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(RESEARCH ARTICLE)

GEOGRAPHIC VARIATION OF NOTIFICATION SCABIES RATES IN IRAQ: A NATIONAL SURVEILLANCE STUDY, 2016–2023

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ABSTRACT

Background: Scabies remains a neglected tropical disease that spreads in environments and conditions where access to healthcare is difficult, which may affect disease transmission and reporting. There is no national surveillance data for Iraq, where millions of people were displaced between 2014 and 2017.

Objective: To describe national and directorate-level trends in notification rates across Iraq between 2016 and 2023.With a focus on governorates most affected by the 2014-2017 displacement crisis.

Methods: We conducted a descriptive study using notification data from the Iraqi Ministry of Health annual reports for 2016, 2019, 2020, 2021, 2022, and 2023 (reports for 2017–2018 were unavailable). Covering 18 governorates. The report summarized scabies cases and rates per 10,000 population nationally and across health directorates, and compared them between directorates affected by the displacement crisis.

Results: The national reported scabies rate increased from 2.1 per 10,000 population in 2016 to 13.9 in 2019, then declined to 7.38 in 2022 before rising to 8.36 in 2023. Nineveh had the highest rate in 2021- 2023; Salah al-Din and Kirkuk fell from 39.3 and 33.0 in 2019 to 7.6 and 9.8 in 2023, and Anbar stayed below the national rate.

Conclusion: Reported scabies rates in Iraq varied substantially over time and across health directorates, with Nineveh persistently highest. These findings highlight the importance of continued surveillance and targeted prevention efforts. As the data are passive notifications with no information for 2017–2018, they cannot show whether these changes reflect transmission or reporting.

Keywords: Scabies, Passive notification, Iraqi prevalence, Descriptive epidemiology.

1 INTRODUCTION

Scabies is a skin infestation caused by a highly specialized and adaptable mite, *Sarcoptes scabiei* var. hominis, which is largely host-specific to humans and causes itching after penetrating the epidermis. The typical mode of transmission is prolonged skin-to-skin contact between an infested individual and one who is not; it can also be transmitted through fomites such as bedding and clothes. It decreases quality of life due to psychological distress and may be associated with significant morbidity, including secondary bacterial infections and post-streptococcal complications [1].

Global scabies incidence was approximately 622.5 million episodes in 2021, with the highest rate observed in middle sociodemographic-index settings and in populations living under crowded conditions [2]. A systematic review and meta-analysis of scabies found a close association between overcrowded living conditions and limited access to water with increased risk of scabies. Also, A recent study from Gaza reported scabies in 2.5% of internally displaced people who participated in this survey; this study associated scabies and impetigo cases with difficulty accessing clean water, as did another on displaced Somali households in Hargeisa [3-5].

Historically, scabies was considered a minor dermatological complaint with limited recognition of its broader health consequences and associated morbidity. As its public health significance grew, the World Health Organization categorized scabies as a neglected tropical disease in 2017 and added it to the 2021–2030 neglected tropical disease roadmap [6].

More than 4 million people were displaced in Iraq in 2014–2017; these people suffered from prolonged displacement and overcrowded living conditions, with many displaced populations experiencing limited access to basic services, including water [7]. Such conditions are recognized risk factors for scabies transmission. Epidemiological data on scabies in Iraq remain limited and geographically restricted, coming mainly from facility-based studies in individual governorates. To our knowledge, no one has analyzed routine surveillance data at the national level. This study aims to describe and examine national and directorate-level trends, especially in governorates affected by the displacement crisis, using six years of directorate-level Ministry of Health notification data, from 2016 and 2019 through 2023.

2 MATERIALS AND METHODS

2.1 Data source and study design

This is a descriptive, repeated cross-sectional analysis of collected surveillance data. Data were obtained from the annual reports of the Iraqi Ministry of Health for six reporting years, 2016, 2019, 2020, 2021, 2022, and 2023 [8]. Each report presents scabies cases per 10,000 population by health directorate and sex. Nineteen directorates are represented, including two directorates covering Baghdad governorate separately (Karkh and Rusafa). Reports for 2017 and 2018 were not available to the authors at the time of writing, producing a two-year gap that coincides with the most intense phase of camp consolidation and return in Iraq's post-conflict displacement crisis; this gap is treated as a data-availability limitation throughout and is not interpolated.

