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Research Article

Demographic and Clinical Characteristics of Refugee Children Utilizing Healthcare Services of Türkiye (2021-2022): A Single-Centre Study

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Gözde Ercan[1], Colleen Kraft[2], Roger Worthington[3], Şadiye Elif Çetin[4], Necibe Tuğçe Göktaş[5], Nadire Ece Bozköylü[4], Esra Polat[6], Şirin Güven[7]

1. Keck Hospital of USC, Los Angeles, United States; 2. Department of General Pediatrics, Keck School of Medicine USC, Los Angeles, United States; 3. Institute of Medical Ethics, St Helens, United Kingdom; 4. Independent researcher; 5. Koc University, Turkey; 6. University of Health Sciences Antigua, Antigua and Barbuda; 7. Education Training And Research, Scotts Valley, United States

Background: The number of refugees in the world is increasing due to ongoing wars, political instability, violence, poverty and climate change. Türkiye has the world's largest refugee population and half of the refugees are children. The aim of this study is to describe healthcare utilization patterns of the pediatric refugee population admitted to emergency, outpatient and inpatient services to enable hospitals to be better prepared to treat large numbers of refugee children.

Methods: This was a retrospective observational study using data from medical records of refugee children who had visited the *University of Health Sciences Sancaktepe Training and Research Hospital*, Istanbul, in pediatric emergency, outpatient and inpatient services between 1 June 2021 and 1 June 2022.

Results: 4383 refugee children including emergency (81.9%), outpatient (15.1%) and inpatient clinics (3%) were analyzed. The most frequently seen diseases for each service were upper respiratory infection and gastroenteritis in emergency; vitamin D deficiency and malnutrition in outpatient; lower respiratory infection, fever and intoxication in inpatient services. Most of the visits were non-urgent visits. COVID-19 disease was found in 1.3% of all children.

Conclusion: Up to now, there is little data available on the health status of these pediatric refugees. This study demonstrates that refugee children's visits to the Emergency Department (ED) are an initial first step for accessing healthcare. Identifying the reasons for non-emergency ED use might provide additional insights and new approaches to help serve the healthcare needs of this vulnerable population.

Gözde Ercan, Colleen Kraft, Roger Worthington, Esra Polat, and Şirin Güven contributed equally to this work. Şadiye Elif Çetin, Necibe Tuğçe Göktaş, and Nadire Ece Bozköylü also contributed equally to this work.

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Corresponding author: Roger Worthington, rpworthington@gmail.com

Introduction

The global population of forcibly displaced persons substantially increased to 108.4 million at the end of 2022 as a result of persecution, conflict, violence, human rights violations, climate change, and/or events seriously disturbing public order. Currently, 40% of the population displaced worldwide are children [1]. Türkiye hosts the world's largest refugee population with 3.6 million Syrians under temporary protection and 318,000 refugees and asylum-seekers under international protection [2]. More than 1.8 million, about 50% of all refugees, are children, 15% of whom are under 5 years of age. In March 2022, Ministry of Health Director announced that 754,000 Syrian babies had been born in Türkiye since 2011. This has created a considerable burden on the pediatric and maternal health services in the country.

Periodic health services, including well baby care, are provided to refugees born in Türkiye. Since April 2011, all the Syrians who have been registered in Türkiye with temporary identification numbers can benefit from the same level of primary and secondary health services as Turkish citizens [3]. However, amongst this refugee population, pregnancy and birth patterns include high numbers of teen pregnancies, birth intervals of less than two years between children, and large numbers of children in families. Breastfeeding may be initiated but is discontinued early. Formula feeding is often started, and complementary feeding is initiated too early (<17 weeks) or too late (>26 weeks). Consequently, many of these children have acute or chronic malnutrition. Other factors of concern include premature birth, congenital anomalies, and high risk of child abuse and neglect.

In older children, higher rates of certain infectious diseases, anemia, dental caries, malnutrition (undernutrition, overweight, obesity) have been described in the literature. Refugee and resettlement experiences may impact critical stages of the child's intellectual, social, emotional, and physical development. Higher rates of certain behavioral health disorders have also been reported [4].

