

RESEARCH ARTICLE

Scabies epidemiology in health care centers for refugees and asylum seekers in Greece

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Abstract

Background

Scabies is a global health concern disproportionately affecting vulnerable populations such as refugees and asylum seekers. Greece is a main point of entry in Europe for refugees, but epidemiological data on scabies in this population are scarce. We aimed to describe the epidemiology of scabies, including trends over the study period.

Methodology/Principal findings

Data were collected from June, 2016 to July, 2020, using the surveillance system of the Greek National Public Health Organization. Daily reports on scabies and other infectious diseases were submitted by staff at health centers for refugees/asylum seekers. Observed proportional morbidity for scabies was calculated using consultations for scabies as a proportion of total consultations.

There were a total of 13118 scabies cases over the study period. Scabies was the third most frequently observed infectious disease in refugees/asylum seekers population after respiratory infections and gastroenteritis without blood in the stool. The scabies monthly observed proportional morbidity varied between 0.3% (August 2017) to 5.7% (January 2020). Several outbreaks were documented during the study period. The number of cases increased from October 2019 until the end of the study period, with a peak of 1663 cases in January 2020, related to an outbreak at one center. Spearman correlation test between the number of reported scabies cases and time confirmed an increasing trend ($\rho = 0.67$).

Conclusions/Significance

Scabies is one of the most frequently reported infectious diseases by health care workers in refugee/asylum seekers centers in Greece. Observed proportional morbidity for scabies

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increased over time and there were several outbreaks. The current surveillance system with daily reports of the new cases effectively detects new cases in an early stage. Public health interventions, including mass drug administration, should be considered to reduce the burden of scabies in refugee/migrant populations.

Author summary

Scabies is a skin disease caused by the ectoparasitic mite *Sarcoptes scabiei* var. *hominis*. Most people with scabies have a diffuse and pruritic rash, while the most complicated forms of the infection can lead to bacterial infections and sepsis. Scabies is a global health concern and in 2017, the World Health Organization (WHO) added it to the portfolio of conditions prioritized by WHO's Department of Control of Neglected Tropical Diseases. However, the prevalence of scabies among refugees residing in camps in Greece has not been thoroughly investigated. In this study, we wanted to obtain an overview of scabies epidemiology and identify trends over time. To do so, we analyzed data extracted from epidemiological reports submitted each week as part of the Greek National Public Health Organization. Our findings confirmed the high prevalence of scabies among refugees residing in the camps and identified a clear trend of significant increase over time. Public health interventions, like mass drug administration with ivermectin, could help restrain the dissemination of the disease and lower its burden among refugees.

Introduction

Scabies is a skin disease caused by infestation with the ectoparasitic mite *Sarcoptes scabiei* var. *hominis*. The main clinical manifestations include mild to severe itching and a rash consisting of small papules, nodules, and vesicles. Scabies can be further complicated, leading to secondary bacterial skin infections, invasive bacterial infections, and sepsis [1].

Scabies is a global health concern affecting an estimated 200 million people worldwide. It is endemic in many low- and middle-income countries, particularly those with hot, tropical climates, and it disproportionately affects children and vulnerable populations [2,3]. Overcrowded conditions, low income and limited access to treatment are factors associated with its increased prevalence. In 2017, the World Health Organization officially included scabies in the portfolio of conditions prioritized by the Department of Control of Neglected Tropical Diseases.

Ongoing armed conflict, political turmoil and financial instability has increased the number of asylum seekers and refugees seeking entry in Europe [4]. Several studies have demonstrated the increased prevalence of scabies amongst asylum seeker populations in Europe [5–7]. These individuals originate mainly from Afghanistan, Syria, Iraq, and both North Africa and sub-Saharan Africa. Greece is a major entry point for refugees trying to reach Europe. According to the United Nations High Commissioner for Refugees, approximately 1.2 million refugees have entered Greece through sea or overland routes, from early 2015 through June 2021 [8]. After their arrival, refugees are placed in designated centers on the Greek mainland and on several Greek islands in the Aegean sea.

Specialized medical personnel are appointed in Points of Care (PoC) within refugees/asylum seekers centers and are responsible for the healthcare, medical examination, and subsequent treatment of the refugees/asylum seekers. The National Public Health Organization (NPHO) provides directions and instructions for the management of a range of communicable

diseases, including scabies to medical personnel. For scabies, instructions cover the detection, treatment, individual and environmental preventive measures, and management of scabies outbreaks [9].

