrian refugee children in Turkey, described how refugee conditions were associated with deteriorating oral hygiene habits and increased difficulty in accessing dental care [9]. The third study highlighted the high percentage of refugee children in the USA who require access to dental services within their first year of residence in the host country [24]. In summary, these studies have underscored a significant contradiction in refugee children: an urgent need for dental care coupled with irregular attendance at dental services, leading to a progressive worsening of their dental health status. Moreover, in a recent review dealing with immigrant children, a vulnerability very similar to that described here was identified. The published epidemiological data in terms of prevalence and severity were in substantial agreement with our findings, indicating that in primary dentition, caries prevalence varied between 22% and 88%, and the dmft index was nearly four [4].

Therefore, there is an ethical responsibility on the part of countries hosting young refugees to provide easily accessible pathways to health to ensure that the same standard is provided to children belonging to the host population, as stated in the Convention on the Rights of the Child, adopted by the United Nations General Assembly on 20 November 1989 (ISSOP Migration Working Group, 2018). In fact, refugee children, owing to their increased susceptibility to caries and periodontal disease, are at risk of aggravating their already compromised quality of life with oral health-related disorders (e.g., pain, chewing dysfunction, and psychological difficulty in smiling) as well as general oral health-related diseases [3, 7, 14, 24]. In this complex and critical situation involving refugees, a national health system unprepared to treat them could increase the risk of raising barriers to access to dental care with a consequent deterioration of oral health (World Dental Federation, 2017). The employment of specific professional figures, such as cultural mediators, could be useful for helping physicians approach uneasy patients, such as refugees, due to their psychological trauma and cultural and linguistic differences (ISSOP Migration Working Group 2018).

Furthermore, this study addressed the significant relationship between DMFT > 4 and a low level of communication in Italian; however, the true significance of this reduced language ability (observed in a large part of the study population) lies not in its potential role as a risk factor for caries, but in the insight it provides into the need for health policies that address the challenges refugees face in interacting with the host environment, including access to oral health services.

Study limitations

This study was conducted by contacting only official refugee asylee associations and, therefore, likely did not include the entire sample of refugees in the region where this analysis was carried out with limits of accuracy in describing data on the oral health of Ukraine children; for this reason, it should be considered a study offering only preliminary data. In addition, this was a single-center study on a limited sample of 50 participants with an increased risk of reduced accuracy when our results were considered as expressions of the entire population of children and adolescent refugees from Ukraine in Italy. Therefore, this study should be considered an exploratory analysis with a risk of bias in terms of "generalizability" of the epidemiological data found (and the data on the relationship between variables) when referred to the general population of interest. A further limitation of the study is because in some study participants (n.8/50) it was not possible to perform an intraoral radiological examination, due to age or temperament. Therefore, a part of the sample received a partial diagnosis (only by visual examination and use of the dental probe) with the risk of underestimating the prevalence of tooth decay (risk of false negatives). Moreover, although a small percentage (4%) of the study participants were affected by general diseases, which could influence their receptivity to caries, their inclusion in this study could result in an overestimation of the prevalence and severity of caries due to the disease rather than to this refugee status. Furthermore, data on dietary habits (beverages and sucrose-sweetened foods) of study participants were not recorded because the diet varied so much before and after the war that it provided data too heterogeneous to be collected. However, since this variable was described in the study protocol, the study presented a "selective reporting bias". In addition, several pieces of information, constituting confounder variables in the caries onset, such as the level of fluoride in the consumed drinking water, the toothbrushing behaviors (although indirectly assessed by evaluating the gingival inflammation with PSR index), the use of fluoridated toothpaste, the access to the caries prevention and/or oral health care programs were not recorded representing a further limitation of this study.

Conclusions

The present study revealed a high prevalence of caries in Ukrainian children in Umbria, Italy, which was particularly related to difficulty speaking the language of the host country.

Therefore, it is important to improve dental services for refugees, consider their specific needs and prepare health care workers to face the new challenges of dental services. We hope that this study will serve as a basis for further research and will be used as a reference model for the implementation of similar programs in other regions and contexts. The continuity and expansion of this work could facilitate the development of standardized practices that ensure access to quality dental care for all war refugees, thus helping to reduce inequalities in oral health and promoting social inclusion.

Abbreviations

OR	Odds Ratio
CI	Confidence Intervals
PSR	Periodontal screening and recording
DMFT	Decay missing, filling teeth
SD	Standard deviation
p	*p* value
IQR	Interquartile Range

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

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Third party material

All of the material is owned by the authors and no permissions are required.