Refugee children are at high risk of developmental delay due to dislocation from their homes and social-emotional deprivation from parental stress and depression. Standardized developmental screening in this diverse population is challenging [5]. Little is known regarding healthcare demand in underage migrants. Despite limitations, the US Center for Disease Control and Prevention (CDC) used the best available data to develop screening guidelines specific to refugees. Any improvement in healthcare for refugee children has to start with routine evaluation of health status and the systematic collection of health data. The following assessments are imperative for further appropriate management: somatic/organ status, previous and chronic diseases, mental health status, dental status, developmental status/stage of puberty, immunity/vaccinations, and infectious diseases [6].

To meet the healthcare needs of refugees and to prepare for future immigration scenarios, a thorough analysis of healthcare utilization during times of significant migration is helpful. Several studies have shown that emergency departments provide easy access to care at any time or place, with the absence of administrative barriers and up-front medical cost [4]. Studies report that refugees are commonly afflicted with both infections and infestations and have a high incidence of health care utilization. With more pregnancies and deliveries amongst refugee women, this highlights the need for more accessible maternal-infant care [7]. Pediatricians and healthcare institutions are confronted with challenges including language differences, poor health literacy, lack of time to spend with children and families, and the accuracy of the health record. Understanding patterns of healthcare utilization for these children provides important information about their health care needs, both immediate and in the future [8]. This study aims to identify health risks and medical needs of refugee children admitted to the pediatric ED in Istanbul, as well as outpatient and inpatient services, to help understand the obstacles and identify any gaps in the care of refugee children.

Methods

This was a retrospective descriptive epidemiological study conducted at University of Health Sciences Sancaktepe Prof Ilhan Varank Training and Research Hospital, Istanbul, Türkiye. The study protocol was approved by the University of Health Sciences institutional review board (216.6113300).

Included in the study were 0- to 18-year-old refugee children who visited the pediatric emergency department (ED), outpatient (OC) and inpatient service (IS) between 1 June 2021 and 1 June 2022. Even though the status of "temporary protection" in Türkiye is different from the legal status of "refugees", all Syrian children under temporary protection were considered

refugees in this study. These included Syrian children born both in Syria in Türkiye, or in other countries and residing in Türkiye under temporary protection. The children seeking asylum under international protection were also included as 'refugees' in this study. Written informed consent was obtained from the parent of each participant under 18 years of age. Patients who were older than 18 years of age, children whose parents did not give a written informed consent, resident patients were children with a Turkish ID and other immigrant children were excluded from the study.

Information from ED, OC, IS of all refugee children ≤18 years old were obtained from the hospital medical record system. Data from the ED regarding age, gender, nationality, date of ED visits, triage category, diagnosis, symptoms on admission, status of Covid-19 disease, inpatient hospital admissions and history of intoxication by drugs, alcohol and any chemicals, scabies, and chronic illness were collected. Triage categories were determined by nurses according to the presenting complaints and vital signs of the patients. A three-level triage system was adopted according to Content of the Ministry of Health of Türkiye's emergency triage instrument [9]. Patients requiring immediate life-saving interventions were assigned as red; patients receiving attention within 30 minutes with no threat to life or limb were assigned as yellow; patients with non-urgent symptoms were assigned as green. Diagnoses were classified according to the International Classification of Diseases 10 (ICD-10).

Data in OC included age, gender, nationality, diagnosis, symptoms on admission, the presence of malnutrition and anemia, the percentile value of height, the value of hemoglobin (Hg), mean corpuscular volume (MCV), ferritin, vitamin B12 and the 25-hydroxy vitamin D (25-OH) levels, history of routine childhood vaccination/chronic disease/intake of breastfeeding and supplementary food status were collected. Malnutrition was defined as patients whose weight is at or under third percentile than according to the reference standards for the growth of Turkish infants and children. The threshold of 25-OH vitamin D level was defined according to the traditional consensus; severe deficiency <10 g/mL (<25 mol/L) and deficiency <20 g/mL (<50 mol/L) [10]. Ferritin level was determined according to the WHO data that is serum ferritin thresholds of less than 12 μg/L for children and less than 15 μg/L for women [11].

Data in IS included age, gender, nationality, diagnosis, duration of hospitalization, the presence of malnutrition, the percentile value of height, history of routine childhood vaccination, and the presence of chronic disease in the patient or family. Also collected was the diet, including breastfeeding and supplementary foods, the presence of consanguineous marriage, and the hospitalization requiring respiration support included oxygen therapy with mask and non-rebreather mask and high-flow oxygen.

