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Resurgence of scabies in Italy: The new life of an old disease

Antonio Laganà [a,b], Ilaria Saia [a], Giovanni Genovese [a], Giuseppa Visalli [a], Giuseppa D'Andrea [c], Salvatore Sidoti [c], Angela Di Pietro [a], Alessio Facciolà [a,*]

[a] Department of Biomedical and Dental Sciences and Morphofunctional Imaging, University of Messina, 98125 Messina, Italy
[b] Istituto Clinico Polispecialistico C.O.T., Cure Ortopediche Traumatologiche s.p.a., 98124 Messina, Italy
[c] Department of Prevention, Provincial Health Agency, 98123 Messina, Italy

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ABSTRACT

Scabies, an old parasitic disease with a worldwide presence, has witnessed a recent resurgence in many parts of the world even in the light of the COVID-19 pandemic. We conducted a study on this resurgence in the Italian province of Messina, Sicily, evaluating the general features of affected people to better understand the possible modes of transmission. Specifically, we considered all the scabies notifications made in the period 2003–2022. Then, we focused on those cases occurred in the three-years period 2020–2022 carrying out an active surveillance by calling patients and asking them questions about their recent habits and movements and their consequent chances of contracting the disease. In total, 935 cases of scabies were reported from 2003 to 2022, with a remarkable increase between 2020 and 2022, when 288 cases were reported. Of these patients, we were able to reach by phone 240 (83.3 %) and interview them. Students were the most affected group (24.1 %), followed by retirees (21.0 %) and healthcare workers (13.2 %). Unfortunately, concerning the possible mode of transmission, more than half (58.5 %) of patients were not able to understand the real source of their infection. When known, the most common ways of transmission were a familiar origin (10.7 %) followed by causes linked to health environments (nursing home stays and hospital admissions). Moreover, 66.9 % of all the reported cases were part of an outbreak. Larger outbreaks occurred in healthcare facilities for more than half of the cases (69.4 %), the majority of which (88.9 %) were in nursing homes. Our research confirms the resurgence of scabies in our territory similar to trends in other European countries. Some critical factors, including the COVID-19 pandemic, probably played a key role in influencing this epidemiological trend and showed the importance of always monitoring the epidemiology of all notifiable diseases to enable prompt action by competent authorities to limit their spread to the community.

1. Introduction

Human scabies is a skin disease caused by *Sarcoptes scabiei* var. *hominis* and is mainly transmitted through direct contact with the skin of an infected person or contaminated items (e.g. sheets and clothes) (Center for Diseases Control and Prevention, 2019). The disease is classified as a skin ectoparasitosis and is chiefly characterised by the symptom of generalized itching, which worsens during the night (Tarbox et al., 2018; Chosidow, 2006). Due to scratching lesions, secondary infections are often encountered with consequent

* Corresponding author.
E-mail address: alessio.facciola@unime.it (A. Facciolà).

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impetiginisation (Hay et al., 2012). In immunocompromised persons, scabies can evolve into a severe form called Norwegian scabies in which the human host becomes infested with a large number of mites, causing the formation of highly contagious thick crusts on the body surface (Chandler and Fuller, 2019).

Scabies occurs worldwide, with an impact on more than 400 million people each year (World Health Organization, 2023a). The disease is particularly common in low-income tropical countries and densely populated areas, with children and the elderly, who have a prevalence ranging from 5 to 50 %, being at the greatest risk. On the other hand, sporadic cases are recorded in high-income countries; but recent outbreaks in health institutions and communities with vulnerable patients contribute to significant economic costs in national health services (World Health Organization, 2023a). Therefore, an increasing number of published articles address the frequency of scabies globally and in Europe. Specifically, at the European level, a greater increase in cases has been observed in Germany, France, Norway and Croatia than in other countries (Hewitt et al., 2015; Schmidt-Guerre et al., 2018; Amato et al., 2019; Sunderkötter et al., 2019; Korycinska et al., 2020; Martínez-Pallás et al., 2020; Baykal et al., 2021; De Lucia et al., 2021; Redondo-Bravo et al., 2021; Reichert et al., 2021; Richardson et al., 2021; Augustin et al., 2022; Griffin et al., 2022; Launay et al., 2022; Louka et al., 2022; Van Deursen et al., 2022).