Authors' contributions

S.C. designed the study. A.V. developed and translated the questionnaire administered to the study's participants, reviewed the questionnaire and wrote the manuscript. G.L. and M.S. wrote the paper. C.T.T. reviewed the manuscript and was the corresponding author. I.S. helped in the development of the study. A.M. and D.C. analyzed and interpreted the data.

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Data availability

The dataset(s) supporting the conclusions of this article was reported in appendix 1.

Declarations

Ethics approval and consent to participate

Ethical approval for the study was obtained from the CER Umbria-Regional Ethics Committee of Umbria (4690/24, 20/03/2024). Informed consent was obtained from all subjects and/or their legal guardian(s).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Aleksejuniene J, Brukiene V. An assessment of dental treatment need: an overview of available methods and suggestions for a new, comparative summative index. J Public Health Dent. 2009 Winter;69(1):24 – 8. https://doi.org/10.1111/j.1752-7325.2008.00101.x. PMID: 19054317.
2. American Psychological Association. 2007. https://www.apa.org/pi/ses/resources/class/measuring-status.
3. Asgari-Taee F, Zerafati-Shoae N, Dehghani M, Sadeghi M, Baradaran HR, Jazayeri S. Association of sugar sweetened beverages consumption with non-alcoholic fatty liver disease: a systematic review and meta-analysis. Eur J Nutr. 2019 ;58(5):1759–69. https://doi.org/10.1007/s00394-018-1711-4. Epub 2018 May 14.
4. Banihashem Rad SA, Esteves-Oliveira M, Maklennan A, Douglas GVA, Castiglia P, Campus G. Oral health inequalities in immigrant populations worldwide: a scoping review of dental caries and periodontal disease prevalence. BMC Public Health. 2024;24(1):1968. https://doi.org/10.1186/s12889-024-19354-4. PMID: 39044172; PMCID: PMC11267954.
5. Campus G, Senna A, Cagetti MG, Maida C, Strohmenger L. Caries experience and status in school-age children residing in four north Italian communities. Oral Health Prev Dent. 2005;3(1):33–8. PMID: 15921335.
6. Campus G, Solinas G, Cagetti MG, Senna A, Minelli L, Majori S, Montagna MT, Reali D, Castiglia P, Strohmenger L. National Pathfinder survey of 12-year-old children's oral health in Italy. Caries Res. 2007;41(6):512–7. https://doi.org/10.1159/000110884. Epub 2007 Nov 8. PMID: 17992014.
7. Chaffee BW, Rodrigues PH, Kramer PF, Vítolo MR, Feldens CA. Oral health-related quality-of-life scores differ by socioeconomic status and caries experience. Community Dent Oral Epidemiol. 2017;45(3):216–24. https://doi.org/10.1111/cdoe.12279.
8. Cianetti S, Valenti C, Orso M, Lomurno G, Nardone M, Lomurno AP, Pagano S, Lombardo G. Systematic review of the literature on Dental Caries and Periodontal Disease in Socio-economically disadvantaged individuals. Int J Environ Res Public Health. 2021;18(23):12360. https://doi.org/10.3390/ijerph182312360.
9. Duman C, Uslu FS, Çakmak S, Aytekin Şİ, Apaydın T, Egil E. Accessibility to dental services by immigrant and refugee children residing in Turkey. Int J Paediatr Dent. 2023;33(5):423–30. https://doi.org/10.1111/ipd.13043. Epub 2022 Dec 30. PMID: 36529532.
10. Goswami S, Tseveenjav B, Kaila M. Nonutilization of oral health services and associated factors among children and adolescents: an integrative review. Acta Odontol Scand. 2023;81(2):105–18. https://doi.org/10.1080/00016357.2022.2095020.
11. Hjern A, Kling S. Health Care needs in School-Age Refugee Children. Int J Environ Res Public Health. 2019;16(21):4255. https://doi.org/10.3390/ijerph16214255. PMID: 31683963; PMCID: PMC6862330.
12. Khalid G, Metzner F, Pawils S. Prevalence of dental neglect and associated risk factors in children and adolescents-A systematic review. Int J Paediatr Dent. 2022;32(3):436–46. https://doi.org/10.1111/ipd.12923.
13. Kroening ALH, Dawson-Hahn E. Health considerations for immigrant and Refugee Children. Adv Pediatr. 2019;66:87–110. https://doi.org/10.1016/j.yapd.2019.04.003.