Statistical analyses were performed using the SPSS software version 22. The variables were investigated using visual (histograms, probability plots) and analytical methods (Kolmogorov-Simirnov/Shapiro-Wilk' test) to determine whether they were normally distributed. Descriptive analyses were presented using means and standard deviations for normally distributed variables, whereas for the non-normally distributed variables, median and interquartile range were used. Categorical variables were summarized by frequencies (n) and percentages (%) and compared by Chi-square test. Differences of continuous variables between groups were compared by Kruskal Wallis and Mann-Whitney U test where appropriate. A p-value of less than 0.05 was considered to show a statistically significant result.

Results

Healthcare utilization patterns on a total of 4383 refugee children were analyzed. Of these patients, 3590 (81.9%) presented at the ED, 665 (15.2%) patients were seen in the outpatient clinic and, 128 (2.9%) were admitted to the inpatient service. The majority (94%) of the population came from Syria. The average age of the children was 5.2 ±4.9; 3.3±4.5; 2±3 years old, respectively. The majority of the population was under age 5 in each service, with many children who were younger than 12 months in outpatient and inpatient services. The demographic and clinical characteristics of the refugee children by each healthcare department are shown in Table 1.

Emergency Department Utilization

Most frequent reasons for ED visits were upper respiratory diseases (51.5%) and gastrointestinal infections (14.4%). Infectious diseases collectively accounted for approximately three quarters of all ED visits (n=2643, 73.6%). Covid-19 infection was found in 1.3% of all cases. Also, 4.9% of the population presented at ED for a general examination without a diagnosis (Table 1).

Respiratory symptoms (n=930, 26%) were the most common reasons for emergency admissions, followed by fever (n=621, 17.3%), vomiting and diarrhea (n=523,

14.5%), sore throat (n=398, 11%) and abdominal pain (n=185, 5%) (Table 2).

Most of the visits in the ED were non-urgent visits. Using the triage system, 57.9% of visits were categorized as green, 41.6% yellow and 0.5% were red. It is notable that 97.4% of the refugee children were discharged from emergency. Serious illness was present in 0.5% of emergency visitors, who were admitted to the pediatric intensive care unit, and 2.1% who were admitted to the inpatient service. The recurrent admission to the ED was analyzed and of these patients 55.8% had one visit, 19.6% two visits, 24.6% had three or more visits in one year.

Outpatient Service Utilization

The majority of the population were children under age 5 (n=504, 75.8%). Only 10% of all visitors were older than age 10 (n=73, 11%). Gender was almost equal; 49,3% female and 50.7% male. The most frequently occurring diagnoses of outpatient visitors were routine childhood examination (n=382, 57.4%), vitamin D deficiency (n=54, 8.2%), respiratory infections (n=51, 7.6%), malnutrition (n=35, 5.3%) and neonatal hyperbilirubinemia (n=28, 4.2%) (Table 1).

The prevalence of routine screening (n=346, 52%) was highest among all presenting conditions of outpatient service admissions, followed by general fatigue /weight loss and/or loss of appetite (n=72, 10.8%), fever (n=58, 8.7%), abdominal pain (n=29, 4.4%) and neonatal jaundice (n=24, 3.6%) (Table 2).

Evaluation of laboratory results showed that blood tests were available for some patients, but not all. Borderline ferritin levels (<13µg/l) and low vitamin D levels (<20 µg/l) were noticed in all age groups. The median hemoglobin, MCV and vitamin B12 levels demonstrated differences between age groups ($p<0.05$ *each*). In addition, significant differences were found ($F:3,532$, $p<0.05$) in Vitamin D levels between age groups, with lower levels in children older than 10 years of age (Table 3). The distribution of Hg, MCV, ferritin, vitamin B12 and Vitamin D level by age is shown in figure 1.

No significant differences were found between vitamin D deficiency and presenting conditions of malnutrition, routine examination, being generally unwell/weight loss/poor appetite and musculoskeletal problems (p=1,000; p=0,800; p=0,951; p=0,164 respectively). Malnutrition was diagnosed in 35 (5,3%) of all patients, whereas calculated height on admission below 3 percentile was 30 out of 163 (18.4%) patients. The majority of patients had no chronic disease (n=636, 95.6%), while of the other 29 (4.4%), 8 children were diagnosed with asthma, 5 with cerebral palsy, 6 with rickets, 8 with cardiac anomalies, 1 patient with hypothyroidism and 1 with Type 1 diabetes mellitus.