2.2 Case definition and reporting system

These data reflect actual cases that present to dermatology clinics in healthcare foundations, are registered in the public health system, and receive treatment. Rather than cases identified through a population-based prevalence survey using a standardized clinical case definition such as the 2020 International Alliance for the Control of Scabies criteria.

2.3 Variables and statistical analysis

The variables were presented as absolute case counts and as rates per 10,000 population for each health directorate. For each year, we calculated the mean, standard deviation, minimum and maximum values, and the coefficient of variation. Health directorates were categorized based on the number of reported scabies cases from 2019 to 2023 to assess changes during the period encompassing displacement and population return.

The data of directorates of governorates Nineveh, Anbar, Salah al-Din, and Kirkuk were analyzed separately across six years. These governorates were most affected by the displacement crisis in 2014-2017. The data represent passive notifications of scabies; therefore, they cannot establish causal inference or hypothesis association between governorate level and displacement status

3 RESULTS

3.1 National trend, 2016–2023

The rate of scabies in Iraq rose from 2.1 per 10,000 in 2016 to 13.9 in 2019 (with an increase of 6.6 times through this period). This rate fell to 10.6 in 2020, 9.0 in 2021, and 7.4 in 2022, and thereafter slightly increased to 8.4 in 2023, as shown in Figure 1. The significant difference in rate between 2016 and 2019 cannot be assumed to continuous or gradual increase because of lack reports of 2017 and 2018. The number of cases, notification rate, and percentage change over the years in same period are illustrated in Table 1.

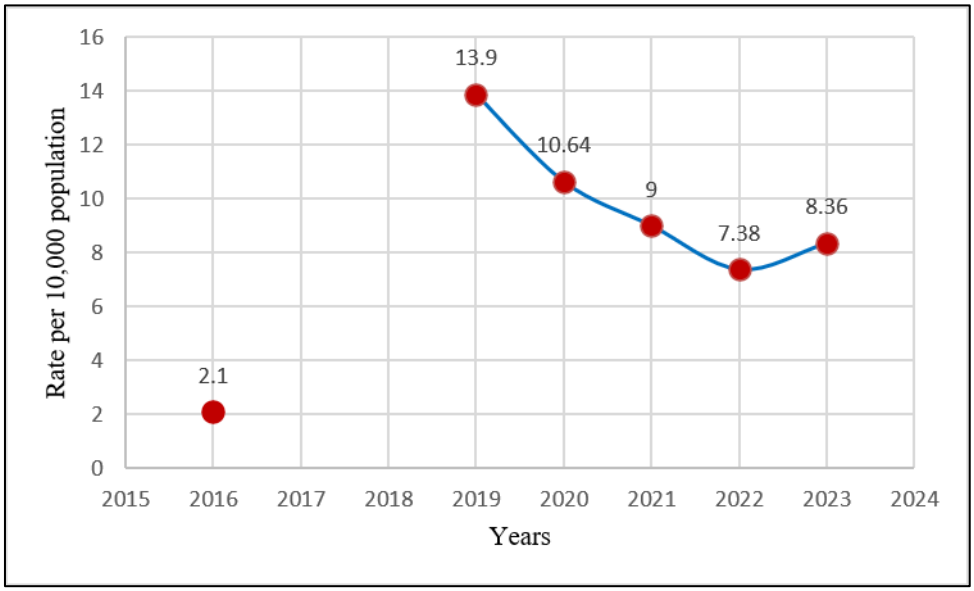


Figure 1: Rate of scabies cases per 10,000 in Iraq

Table 1: National scabies notification trend, all of Iraq, 2016-2023, with year-over-year percentage change.

Year	Reported cases	Rate per 10,000	Change vs. prior year
2016	7939	2.1	(baseline)
2019	54583	13.9	+562.4%
2020	42714	10.64	−23.5%
2021	37046	9	−15.4%
2022	31163	7.38	−18.0%
2023	36222	8.36	+13.3%

The variation in rate across the 19 health directorates in the same years is shown in Table 2. The coefficient of variation in 2016 was 125% and exceeded 84% in the following years, reflecting considerable variation between the rates of directorates. In 2016, the highest rate was 9 per 10,000 population in Maysan directorate, and zero in some directorates. In 2019, the highest rate was 39 per 10,000 population in Salah al-Din directorate, while Erbil directorate had the lowest rate, 0.3 cases per 10,000 population.