For centuries, scabies has been considered a disease affecting people living in poverty or in particularly overcrowded places with poor sanitary conditions. However, in the last decade, this disease has become increasingly common in the general population, frequent travellers and young people (Bhat et al., 2017; Ažđajić et al., 2022). The recent increase in incidence observed in industrialized countries has occurred especially from the autumn of 2021, indicating that the frequency of the disease occurrence is rising in absolute terms (Thompson et al., 2017; Amato et al., 2019; Dei-Cas et al., 2019; Lugović-Mihić, 2019; Sunderkötter et al., 2019; Lugović-Mihić et al., 2020; Akaslan et al., 2022; Augustin et al., 2022; Van Deursen et al., 2022).

In 2017, the WHO officially classified scabies as a neglected tropical disease because cases are sometimes underreported, leading to an inaccurate global epidemiological picture (World Health Organization, 2017). Therefore, the number of reported outbreaks does not represent the real epidemiological situation but rather the tip of the iceberg. Scabies is often reported when diagnosed among people who work, live or frequent at-risk environments such as kindergartens, schools, military facilities and healthcare institutions (Dutch Public Health Act, 2021).

In Italy, scabies is a notifiable disease under Ministerial Decree 15 of December 1990 and follows the same reporting process as all other infectious diseases reported by general or specialized practitioners to local health agencies (Ministero della Salute, 1990). Specifically, scabies falls under the 4th class of diseases, which includes all diseases for which, after the reporting of individual cases by diagnosing doctors to local health agencies within 24 h, the report to the regional health system must be made only in cases of an epidemic outbreak.

The Coronavirus Disease-19 (COVID-19) pandemic has had a profound impact on human health not only in terms of morbidity and mortality but also regarding economic, social and environmental aspects (Miyah et al., 2022; World Health Organization, 2023b). Specifically, many areas of medicine and public health have been affected, including changes in the epidemiology of infectious diseases (Facciolà et al., 2023). Further, some scientific studies have focused on the potential role played by the pandemic in the resurgence of this old disease (De Lucia et al., 2021; Akaslan et al., 2022; Trave et al., 2022).

This study aimed to evaluate the epidemiology of scabies, based on its notification, in a territory generally characterised by low incidences of this disease while highlighting the impact that the COVID-19 pandemic may have had on its spread to understand the possible underlying causes and draw a comprehensive epidemiological picture.

2. Materials and methods

We carried out a cross-sectional study examining all the scabies notifications made over 20 years (2003−2022) in the Italian province of Messina, Italy. Specifically, only cases occurring in the resident population were considered, excluding cases involving irregular migrants. This provincial population is sanitary administered by the local Provincial Health Agency 5 (ASP 5), divided into 8 districts, the largest one being the Metropolitan City of Messina (comprising 37 % of the whole population).

All notifications by local physicians are handled by the Public Health, Epidemiology and Preventive Medicine Unit of the Messina ASP 5 Prevention Department, which is tasked with entering information into the IT platforms of the general infectious disease notification system (known as PREMAL in Italian). The notification data collected by this system were used to obtain disease incidence values, considering the resident population for each year. Resident population data were collected from the website of the National Institute of Statistics (Istituto Nazionale di Statistica [ISTAT]).

Finally, because the notifications only provided general data about the sex, age and residence of affected individuals, to understand the probable mode of transmission, we focused on cases from the 3 years from 2020 to 2022. Specifically, on the latter we conducted active surveillance by calling patients and asking them a series of general and specific questions. In particular, we asked them about their life and work, movements, places visited, communities mingled with, and especially, if there had been contact with a confirmed case of scabies.

Statistical processing was performed using Prism 4.0 software. Moreover, descriptive statistics were used to find the percentage values. Additionally, exact F-tests, along with an evaluation of the odds ratio (OR) were performed to compare the mean values between the studied periods and the association between scabies outbreaks and transmission modality. Further, a Pearson's correlation test was performed to evaluate the general trend of notifications made for all the notifiable diseases starting from 2011 to 2022. Significance was assessed at the $p < 0.05$ level.

3. Results

In the study period, the provincial population averaged 618,713 inhabitants. We used the annual number of resident population to calculate the yearly trend of scabies incidence. The results are shown in Fig. 1.

The figure shows a remarkable increase in scabies incidence in the last three years based on the notifications made during the study period. This increase occurred after a significant decrease observed in the 2006–2017 period which had only sporadic cases and small outbreaks in familial settings. Particularly, in 2022, the highest incidence value of the entire studied period was reached. In total, 935 cases of scabies were notified from 2003 to 2022, that is 11.2 % of all the notified infectious disease cases.

The increase during the three years from 2020 to 2022 was characterised by 288 notified cases (30.8 % of all the cases notified in the 20 years 2003–2022), with a median incidence of 11.3 ± 9.7/100,000 population compared to a median incidence of 3.1 ± 6.1/100,000 population in the previous 2003–2017 period. Before 2020, 59.3 % of cases occurred in men and 87 % were among Italian residents. Additionally, the average age of affected individuals was 35.1 ± 23.7 years.