Scabies is not a mandatory reportable disease for general population in Greece. Nevertheless, surveillance amongst refugees/asylum seekers in PoC is conducted by the NPHO. Clinical scabies cases are documented throughout the country and reported on a weekly basis within the surveillance system for PoC. However, epidemiological data regarding scabies among refugees and asylum seekers in Greece are scarce. We aimed to evaluate the epidemiology of scabies in refugees/asylum seekers centers in Greece, to investigate changes over time and factors relating to these changes and to compare the epidemiology of scabies with other reported infectious diseases.

Methods

Ethics statement

All data included in the study are publicly available through the official site of NPHO and do not include identifiable information. The study was approved by the Greek National Public Health Organization (KPI 22069/2020-19/10/2020).

Identification and assessment of refugees/asylum seekers

Refugees/asylum seekers may enter Greece by sea or land. As soon as practicable after arrival, NPHO personnel conduct an initial, preliminary medical examination and identify those in need of immediate medical assistance and/or hospital admission. Medically stable refugees/asylum seekers complete registration and identification procedures and are relocated to one of thirty-nine Regional Units [10]. These include six ‘Reception and Identification Centers’, located near Greece’s sea and land borders, where newly arrived refugees are documented and identified. Thirty-one ‘Facilities of Temporary Reception’ where refugees are relocated while engaged in the process of seeking asylum, are on the Greek mainland (Fig 1). When the criteria to apply for asylum are not met, people may remain within refugees/asylum seekers centers, until their situation is reevaluated.

Scabies diagnosis

Diagnosis of scabies in PoC for refugees/asylum seekers of the NPHO is based on clinical skin examination, symptoms, and contact history. No laboratory confirmation is performed. This diagnosis is similar to the diagnosis of “Clinical Scabies,” in the consensus criteria developed by the International Alliance for the Control of Scabies in 2020 [11], although these criteria were not used specifically in this study.

Data collection

Data were collected through the NPHO surveillance system in PoC for refugees/asylum seekers. PoC for refugees/asylum seekers include different health care facilities providing medical care within the refugees/asylum seekers centers and/or within hospitals and public primary care health facilities and serve as the first line of care for the people residing within the centers. NPHO systematically monitors 14 defined syndromes or health conditions, including respiratory infection with fever; gastroenteritis without blood in the stool; gastroenteritis with blood in the stool; rash with fever; clinical scabies; pulmonary tuberculosis; malaria with positive rapid diagnostic test; diphtheria; meningitis and/or encephalitis; hemorrhagic manifestations with fever, and sepsis or septic shock.