The mean breastfeeding interval was found to be higher in the first month (n=71, 75.5%). Several infants were breastfed at 6 months (n=19, 20%) and few (4.5%) by 12 months. No child was breastfeeding after 12 months.

Inpatient Service Utilization

Overall, 2.1% (n=128) of ED visits resulted in inpatient hospitalization. The mean age of the hospitalized children was 25±36 months, with the most common age being under 12 months (n=82, 64%). Male gender was higher in hospitalization (n=79, 61.7%). The most common diagnoses for utilizing inpatient services were lower respiratory infection (n=65, 50.7%), upper respiratory infection (n=17, 13.2%), gastroenteritis (n=5, 4%), convulsion (n=5, 4%), Covid-19 infection (n=4, 3.1%) and intoxication (n=4, 3.1%) (Table 1).

The mean hospitalization days was 4.8 (±3.1). Malnutrition rate amongst these children was 17.2% (n=22), and height level below the third percentile was 16.4% (n=21). Children who were hospitalized with chronic illnesses were more likely to be vaccinated against routine childhood illness (89.2%, n=114) and come from consanguineous marriages (21.8%, n=28). Of the hospitalized children, 39.1% (n=50) required oxygen support; 76% (n=38) were diagnosed with lower respiratory infection requiring frequent high flow oxygen (n=29, 76.3%), and oxygen with mask (n=9, 23.7%). Use of high flow oxygen support increased length of hospitalization to over 5 days ($p=0,009$).

Discussion

Refugees may have different reasons for their pattern of utilization of health services, including fear of discrimination, poor education and health literacy, and lack of knowledge about the local health system. These barriers may lead to inappropriate health care utilization, including seeking ED care for non-urgent conditions that could be treated in primary care services. Higher rates of utilization for emergency services have been shown in many refugee populations [12][13][14][15]. Brandenberger et al. found that non-urgent conditions accounted for 82.2% among the emergency department visits by asylum-seeking children. Yalaki et al. [16] showed higher admission to the pediatric emergency department compared to outpatient services for recurrent presentations. Data regarding emergency care provided to refugee children in other parts of Europe noted that children and young

people were seen in pediatric ED for their acute health problems. The estimated number in emergency care visits by this population of children ranged from nought to >500 per year between institutions [17]. In our study, the ED utilization rate was higher compared to outpatient service and the majority of those visits were non-urgent. In addition, 4.9% of children presented to the ED for only general examination, and one quarter of all ED visitors had recurrent admissions.

Hospitalization rates of refugee children display location-dependent differences. In a study of refugee children from Türkiye, Syrian children had high rates of general hospitalization (7.9%) and intensive care unit hospitalization (13.4%) [15]. In another study from the capital of Türkiye in 2020, hospitalization rates for refugee children were found at 21.4%. Refugee children accounted for 25% of hospitalizations from a pediatric center in Canada [18], 27% in Israel [19] and 19.9% in the Germany [20]. In our study, far fewer children who presented to the ED 2.1% (n=128) were hospitalized, considerably lower than in other countries. Most of these children were under one year of age. [15][19][21]. In addition, 18.4% of hospitalized refugee children had chronic illness presented with severe, complex conditions. The most common diagnoses for children admitted to inpatient services were respiratory infection, gastroenteritis, convulsion, Covid-19 infection and intoxication.

Globally, the most common reasons for admission to the ED were respiratory diseases and gastrointestinal system disorders in both refugee and resident children. Acute respiratory infections and diarrheal diseases remain the leading cause of death among children under 5 years of age [15]. A study of Syrian and Iraqi refugees living in Lebanon reported that 90% of children presented due to infectious diseases, with gastrointestinal infections being the most common [22]. Tahirbegolli *et al*. reported that respiratory system diseases were most common amongst Syrian refugees [23]. Bucak et al, also reported acute infectious diseases were the most common cause of presentation [24]. In a Canadian study, refugee children were more frequently diagnosed with respiratory virus infection, abdominal pain, sickle cell anemia and appendicitis [18]. Similar to the literature, this study found that infectious diseases were found in three quarters of all ED visits, and respiratory problems were the most common reasons for emergency admissions, followed by fever, vomiting and diarrhea, sore throat, and abdominal pain.