In 2020–2022, scabies affected men at a slightly higher rate (54.8 %) than it did women (45.2 %). The mean age of the affected individuals was 44.8 ± 25.3 years (min. 1; max 94). In terms of origin, Italians were by far the most affected group, accounting for 96.9 % of the sample. However, we emphasize that notification data covered only the resident population (Italians and foreigners) and that cases among irregular migrants were not included in this analysis. Among the affected resident foreigners, 42.9 % were of European origin while 28.6 % were of African and Asian extraction. The mean age of affected foreigners was 25.1 ± 15.8 years (min. 5; max 58).

The majority (87.2 %) of the notified cases occurred in the Metropolitan City of Messina while 10.2 % occurred in the provincial territory. Only 2.2 % of cases occurred among residents in other provinces. For all the cases that occurred in the city of Messina, we conducted a local analysis, dividing the territory into three zones (city centre, northern suburbs, and southern suburbs). The majority of cases (54.9 %) occurred in the southern suburbs of the city, followed by 30.3 % in northern suburbs and 14.8 % in the city centre. Moreover, the reported notifications showed an irregular annual trend due to a marked seasonality of cases (Fig. 2). Specifically, the cold season (autumn–winter) consistently had the highest number of reported cases, with a significant increase compared to spring–summer ($p < 0.0001$). The percentage of cases during the cold season remained stable across all the 3 study years, with an average value of 67.4 % ± 1.9.

After obtaining this general information from notifications, we focused on specific data collected through phone calls. Specifically, to better stratify the sample and provide a complete epidemiological picture, we divided the sample by work activity. The results are summarized in Fig. 3. Fig. 4 presents information about possible sources of infection and transmission chains based on direct phone interviews. Both figures clearly show that students were the most affected group, representing over a fifth (24.1 %) of the sample, followed by retired people (21.0 %) and healthcare workers (13.2 %).

Unfortunately, the possible mode of transmission was unknown in more than half (58.5 %) of the reported cases. When known, the most reported modes of transmission were familial origin (10.7 %), followed by causes linked to health environments (nursing home stays and hospital admissions). 'Work' included all job activities not linked to health professions. Finally, local trains and hydrofoils were the only reported means of transport.

To summarize all the features of the patients affected during the three years from 2020 to 2022, we included information about work activity, gender, age, nationality and source of infection in Table 1.

Moreover, we distinguished between individual cases and outbreaks and evaluated the presence and features of all the latter. Specifically, 66.9 % of all the reported cases were part of an outbreak. Specifically, 77.8 % were small outbreaks with <5 cases while 22.2 % were large outbreaks with ≥5 cases. The average number of cases was 4.2 ± 2.4 (min.2-max.11). Larger outbreaks occurred in

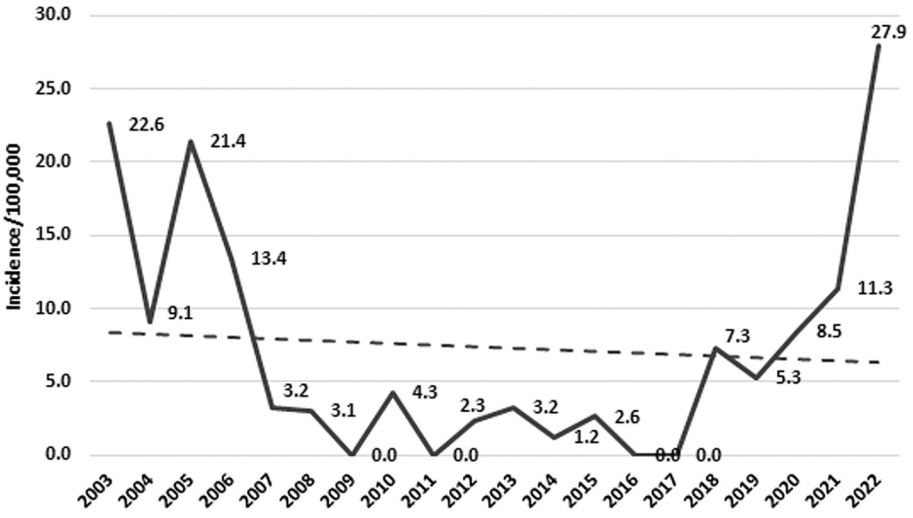

Fig. 1. Annual trend in the incidence of scabies (per 100,000 population) in the 2003–2022 twenty-year period.