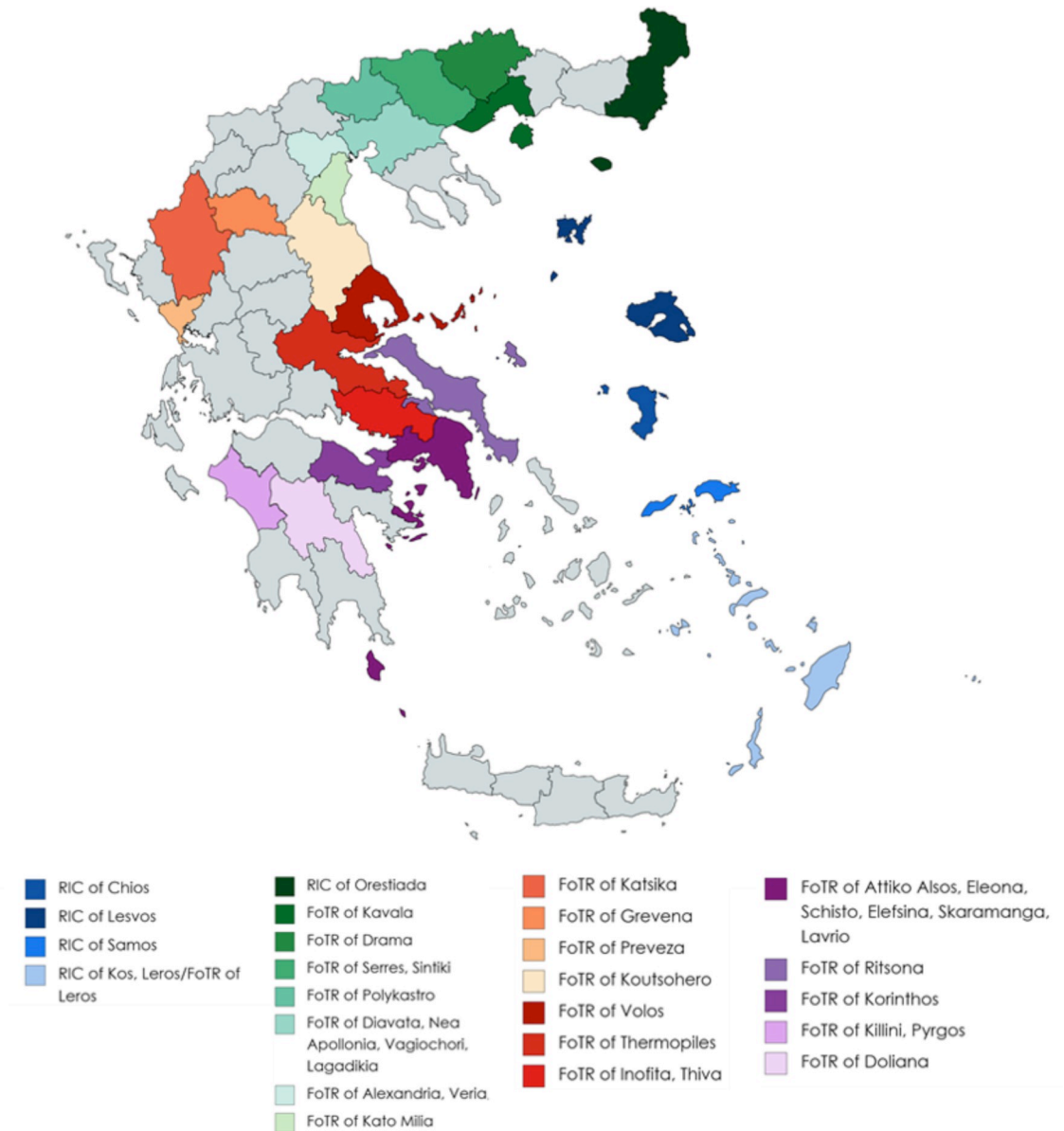


Fig 1. Geographic locations of Regional Units in Greece, as of November 2020. RIC = Reception and Identification Centers, FoTR = Facilities of Temporary Reception. Map created using MapChart (available from: <https://mapchart.net/index.html>)

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Cumulative data are collected and sent daily from the participating PoC for refugees/asylum seekers. Data are collected by doctors, nurses and other health professionals working at the refugees/asylum seekers centers and by Non-Governmental Organizations staffing primary care facilities. Data for a given 24-hour period are analyzed on the next day and after crosscheck/confirmation of some of the collected information, data are further analysed per week by the NPHO. Participation rate (i.e., the number of centers sending data to NPHO), differs on a weekly basis. Weekly reports and detailed information on the system of epidemiological surveillance in points of care for refugees/asylum seekers are published online [12]. No individual clinical data are collected or published. The total population of refugees/asylum seekers at each center, and over time, is not reported.

Treatment and management of scabies

Treatment instructions and medication supplies for scabies are under the authority of the Vector-mediated Diseases department of the NPHO. All treatment and infection control measures are implemented in collaboration with the NPHO, the Ministry of Migration and Asylum and other organizations responsible for refugee/migrant health care.

Treatment is administered to all suspected scabies cases and their close contacts. NPHO recommends treating adults and older children with topical benzyl benzoate lotion and treating infants, young children, and pregnant women with precipitated sulfur in petrolatum. Dosages and duration of treatment differs per case according to the treating doctor's assessment. Prophylactic mass administration of ivermectin or any other scabies treatment is not currently used systematically in the refugees/asylum seekers centers, but has been used to control outbreaks and/or clusters.

In addition, along with the administration of the medication for scabies, NPHO proposes a bundle of environmental measures. Use of clean clothes and bed sheets is recommended after, at least, the first two applications of the treatment. Clothes and bed sheets should be washed at high temperatures and thoroughly dried afterwards. When this is not feasible, clothes and bed sheets should be enclosed in a bag for seven days. Thorough cleaning of the living area with standard cleaning detergents is recommended but sterilization of the living environment or application of insecticides is not recommended [9].