Table 3 presents the ranking of the 19 health directorates by scabies notification rate and the changes observed between 2019 and 2023. The rate in Nineveh increased substantially, making it the highest-ranked directorate in 2023. In contrast, Salah al-Din, which had ranked first in 2019, showed the largest decline among directorates, with its rate falling by 32 points per 10,000 population. Several other directorates also reported substantial declines, including Kirkuk (−23.2 points per 10,000), Maysan (−19.8 points per 10,000), Basra (−13.9 points per 10,000), and both Baghdad Karkh and Diyala (−8.4 points per 10,000).

Table 2: Descriptive statistics of directorate-level scabies rates (per 10,000), 2016-2023.

Year	Simple Mean	SD	Min	Max	CV (%)
2016	2.13	2.67	0.00	9.01	125.2
2019	13.86	11.73	0.30	39.30	84.6
2020	10.35	10.03	0.11	30.50	96.9
2021	7.97	8.63	0.48	36.00	108.4
2022	6.77	6.12	0.40	25.65	90.4
2023	7.72	6.85	0.83	29.35	88.7

Note: Simple Mean = unweighted arithmetic average of the 19 directorate-level rates; it differs from the population-weighted national rate reported in Table 1. **SD**: standard deviation; **Min**: minimum; Max: maximum; **CV**: coefficient variation

Table 3: Directorate ranking by scabies rate (per 10,000), 2023, compared with 2019.

Rank (2023)	Health directorate	Rate 2019	Rate 2023	Change
1	Nineveh	24.6	29.35	+4.8
2	Najaf	25.8	20.52	-5.3
3	Karbala	16.0	9.97	-6.0
4	Kirkuk	33.0	9.81	-23.2
5	Baghdad Karkh	17.7	9.29	-8.4
6	Babil	5.3	8.10	+2.8
7	Wasit	11.3	8.02	-3.3
8	Maysan	27.8	7.97	-19.8
9	Salah al-Din	39.3	7.62	-31.7
10	Anbar	10.7	5.80	-4.9
11	Basra	19.6	5.72	-13.9
12	Diwaniya	3.0	4.12	+1.1
13	Thi-Qar	2.3	3.51	+1.2
14	Diyala	11.9	3.49	-8.4
15	Muthanna	3.1	3.48	+0.4
16	Baghdad Rusafa	6.8	2.43	-4.4

3.2 Trajectories of conflict-affected directorates

Table 4 shows variation in governorates that were affected by the displacement crisis between 2016 and 2023. The rate of scabies in Nineveh Governorate increased from 0.77 in 2016 to 24.60 in 2019, then to 29.58 in 2020, before peaking at 36.0 in 2021. It maintained the highest or second-highest directorate in the following years. In contrast, the rate in Salah al-Din Governorate rose from 0.09 in 2016 to 39.3 in 2019, and Kirkuk rose from 3.14 in 2016 to 33.0 in 2019; then it began to decline. The rates in these governorates started to decline in 2022 and 2023, except in Dohuk governorate, which recorded the highest rate of 5.79 in 2023.

Table 4: Scabies rates in governorates hosting internally displaced populations.

Directorate	2016	2019	2020	2021	2022	2023
Nineveh	0.77	24.60	29.58	36.00	25.65	29.35
Anbar	0.01	10.70	5.93	7.80	4.86	5.80
Salah al-Din	0.09	39.30	24.27	13.30	8.24	7.62
Kirkuk	3.14	33.00	30.50	16.80	12.71	9.81
Erbil	0	0.3	0.11	0.71	0.4	0.83
Duhok	0	1.4	3.9	2.13	2.77	5.79
Sulaimaniya	1.75	3.5	1.15	1.79	0.59	0.89

3.3 Sex distribution

Table 5 shows the number of reported scabies cases at the national level by sex. The proportion of male cases among all reported cases ranged from 50% to 53% across the study years.

Table 5: National case counts by sex and percentage male, 2016-2023.