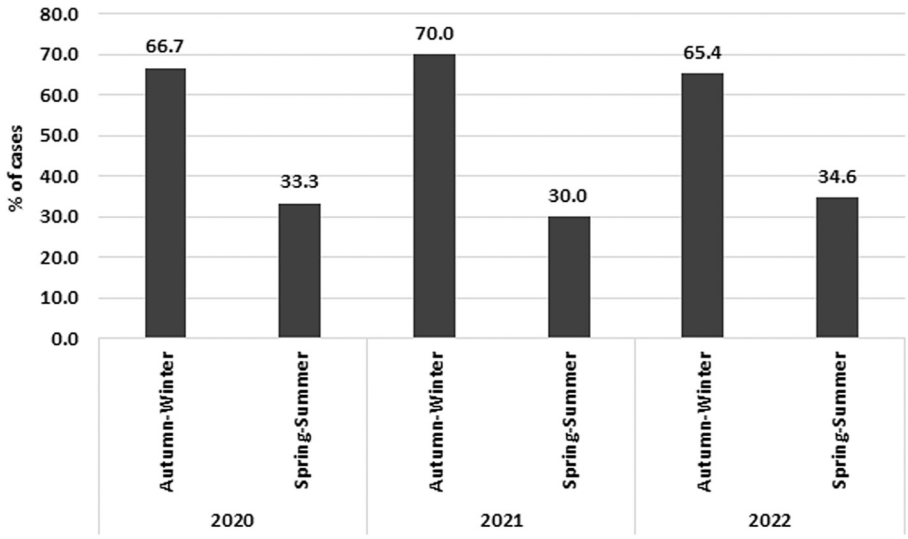

Fig. 2. Seasonality of the scabies cases notified in the three years from 2020 to 2022.

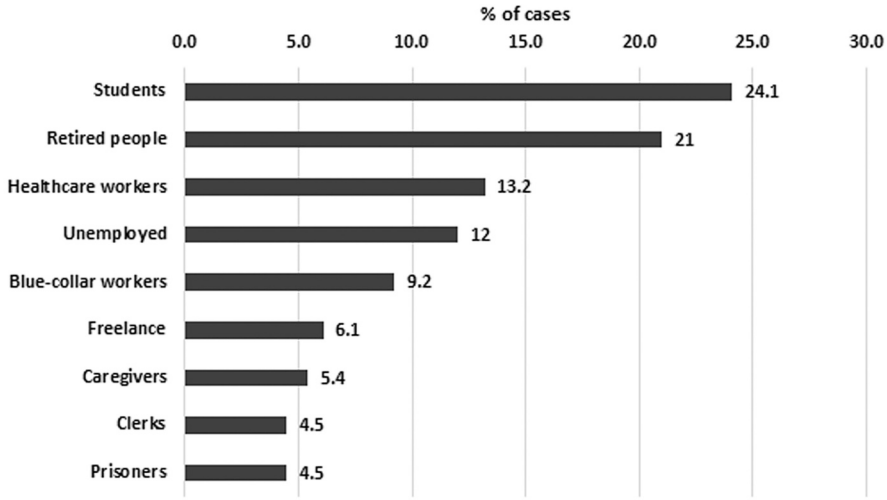

Fig. 3. Work activity distribution of people infected by scabies in the three years from 2020 to 2022.

healthcare facilities for more than half the cases (69.4 %), with the majority (88.9 %) of them occurring in nursing homes. In these settings, during large outbreaks, the average number of cases was 9.5 ± 1.3 (min.6-max.10). The remaining large outbreaks (30.6 %) involved family settings, where the average number of cases was 6.8 ± 2.5 (min.5-max.11). Smaller outbreaks were especially common in family settings (32.6 %, with an average of 2.8 ± 0.9 cases; min.2-max.4), nursing homes (11.7 %, with an average of 3.2 ± 1.0 case; min.2-max.4) and during travel (10.0 %, with an average of 2.5 ± 0.9 cases; min.2-max.4). Fig. 5 shows the reported modes of transmission for all the outbreaks.

Fig. 5 shows that, generally, the most frequently reported transmission route during outbreaks was within families ($p < 0.0001$; OR = 11.20), followed by nursing home stays ($p < 0.0001$; OR = 25.00). Although family settings were generally the most common location for outbreaks, the number of cases per outbreak was higher in nursing homes than in familial settings. Therefore, family environments and nursing home stays are key risk factors for infection. However, the mode of transmission was unknown in 31.4 % of cases.