Global COVID-19 data on the number of cases and deaths among children and adolescents is limited. Children and adolescents under 20 years of age account for 20 per cent of the reported COVID-19 cases and 32 per cent of the 2020 population [25]. As of May 11, 2023, the American Academy of Pediatrics indicated that nearly 15.6 million pediatric COVID-19 cases were reported, with children representing 17.9% of all cases [26]. However, there is no available data for Covid-19 prevalence particularly in refugee children. In our study, Covid-19 infection was the diagnosis in 1.3% of all ED admissions and 3.1% of hospitalization. The low rate in our study in comparison to global data could be explained by the relatively uncomplicated presentation in younger children [27].

There are few studies describing signs and symptoms of acute medical needs in refugee children. In a European survey study, respondents indicated that skin and soft tissue infections, child safety concerns, mental health issues, and weight loss were seen more commonly in refugee children than in the local population [17]. Kerbl et al discuss few differences in prevalence of diagnoses between refugee and resident minors in the Middle East with the exception of malnutrition, genital mutilation, anemia, and dental disorders [28]. A systematic review showed that refugee children exhibit high estimated prevalence rates for anemia (14%) [29]. Bucak et al reported anemia was present in 50% of the 70 patients for whom complete blood count data were available. In addition, 19.2% were below the third percentile in weight. All patients with body weight below the third percentile had chronic malnutrition [24]. Poor nutrition was evident through the presence of both underweight and overweight refugee children. A total of 11% of refugee children were reported as overweight, while 6% were classified as obese [29]. In our study, malnutrition rate was 5.3% in outpatient clinic and 17.2% in inpatient services. In the outpatient setting, 2.3% of refugee children were found to be overweight. No anemia was observed, however, and borderline ferritin levels (<13 µg/l) were noticed in all age groups. Even though the median hemoglobin, MCV and vitamin B12 levels showed differences between age groups, the mean level of hemoglobin and MCV were found normal according to their age.

Up to 70% of all children from the Middle East that were studied were found to have 25-hydroxyvitamin D insufficiency. Adolescents exhibited the highest prevalence of this insufficiency [29]. In a study of Benson et al, refugee health centers confirm that vitamin D deficiency is present in 40-80% of refugee

patients, and this is usually asymptomatic [30]. A study and survey on refugee children attending an outpatient general health clinic in Sydney reported that 215 patients were examined (age range 0-17 years); 19% showed moderate vitamin D deficiency (25-hydroxyvitamin D: 13-25 nmol/L), and 2% were severely deficient (25-hydroxyvitamin D <13 nmol/L). Deficiency was most common in East African (72%), Middle Eastern (66%) refugees, and children in early puberty (89%) [31]. In our study, evaluation of laboratory results showed that blood tests were only available for some patients, but not all. Overall, 8.2% of our refugee children had vitamin D deficiency. Remarkably, low 25-hydroxyvitamin D levels (<20µg/l) were noticed in all age groups and significant differences were found in Vitamin D levels between age groups with the lowest levels in children older than 10 years. General practitioners and pediatricians are encouraged to test for vitamin D deficiency in refugees, especially as part of the initial health assessment and prophylactic vitamin D administration might be recommended for children aged above 10.

There has been a reemergence of vaccine-preventable diseases such as measles, polio and diphtheria among refugee children in war zones and other unstable areas. Baauw et al reported that vaccine coverage was found at 72.4% rubella, 70.2% measles and 63% hepatitis B [29].

One study of Syrian refugee children who had settled in Germany revealed that 11% of 488 children had been diagnosed with active tuberculosis and 9% with chronic hepatitis B or C [32]. After being registered in Türkiye, Syrian children under temporary protection are vaccinated according to the national immunization program free of charge at Migrant Health Centers or Family Health Centers. Strategies exist to increase immunization coverage in Syrian children and targeting 90% coverage in every region [33]. In our study, 89.2% had routine childhood vaccination, with no record concerning tuberculosis or chronic hepatitis.

In this study, we observed high ED utilization (81.9%) among all healthcare services in one year by refugees, but 4.9% of whom had no complaint. In addition, only 2.1% of ED visitors in Istanbul were hospitalized, many of these were less than 12 months. Of the most common reasons for hospitalization from infectious diseases, Covid-19 infection was the diagnosis in 1.3% of all ED admissions and 3.1% of hospitalization. To the best of our knowledge, this is the first study of Covid-19 prevalence among refugee children admitted to pediatric emergency in one year. Furthermore, malnutrition rate was found in 5.3% of outpatients, 17.2% in inpatient services and 8.2% of all refugee children had vitamin D deficiency. Remarkably, significantly low 25-hydroxyvitamin D levels (<20µg/l) were noticed in refugee children older than 10 years. Therefore, vitamin D prophylaxis might be recommended for these children, apart from routine child health screening.