14. Lee R, Cheung SY. Refugee Children in Australia: Wellbeing and Integration. In: Baxter J, Lam J, Povey J, Lee R, Zubrick SR, editors. Family Dynamics over the Life Course. Life Course Research and Social Policies, vol 15. Cham: Springer; 2022. https://doi.org/10.1007/978-3-031-12224-8_5.
15. Marchetti F, Preziosi J, Zambri F, Tambascia G, Di Nolfi A, Scardetta P, Splendore F, Colaceci S, Coia M, Caredda E, Masi L, De Luca V, Perra A, Giusti A. Health needs and perception of health care quality among Asylum seekers and refugees in an Italian local health authority: a qualitative study. Front Public Health. 2023;11:1125125. https://doi.org/10.3389/fpubh.2023.1125125.
16. Mazur IP, Lekhan VN, Rybachuk AV. Transformations of the dental industry during the period of independence of Ukraine and their impact on the availability of dental care. Medičnì Perspektivi. 2022;24(1):184–92. https://doi.org/10.26641/2307-0404.2022.1.254470. https://journals.uran.ua/index.php/2307-0404/article/view/254470.
17. Mendoza AN, Simecek JW, Colthirst PM, Mitchener TA. A Description of the Dental Health and Treatment of Ukraine Military at U.S. Army Clinics in Germany. Mil Med. 2024;usae480. https://doi.org/10.1093/milmed/usae480.
18. Nair L, Adetayo OA. Cultural competence and Ethnic Diversity in Healthcare. Plast Reconstr Surg Glob Open. 2019;7(5):e2219. https://doi.org/10.1097/GOX.0000000000002219.
19. Pitts NB, Stamm JW. International Consensus Workshop on Caries Clinical Trials (ICW-CCT)--final consensus statements: agreeing where the evidence leads. J Dent Res. 2004;83(Spec C). https://doi.org/10.1177/154405910408301.
20. Ponomarenko M, Kaifie A. Oral health, stress and barriers accessing dental health care among war-affected Ukrainian refugees in Germany. BMC Oral Health. 2023;23(1):804. https://doi.org/10.1186/s12903-023-03513-x.
21. Ramos RQ, Bastos JL, Peres MA. Diagnostic validity of self-reported oral health outcomes in population surveys: literature review. Rev Bras Epidemiol. 2013;16(3):716–28. https://doi.org/10.1590/s1415-790x2013000300015. English, Portuguese.
22. Romaniuk P, Semigina T. Ukrainian health care system and its chances for successful transition from soviet legacies. Global Health. 2018;14:116. https://doi.org/10.1186/s12992-018-0439-5.
23. Salim NA, ElSa'aideh BB, Maayta WA, Hassona YM. Dental services provided to Syrian refugee children in Jordan: a retrospective study. Spec Care Dentist. 2020;40(3):260–6. https://doi.org/10.1111/scd.12460. Epub 2020 May 4. PMID: 32364252.
24. Seminario AL, Nguyen LQ, Wang Y, Weatherspoon D, Okunseri C, Roberts F. Dental Utilization of Refugee Children in Washington State Varies by demographic characteristics. Pediatr Dent. 2023;45(5):411–7. PMID: 37904261.
25. Sherif B, Awaisu A, Kheir N. Refugee healthcare needs and barriers to accessing healthcare services in New Zealand: a qualitative phenomenological approach. BMC Health Serv Res. 2022;22:1310. https://doi.org/10.1186/s12913-022-08560-8.
26. Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: Framework and proposal of a new classification and case definition. J Periodontol. 2018;89(Suppl 1):S159–72. https://doi.org/10.1002/JPER.18-0006.
27. Vukovic A, Schmutz KA, Borg-Bartolo R, Cocco F, Rosianu RS, Jorda R, Maclennon A, Cortes-Martinicorenas JF, Rahiotis C, Madléna M, Arghittu A, Dettori M, Castiglia P, Esteves-Oliveira M, Cagetti MG, Wolf TG, Campus G. Caries status in 12-year-old children, geographical location and socioeconomic conditions across European countries: a systematic review and meta-analysis. Int J Paediatr Dent. 2025;35(1):201–15. https://doi.org/10.1111/ipd.13224. Epub 2024 Jun 16. PMID: 38881267; PMCID: PMC11626496.

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