Finally, we categorized the sample according to age to evaluate the most affected age group and to understand the most common mode of transmission for each group. Specifically, we divided the sample into 3 age groups: children and young adults (0–29 years), adults (30–59 years) and elderly people (≥60 years). The results are shown in Fig. 6.

The panel shows that children and young adults were the most affected group, followed by adults and the elderly ($p < 0.05$). Family-related transmission was common across all age groups. Further, school and travel were the most frequently reported

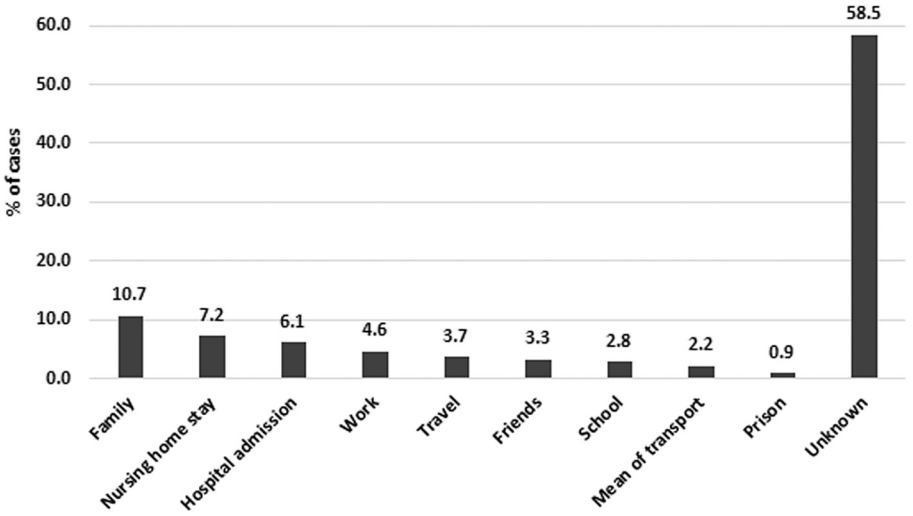

Fig. 4. Possible modes of transmission of scabies cases in 2020–2022 as reported by interviewed individuals.

Table 1
General features of the sample according to the personal characteristics.

Work activity	Gender	Age	Nationality	Source
(%)	(%)	(M ± SD)	(%)	(%)
Students	M 57.1	16.0 ± 6.0	I 93.9	Family 16.3 School 8.2 Travel 8.2 Friends 6.1
(24.1)	W 42.9	(min.5-max.36)	F 6.1	Mean of transport 4.1 Shopping activity 4.1 Gym 2.0 Unknown 51.0
Retired people	M 63.9	76.7 ± 9.3	I 100.0	Nursing home stay 11.6 Hospital admission 11.6
(21.0)	W 55.6	(min.57-max.94)	F 0.0	Family 11.6 Friends 4.7 Unknown 60.5
Healthcare workers	M 50.0	46.0 ± 10.1	I 100.0	Work 62.5
(13.2)	W 50.0	(min.25-max.61)	F 0.0	(Nursing home 45.8; Hospital 16.7) Unknown 37.5
Unemployed	M 36.8	43.9 ± 13.2	I 100.0	Family 21.1 Hospital admission 5.3
(12.0)	W 63.2	(min.21-max.59)	F 0.0	Travel 5.3 Mean of transport 5.3 Unknown 63.2
Workmen	M 92.3	49.1 ± 14.8	I 100.0	Unknown 100.0
(9.2)	W 7.7	(min.24-max.68)	F 0.0	
Freelance	M 50.0	50.1 ± 6.9	I 100.0	Work 12.5
(6.1)	W 50.0	(min.36-max.59)	F 0.0	Unknown 87.5
Caregivers	M 0.0	45.0 ± 13.4	I 100.0	Work 50.0
(5.4)	W 100.0	(min.20-max.59)	F 0.0	Unknown 50.0
Clerks	M 50.0	41.8 ± 9.7	I 100.0	Family 75.0
(4.5)	W 50.0	(min.29-max.53)	F 0.0	Travel 25.0
Prisoners	M 75.0	38.5 ± 14.1	I 100.0	Prison 100 %
(4.5)	W 25.0	(min.24-max.60)	F 0.0	

transmission route among young adults, while work-related transmission was most frequently reported by adults. Among the elderly, the most frequent mode of transmission was linked to healthcare environments.