Statistical analysis

Data were analyzed by month for the period June 2016 to July 2020. The proportional morbidity for scabies was calculated as the proportion of cases of scabies compared to total consultations for all infective causes. The number of cases and proportional morbidity for four other syndromes (gastroenteritis without blood in the stool, respiratory infections, tuberculosis, and rash with fever) were also analyzed, to provide an overview of the health status of the population over time and a comparison for the trends of scabies cases. Descriptive analyses were performed using Microsoft Excel. Spearman correlation test was performed, using RStudio and R for Windows 4.0.2, to investigate correlation between scabies cases and time and any significant epidemiological changes through time.

Results

Data were collected through the system of epidemiological surveillance in PoC for refugees/asylum seekers of NPHO from June 20, 2016 to July 26, 2020, with the exception only of week 29 of 2017, for which no data were available (in total, 213 weeks of data were included). The number of refugees/asylum seekers centers sending data to the epidemiological surveillance system varied weekly. The median weekly response rate was 95.2% (40 out of 42 PoC), with a minimum of 68% (week 52, 2018, 17 out of 25 PoC). There was a complete response (100%) for 53 weeks of the 213 week study.

In total, 1054807 consultations were documented for all causes. The median number of consultations, per month, was 19560 (IQR 17274–23549, Fig 2). (S1 Table)

Scabies epidemiology

A total of 13118 consultations with clinical scabies were reported over the study period (median 176, IQR 117–292, Fig 3). A maximum number of 1663 cases was observed in January 2020, related to a large outbreak. (S1 Table)

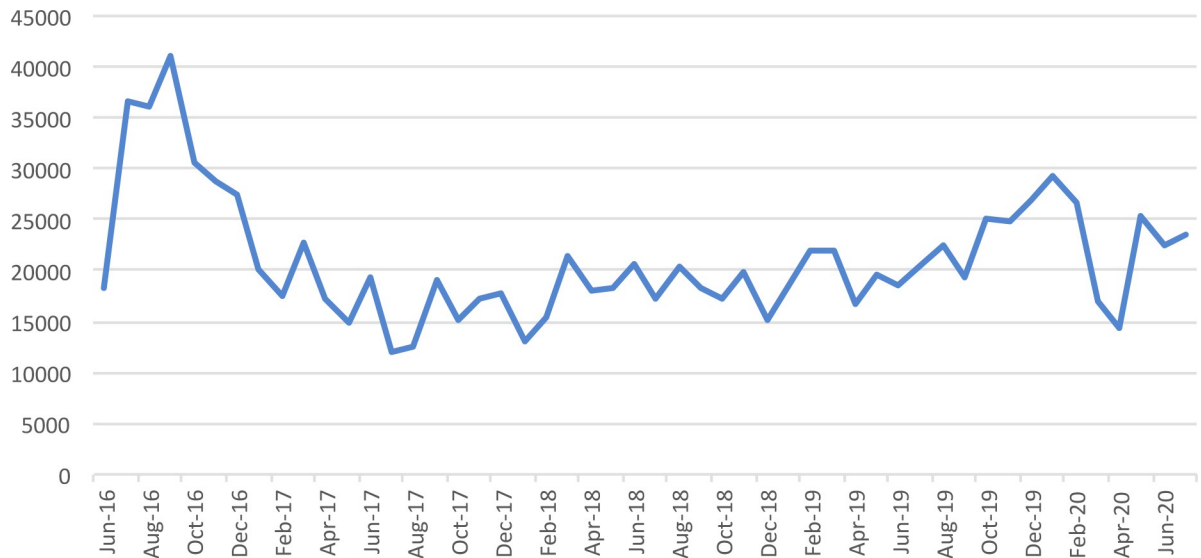


Fig 2. Total reported consultations at the centers hosting refugees/asylum seekers, for all causes, per month.

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Although scabies cases fluctuated throughout the study period, the number of cases and the percentage of scabies cases to total consultations significantly increased from October 2019 until the end of the study period, with a peak of 1663 cases (5.68%) in January 2020 (Fig 4).

Spearman correlation test between reported scabies cases and time confirmed an increasing trend over the study period and a strong correlation between the two variables ($R = 0.67$, Fig 5). The correlation remained strong ($R = 0.65$) even after removing the January 2020 peak.