The present study was limited to a local region of Istanbul. However, our study has a large sample size from a single facility over a period of one year. This study did not quantify the effects of the elements, such as parental socioeconomic status, educational level and income in relation to ED utilization, since hospital medical records were lacking this data. However, given the location of our hospital, we suspect that most of the refugee patients were of low to middle income status.

Limitations

This was a single-center study, and the results may or may not be generalizable to similar medical facilities. All data were trawled from hospital records, including Emergency Department, outpatient and inpatient clinics, encompassing healthcare needs for both acute and sub-acute patients. Language barriers (for Syrians who do not speak Turkish and Turkish healthcare professionals who do not speak Arabic) could affect how patients interact with medical services, but it was not possible to assess the extent of this problem or to compare service utilization between migrant and non-migrant communities.

The scope for doing further research on this vulnerable population could include replicating this study at other hospitals (e.g., in areas with large migrant populations) and/or assessing healthcare needs and service utilization for other age groups.

Conclusion

Up till now, there is little data available on the health status of these pediatric refugees. This study demonstrates that refugee children's visits to the Emergency Department (ED) are an initial first step for accessing healthcare. Identifying the reasons for non-emergency ED use might provide additional insights and new approaches to serve the health care needs of this vulnerable population.

Key points

- We identified health care problems and utilization of services to this vulnerable group. These results highlight refugee children are more likely to be seen

in the emergency department with poor follow-up in an outpatient system, despite higher rates of malnutrition, stunting, and vitamin D deficiency.
- Covid-19 infection was the diagnosis in 1.3% of all ED admissions and 3.1% of hospitalization. To the best of our knowledge, this is the first study of Covid-19 prevalence among refugee children admitted to pediatric emergency in one year.
- Significantly low 25-hydroxyvitamin D levels (<20μg/l) were noticed in refugee children older than 10 years. Therefore, vitamin D prophylaxis might be recommended for these children, apart from routine child health screening.
- Many hospitals are not adequately prepared for providing urgent and emergency care to refugee children and young people. Therefore, increased effort for international collaborations and consensus on standards of care are needed between relevant policymakers and medical scientific bodies.

Tables and Figures

	Emergency Department (n=3590)	Outpatient Service (n=665)	Inpatient Service (n=128)
Age (months), n (%)			
0-12	600 (16,7%)	374 (56,2%)	82 (64%)
13-36	1147 (32%)	81 (12,2%)	23 (18%)
37-60	503 (14%)	49 (7,4%)	10 (8%)
61-120	680 (19%)	88 (13,2%)	8 (6%)
≥121	660 (18,3%)	73 (11%)	5 (4%)
Gender, n (%)			
Female	1622 (45,2%)	328 (49,3)	49 (38,3)
Male	1968 (54,8%)	337 (50,7)	79 (61,7%)
Nationality, n (%)			
Syrian	3307 (92,1%)	636 (95,6)	122 (95,3%)
Afghanistan	83 (2,3%)	10 (1,5%)	2 (1,6%)
Iraq	10 (0,3%)	1 (0,2%)	0
Iran	24 (0,7%)	1 (0,2%)	0
Others	166 (4,6%)	17 (2,6%)	4 (3,1%)
Most common diagnoses on admission*, n (%)			
Upper respiratory infection	1849 (51,5%)	37 (5,5%)	17 (13,2%)
Lower respiratory infection	97 (2,7%)	14 (2,1%)	65 (50,7%)
Gastroenteritis	517 (14,4%)	8 (1,2%)	5 (4%)
Urinary infection	65 (2%)	8 (1,2%)	2 (1,5%)
Ear infection	68 (1,9%)	5 (0,8%)	0
Covid-19 infection	47 (1,3%)	0	4 (3,1%)
Intoxication	11 (0,3 %)	0	4 (3,1%)
Convulsion	26 (0,7%)	1 (0,2%)	5 (4%)
Malnutrition**	0	35 (5,3%)	1 (0,8%)
Iron deficiency	0	20 (3%)	0
Vitamin D deficiency**	0	54 (8,2%)	1 (0,8%)
Scabies	75 (2,1%)	1 (0,2%)	0
General examination	176 (4,9%)	382 (57,4%)	0
Neonatal hyperbilirubinemia	32 (0,8%)	28 (4,2%)	0
Others	627 (17,4)	72 (10,8%)	24 (18,8)