4. Discussion

In the last two decades, a high number of published papers have noted the rapidly increasing frequency of scabies occurrence in many countries (Amato et al., 2019; Lugović-Mihić, 2019; Sunderkötter et al., 2019; Lugović-Mihić et al., 2020; Akaslan et al., 2022;

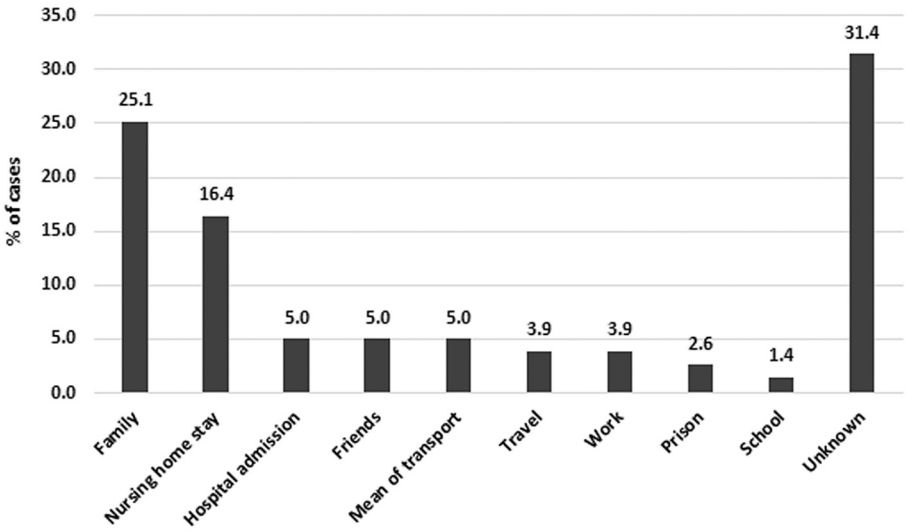

Fig. 5. Possible mode of transmission involved in outbreaks, as reported by interviewed individuals.

Van Deursen et al., 2022). Therefore, in recent years, there has been growing public debate around this disease. As the incidence of almost all notifiable infectious diseases decreased during the COVID-19 pandemic due to reduced transmission, underreporting and underdiagnosing (Facciolà et al., 2023), it has been interesting to assess the impact of the pandemic on scabies incidence.

Our research, which was conducted in a territory typically characterised by a high socioeconomic level with some 'disadvantaged' areas, reveals a significant increase in scabies notifications starting from 2018, with a highly notable surge during the COVID-19 pandemic, aligning with the existing literature (Redondo-Bravo et al., 2021; Ažđajić et al., 2022; Van Deursen et al., 2022). Preliminary data show that this upward trend seemed to have been maintained in 2023, with a 146 % increase compared to 2022. We hypothesize that this increase was probably occasioned by different factors. Firstly, it is well known that the first phase of the pandemic had a great impact on health services – especially those health services such as dermatology that are unrelated to acute diseases, with a remarkable increase in waiting times (Gisondi et al., 2020; Wood, 2022; Valenti et al., 2022; Shah et al., 2024). Moreover, people were homebound during the lockdown and even after, when the fear of becoming infected with COVID-19 led people to stay home unless necessary and to completely refrain from seeking medical attention unless they had acute and severe cases, leading to a remarkable delay in diagnosis. Additionally, we can assume that people during this period were forced to spend time in close contact with relatives, heightening the risk of transmitting the scabies parasite through direct contact or fomites.

All these factors could have played a major role in the remarkable increase in diagnoses and notifications that occurred during the two years of the pandemic. We could also assume that the pandemic, due to the major economic crisis induced in Italy (Auriemma and Iannaccone, 2020), could have exacerbated some already critical situations, especially in families living in extreme poverty, which is well-known to favour the development of scabies.

Notably, we did not consider the extremely high number of scabies cases detected among irregular migrants, despite our territory is an important arrival point for many people who irregularly come from Africa and the Middle East. We made this choice because notifications for this population follow an alternative process that does not involve the local health agency. However, we can easily show that this particular situation had no impact on our infectious diseases epidemiological context because despite the incredibly high number of arrivals to our territory before the pandemic, during the 2014–2018 five-year period and the tremendous number of scabies cases detected among migrants, there was no corresponding increase in cases among the resident population (Visalli et al., 2020). The number of resident foreigners in our sample was very low and exclusively consisted of young students who contracted the disease during school outbreaks. Notably, the mean age of affected foreigners was much lower than that of affected Italians.

Geographically, most of the notified cases were from the Metropolitan City of Messina. Specifically, more than half of the notified cases occurred in the southern suburb of the city, a territory with many disadvantaged neighbourhoods. Furthermore, the residence of the individual patients reveals that many of the affected people were from these neighbourhoods, suggesting that some critical socioeconomic conditions might have favoured the onset of the disease. This assumption is supported by the high number of cases that occurred among 'disadvantaged' groups, such as the unemployed, blue-collar workers and retired people.