The proportion of consultations with scabies varied from 0.3% in August 2017 to 5.7% in January 2020. The number of consultations for clinical scabies cases compared to other syndromes is shown in Fig 6. Respiratory infections, gastroenteritis without blood and scabies were the most frequent causes for consultations amongst the syndromes included in the

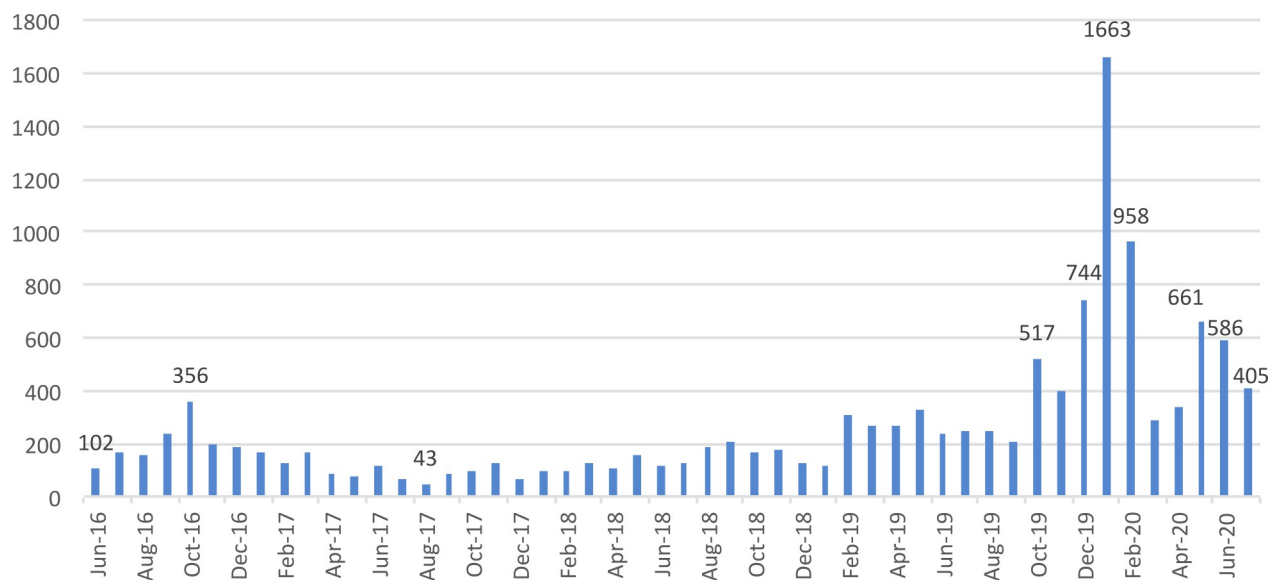


Fig 3. Number of consultations for clinical scabies reported by centers hosting refugees/asylum seekers, per month.

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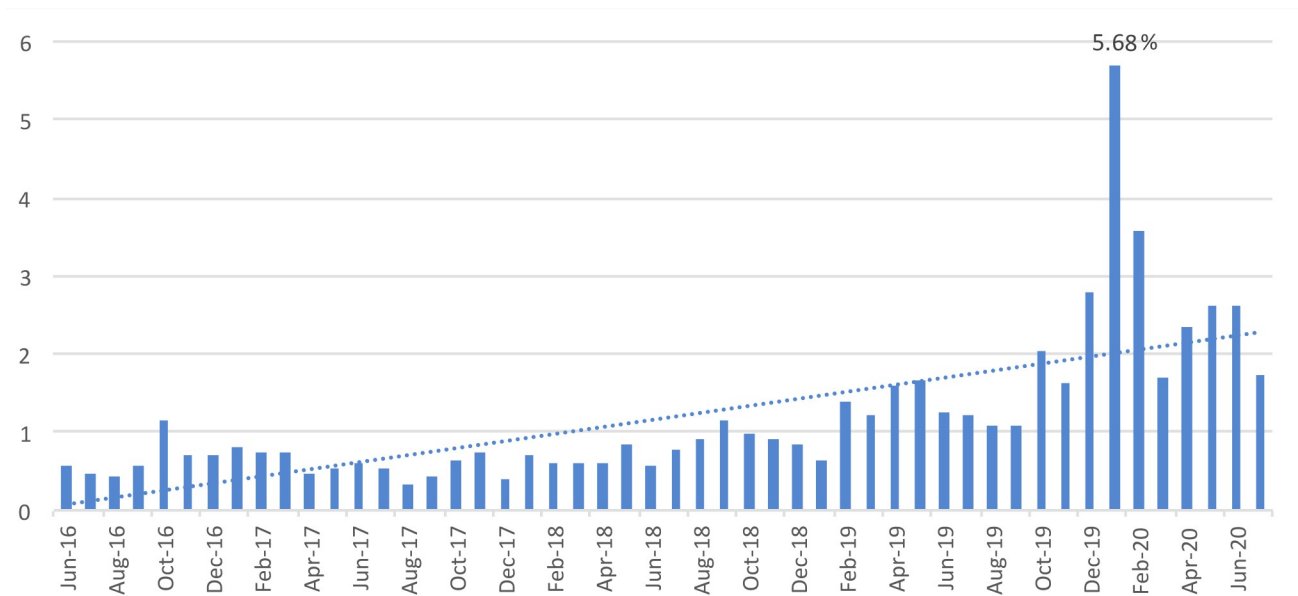