Table 1. Demographic and clinical characteristics of refugee children who visited to the emergency department, outpatient clinics and inpatient services

** Diagnoses were recorded using the ICD-10 coding system, ** Malnutrition: <%3 percentile in weight according to Turkish children's data, *** Vitamin D deficiency: 25 OH - Vitamin D <20 µg/l*

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Type of hospital visits	Top reasons among refugees	n, (%)
Emergency department visits		
	1. Respiratory symptoms*	930 (26%)
	2. Fever	621 (17,3%)
	3. Vomiting/diarrhea	523 (14,5%)
	4. Sore throat	398 (11%)
	5. Abdominal pain	185 (5%)
	6. Routine screening	176 (5%)
	7. Earache	90 (2,5%)
	8. Itching	91 (2,5%)
	9. Rash (except scabies)	87 (2,4%)
	10. Headache	62 (1,7%)
Outpatient clinic visits		
	1. Routine screening	346 (52%)
	2. Generally unwell, showing weight loss, loss of appetite	72 (10,8%)
	3. Fever**	58 (8,7%)
	4. Abdominal pain	29 (4,4%)
	5. Neonatal jaundice	24 (3,6%)
	6. Musculoskeletal problems	23 (3,5%)
	7. Vomiting/diarrhea	19 (2,8%)
	8. Headache	15 (2,3%)
	9. Overweight problems	15 (2,3%)
	10. Chest pain	12 (1,8%)

Table 2. Most common presenting conditions of refugee children by age each admission on emergency department and outpatient clinics

**Respiratory symptoms include signs and symptoms consisting of upper and lower respiratory tract disease.* ***Fever is considered as >38°C*

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Laboratory Parameters	Total Patient number	Age groups (months)				p
		0-12	13-60	61-120	≥120	
Hg (g/dl)*	297	11,5 [7,3- 21,1]	12,1 [6,9- 17,1]	12,8 [7,3- 15,4]	13 [8,3-15,9]	.000*
MCV (fL)*	297	79 [53-109]	77 [50-87]	78 [53-89]	80 [55-88]	.006*
Ferritin (µg/l)	199	15,8 [2-31]	14,8 [1-31]	15,6 [1-31]	15 [1-79]	.811
Vitamin B12 (ng/l)*	205	341 [39-1035]	369 [137- 1999]	279 [106-627]	279 [100- 606]	.004*
Vitamin D (µg/l)*	117	11,6 [1-30]	13,1 [3-30]	11,1 [2-24]	7 [3-18]	.017*

Table 3. Comparison of Hg, MCV, ferritin, vitamin B12 and Vitamin D levels on routine general examination by age groups in outpatient clinics

**p <0.05, Hg: hemoglobin, MCV: Mean corpuscular volume, Vitamin D: 25-OH vitamin D*

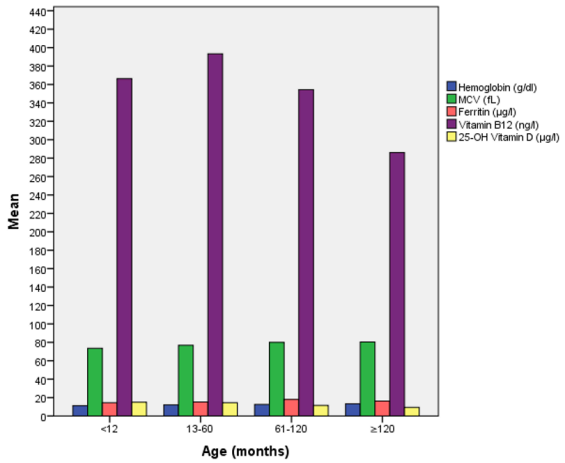

Figure 1. The distribution of Hg, MCV, ferritin, vitamin B12 and 25-OH Vitamin D level by age
MCV: Mean corpuscular volume, 25-OH Vitamin D: 25-hydroxyvitamin D

Statements and Declarations

Data Availability Statement

The data that support the findings of this study are available from the corresponding author, [GE], upon reasonable request.

Conflict of interest

No conflicts of interest associated with this publication.

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