From an epidemiological perspective, even if scabies is classically considered a disease affecting people living in poor socioeconomic conditions, such as overcrowding, resource-limited geographical regions and institutional settings (e.g., long-term care facilities and prisons), the disease currently seems to also affect individuals of all socioeconomic statuses (Stamm and Strowd, 2017). Additionally, as expected, the number of notified cases was always high during the cold season because people live in close contact with each other during this season, increasing the likelihood of this kind of infection.

The source of infection was unknown in a very high percentage of cases because many patients, when asked about this information, were unable to trace the exact chain of transmission. When known, a family outbreak was the most commonly reported origin in most

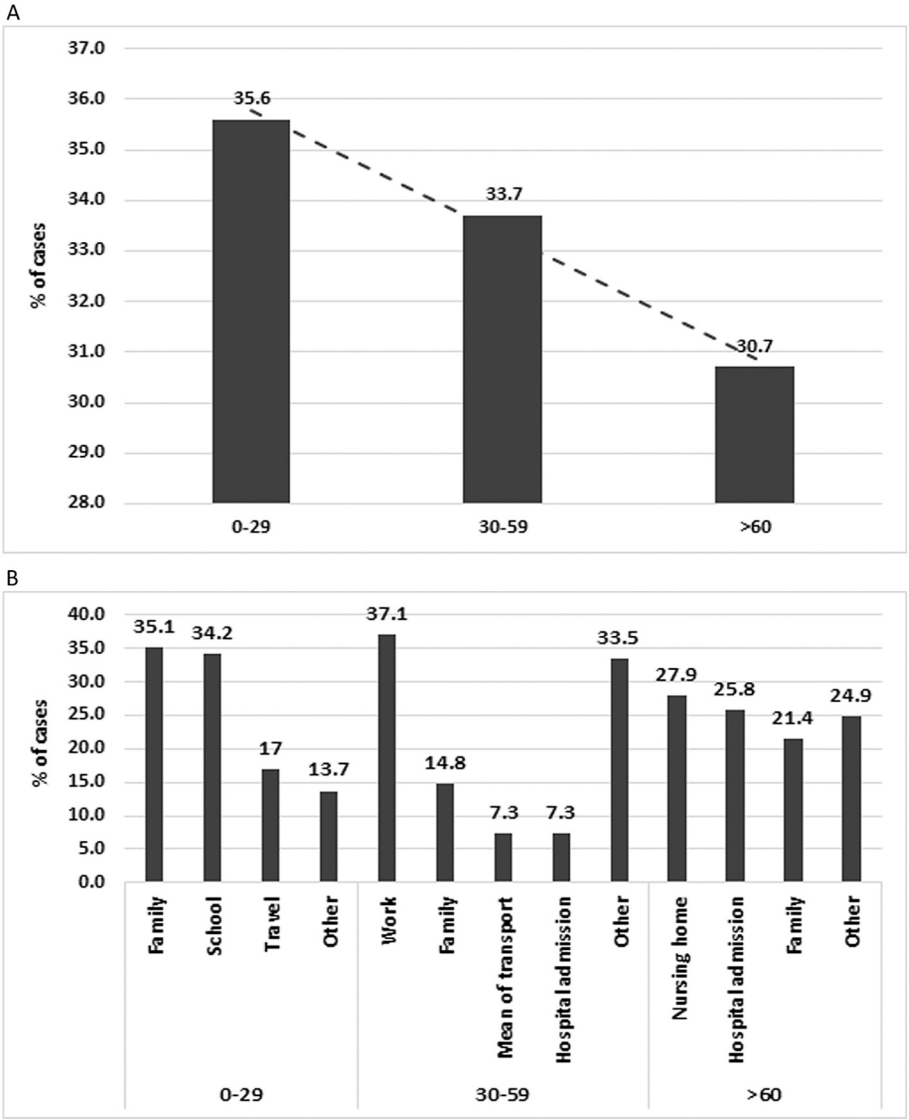

Fig. 6. Percentage of scabies cases (A) and presumed mode of transmission (B) in different age groups.

cases although the exact source from which the primary case acquired the infection remained uncertain.