Fig 4. Percentage of scabies cases to total reported consultations at the centers hosting refugees/asylum seekers, for all causes, per month.

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NHPO epidemiological surveillance system. The observed peaks in consultations for these syndromes did not follow a specific seasonal pattern. However, consultations numbers peaked during the summer of 2016 and winter of 2020. The number of suspected tuberculosis cases remained relatively low throughout the study period.

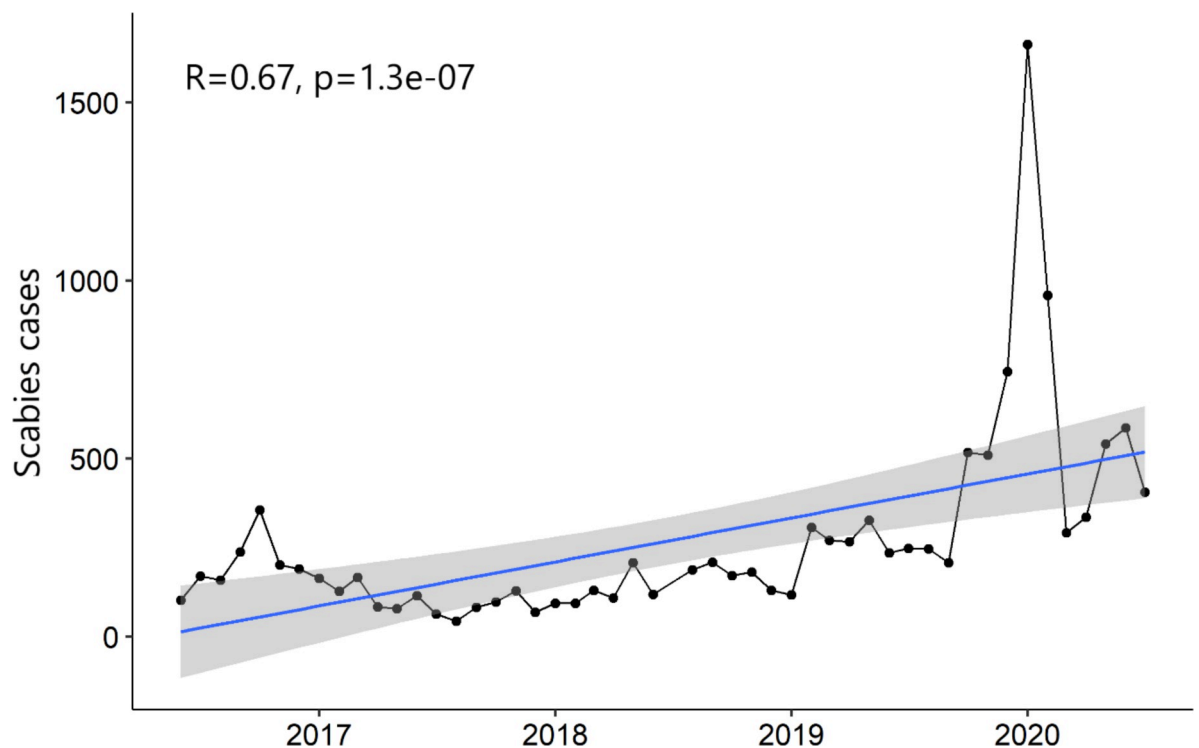


Fig 5. Trend of reported scabies cases during the time of the study period, including all data.

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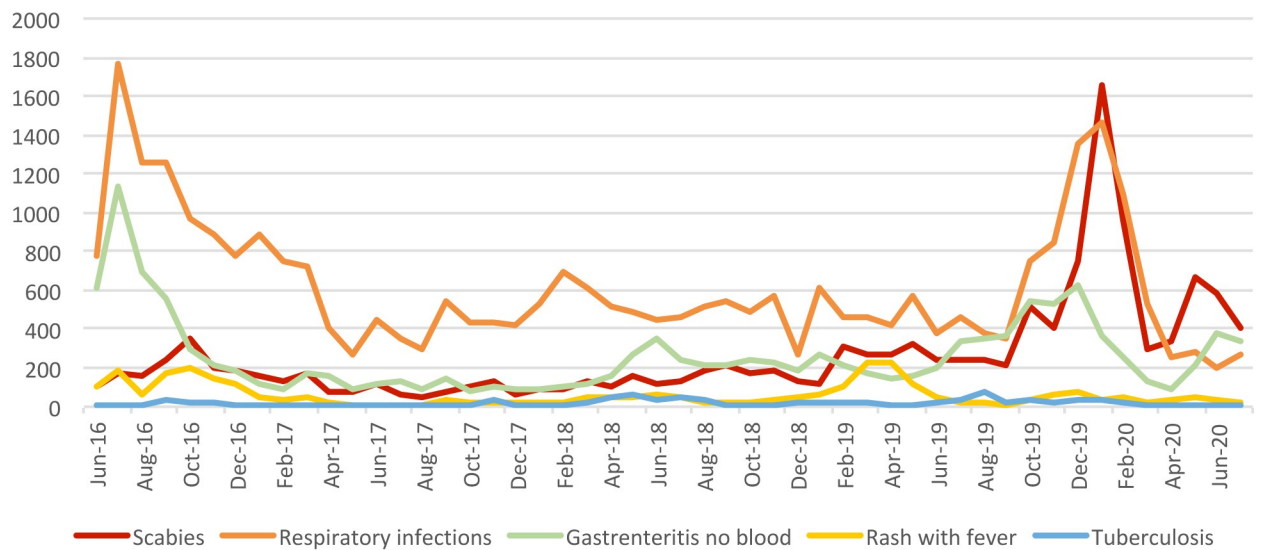


Fig 6. Number of consultations for clinical cases of scabies as compared to the four most common reported infectious diseases*, at the PoC, per month. *gastroenteritis without blood in the stool, respiratory infections, tuberculosis, rash with fever.

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Discussion

Clinical scabies cases were documented for a four-year period from PoC for refugees/asylum seekers in Greece, with a very high average surveillance response rate. Our study demonstrated that clinical scabies is a commonly reported infectious disease in this population. Scabies cases were reported from refugees/asylum seekers centers every week, and the number of consultations increased over the study period.

The increased number of clinical scabies cases during the first few weeks of 2020 is related to an outbreak of scabies observed in a PoC in a refugees/asylum seeker center. The specific center reported approximately 80% of the total scabies cases that month, mainly regarding newly arrived refugees, who manifested clinical symptoms before their arrival at the center [13].

Scabies is a major burden amongst vulnerable populations such as refugees/asylum seekers. While on their transnational migrating routes, refugees/asylum seekers often live in crowded conditions which may increase the transmission of scabies. In a 2020 study of people rescued by the non-governmental organization Open Arms in the Central Mediterranean, scabies was the most frequent infectious disease observed, accounting for 96% of total infectious diseases diagnoses [14]. Another study from Germany investigated infectious diseases among a cohort of unaccompanied refugee minors, and found scabies to be the most frequent infectious disease, affecting 14.2% of minors [15]. Furthermore, a systematic review that assessed the infectious disease profiles of Syrian and Eritrean migrants in Europe, found a high prevalence of scabies, up to 80% prevalence in the Eritrean migrants [16]. Patients with scabies, particularly children, often describe the disturbing symptoms of the disease as a burden that reduces their quality of life [17].

We report a very high burden of scabies among the refugees/asylum seekers population in Greece, with cases reported throughout the study period. Scabies was the third most frequent infectious disease, included in the systematically reported to NPHO syndromes. At specific time points, namely January 2020 and May-July 2020, scabies was the most frequently reported

infectious disease. Outbreaks of scabies cases coincided with peaks in other infectious diseases, with the most prominent example in January of 2020. A possible explanation could be an increase of the refugees/asylum seekers residing in the centers at the specific time points, the crowded conditions within the centers and/or seasonality of infectious diseases. No information is available on how many cases were complicated leading to secondary bacterial infections.