The situation was different for all infections acquired in healthcare settings, involving both healthcare professionals and admitted patients. Specifically, a healthcare setting was the primary source of infection for the healthcare workers and the elderly staying in nursing homes or under hospitalization. These settings were characterised by large outbreaks affecting both patients and workers. In our analysis, the largest outbreaks occurred in these contexts because these settings are highly vulnerable to outbreaks: individuals from different social and economic backgrounds mingle in these settings. Specifically, healthcare settings, due to the presence of patients with different illnesses, might play a leading role in the transmission of scabies. Especially nursing homes are well-known to be at risk of scabies development (Murakonda et al., 2014; Cassell et al., 2018; Morrison et al., 2019) and were affected by these outbreaks. We can hypothesize different factors that may have contributed to the occurrence of these outbreaks. Probably, the quality and quantity of care provided in these settings deteriorated during the COVID-19 pandemic, as many health personnel were affected by COVID-19 and stayed away from work. Hence the remaining staff on duty were overloaded and had to increase the care provided to patients. This outcome certainly led to an increase in contact between staff and many patients, and if only one case of scabies was present, it created ideal conditions for an easy spread of the infection. Moreover, the pandemic induced stringent isolation of the elderly in nursing homes due to the severe restrictions adopted in healthcare institutions during the lockdown and the entire first phase of the pandemic. Hence, relatives were not allowed to visit their loved ones. This situation could have led to late identification of scabies infection by the overburdened healthcare workers. This overall context led to a worsening of environmental hygiene and a deterioration of living conditions, creating ideal conditions for large scabies outbreaks.

Regarding the features of the affected individuals, students were the most impacted group, which is further supported by the highest number of reported cases in the 0–29 age group. In this group, familial and school-related transmission were the most commonly reported sources of outbreaks. A lot of them were involved in outbreaks broke out just in these contexts. Furthermore, travel was an important source of transmission in this population. For retirees and healthcare workers, a primary source of infection was staying and working in healthcare settings, confirming that these contexts can be an important source of infectious diseases. This conclusion is confirmed by the high significance between nursing home stays and outbreaks. Especially for healthcare workers, strict adherence to hygiene rules and best practices such as consistently wearing personal protective equipment (PPE), changing it between patients, proper hand hygiene and sanitizing all patient areas are key to the prevention of individual and, especially, outbreaks of scabies (Los Angeles County Department of Public Health, 2019; GOV.UK, 2023).

Another population group that reported healthcare assistance as a primary source of infection was caregivers who, in our study, were exclusively women. Caregivers could adopt the same recommended practices described for healthcare workers to limit the spread of scabies. Finally, some scabies infections also occurred among prisoners, an 'at-risk' category according to literature data (Mannocci et al., 2014; Bartosik et al., 2020; Bogino et al., 2023).

A limitation of this study is it relied solely on notified cases. Consequently, the results and conclusions might have been limited due to underreporting, particularly for cases occurring outside healthcare settings. Notably, we assumed that cases occurring in hospitals or nursing homes are much more likely to be reported than cases in the general population diagnosed by private specialists. Moreover, despite the high response rate from interviewed patients, we have to consider that we received information and declarations that may have been influenced by the patients' recall. However, we can reasonably assume that the epidemiological situation described in this study is a good representation of the real situation.

5. Conclusion

Scabies is an old disease typically affecting people living in disadvantaged socioeconomic conditions. However, in recent years, many countries have reported an increase in incidence concomitantly with the onset of the COVID-19 pandemic. Our research confirms this general epidemiological trend in Italy probably due to a combination of different causal factors. This consideration shows the importance of always monitoring the epidemiology of all notifiable infectious diseases to ensure prompt action by competent authorities to limit the spread of these diseases to the community. Careful and continuous epidemiological monitoring should be especially done in at-risk environments that can facilitate infectious disease transmission. Specifically, concerning scabies, healthcare settings, such as hospitals and nursing homes and schools and prisons should be continuously monitored and made subject to best practice application. Also, familial cases and outbreaks pose a risk of transmission of scabies infection to the community. Therefore, substantial economic and human efforts should be dedicated to sustaining continuous monitoring which must be considered a key objective of global public health.

Ethics

This study has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Data are reported in an aggregated form, guaranteeing anonymity.

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CRediT authorship contribution statement

Antonio Laganà: Data curation, Formal analysis, Investigation, Methodology. **Ilaria Saia:** Formal analysis, Investigation, Methodology. **Giovanni Genovese:** Investigation, Methodology. **Giuseppa Visalli:** Data curation, Formal analysis, Investigation, Methodology. **Giuseppa D'Andrea:** Investigation, Methodology, Resources. **Salvatore Sidoti:** Investigation, Methodology, Resources. **Angela Di Pietro:** Conceptualization, Data curation, Supervision. **Alessio Facciolà:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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