The rapid turnover of populations in the refugees/asylum seekers centers predisposes to reinfestations and outbreaks of scabies. According to data reported by the Nations High Commissioner for Refugees, arrivals of refugees/asylum seekers through sea and mainland in Greece followed a seasonal pattern from June 2016 to June 2019. Arrivals remained relatively low during autumn and winter months and almost doubled during spring and summer months. However, a significant increase in arrivals was documented from September 2019 to December 2019, with a total of 41033, while the corresponding numbers for 2017 and 2018 were 14599 and 18883, respectively [8]. The increased arrivals in the last four months of 2019 subsequently led to increased refugees/asylum seekers population residing in the centers. Overcrowding could be a possible explanation for the increased scabies cases we observed in 2020.

A study from the Netherlands described mass drug administration of ivermectin/permethrin in Eritrean and Ethiopian refugees with a high prevalence of scabies. The number of reinfestations and the number of complicated forms of scabies decreased after mass drug administration [18]. Population-level mass drug interventions, particularly with oral ivermectin, can be more effective than individual case management, especially if scabies prevalence is over 5–10% [19]. Currently, in Greece, mass administration for prevention of scabies in refugees/asylum seekers is not implemented. Considering the increasing caseload of scabies and the crowded living conditions, mass drug administration, targeting newly-arrived refugees/asylum seekers may be an effective strategy. The current NPHO surveillance and response system could then act to detect and manage new cases and any emerging outbreaks in a timely and effective manner.

It is possible that infection control measures aiming to reduce the transmission of the SARS-CoV-2 virus may have influenced the number of consultations for infectious diseases under surveillance after March of 2020 [20,21]. However, respiratory infections and gastroenteritis cases, which also increase under crowded living conditions, in 2020 followed a similar pattern to the previous years, possibly reflecting the challenges with implementing social distancing in these refugee/asylum seekers centers.

Continuous, systematic data collection within the system of epidemiological surveillance in PoC for refugees/asylum seekers and subsequent publication by NPHO, provided valuable information on infectious diseases prevalence among the specific population allowing earlier interventions. Data were collected from a large number of PoC distributed widely in Greece's mainland and its Aegean islands, reflecting clear overview of scabies epidemiology in refugees/asylum seekers population in centers.

This study has several limitations. The increased number of new arrivals, during the past few years and the often relocation of the refugees to other countries/camps within Greece made it difficult to obtain data on the exact number of refugees population. Data on complications of scabies, therapeutic adherence and clinical outcomes or reinfestation of scabies in Greece are not systematically documented and were therefore not available to include. Furthermore, demographic characteristics of the refugees/asylum seekers are not available, hence reported scabies cases could not be related to the country of origin. This study included only the scabies patients who visited the health care facilities. Therefore, the number of scabies

included in our reports is likely to be an underestimation of the actual burden of scabies in the refugee centers.

To our knowledge, this is the first study to investigate the epidemiology of scabies in the refugees/asylum seekers populations in Greece. This dearth of evidence may indicate limits of the health care provided to refugees; reflect the fear that data may be used for political purposes; or contribute to stigma instead of assisting public health decisions. In Greece, data on scabies cases amongst refugees/asylum seekers population are systematically documented. Expansion of the surveillance system to include registration of clinical and treatment data, and number of refugee population residing in the centers could improve management and epidemiological surveillance of scabies and facilitate future interventions and public health policies. Hopefully, this study provides insight into the epidemiology of scabies among refugees/asylum seekers and will help initiate further research on the topic.

Conclusion

Scabies is one of the most frequent reported infectious diseases among the refugees/asylum seekers population in Greece. The number of consultations due to scabies increased over the period 2016 to 2020. National systematic reporting of scabies by health personnel working in PoC can enable early interventions in order to reduce the burden of scabies and its complications. As the incidence increases and living conditions complicate optimal treatment of individual patients, mass drug administration may prove to be a necessary intervention to reduce the burden of scabies in refugees/asylum seekers population.

Supporting information

S1 Table. Table with all relevant data exported from the surveillance system in Points of Care for refugees/asylum seekers of the Greek National Public Health Organization, per month of the study period.

(DOCX)

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Writing – original draft: Christina Louka.

Writing – review & editing: Christina Louka, Emmanouil Logothetis, Daniel Engelman, Eirini Samiotaki-Logotheti, Spyros Pournaras, Ymkje Stienstra.

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