Year	Female	Male	% Male
2016	3551	4012	53.0
2019	26759	26807	50.0
2020	20866	21034	50.2
2021	17684	18645	51.3
2022	14873	15669	51.3
2023	16743	18235	52.1

Two directorate-year records for 2021, the Sulaimaniya directorate rate and the national grand-total rate, were illegible in the source image first obtained for this study; the case counts were provisionally recovered by arithmetic from the other directorates in the same year, and a complete image of the same table, obtained subsequently, confirmed both the recovered case counts and the associated rates (1.19 per 10,000 for Sulaimaniya; 9.0 per 10,000 nationally), which are used throughout this paper and the accompanying dataset.

4 DISCUSSION

Three key findings were identified from this six-year compilation of Iraqi scabies surveillance data. First, the national rate rose markedly between 2016 and 2019, then declined gradually through 2022. Because data for 2017 and 2018 are missing, we cannot determine whether this curve reflects a true change in epidemiological burden, improved reporting and surveillance coverage, or both. Second, variation across directorates was substantial and persistent, with a coefficient of variation above 70% in every year. This suggests that the factors driving the national trend varied by region. Third, the four directorates most affected by the 2014–2017 displacement crisis diverged markedly when tracked individually, with Anbar staying relatively low throughout while Nineveh rose to and remained at the top of the national ranking.

The difference between Anbar and Nineveh is notable because it argues against a simple interpretation in which conflict history alone determines scabies burden. According to IOM's return index, 92% of the population displaced from Anbar had returned in December 2021, compared with 74% of those displaced from Nineveh. The return rate of displaced populations may also reflect the availability of, and improvements in, living conditions and the restoration of essential services, including access to safe water, healthcare, case detection and treatment, and other basic services [9].

These factors may reduce the conditions that enable continued scabies transmission. Meanwhile, the scabies rate in Anbar remained below levels observed in Salah al-Din, Kirkuk, and, particularly, Ninewa throughout the study period [10]. This is aligned with theory that suggests crowding, limited access to water, and healthcare can contribute to the transmission of scabies [11]. These findings should not be interpreted as causal relationships but as descriptive

patterns, because the current data are passive notifications. These findings align with studies that focus on displacement causes rather than displacement itself as a mechanism facilitating the spread of scabies. A study conducted in Gaza found that scabies and impetigo were linked to access to water and essential services, regardless of displacement duration [12]. In Bangladesh, a prevalence of 66.42% was reported among forcibly displaced Myanmar nationals. Similar findings have been reported in a global study of displaced populations [13,14].

In Iraq, previous studies have investigated scabies in specific populations and local settings; for example, a study was conducted on displaced people in Cham Mishko camp, Zakho city, Duhok governorate, which reported scabies in 45% of 1300 internally displaced people who attended the dermatology clinic [15], while study conducted in 2019 in Duhok, which included 35,447 patients (29,183 native residents who visited hospitals and 6,264 displaced persons who visited health centers in refugee camps within the governorate), it was found that 5.52% of the native residents (47.58% male, 52.41% female) and 5.45% of the displaced persons in the camps (42.10% male, 57.89% female) were affected by scabies[16].

Two other studies among patients who visited Azadi Hospital in Duhok reported scabies prevalence: the first study, conducted in 2012-2013, reported 5.5%; the second study, conducted in 2023-2024, reported 60.7% among the study participants [17, 18]. A study conducted in Tikrit between 2007 and 2008 reported that 132 (11.1%) had scabies among 1,194 patients who visited a dermatology clinic. Similarly, comparable findings were reported in another study in Tikrit, where the frequency of scabies was 1106 (10.7%) among 10312 patients who visited the dermatology department in Salahaldeen Hospital [19, 20]. At Baqubah General Hospital in Diyala Governorate. 344 (2.16%) of 15891 patients who visited the dermatology clinic were diagnosed with scabies, with males accounting for 214 (62%) of those cases [21].

Two studies in Baghdad examined scabies. The first, carried out at Al-Kadhimiya Teaching Hospital between 2011 and 2012, involved 200 individuals with scabies, most of whom were children or young adults. The majority were male, lacked formal education, and lived in densely populated areas [22]. The second study was conducted in the Al-Daseem area in 2019 and included 11,363 school students and residents. 746 participants (6.6%) were diagnosed with scabies, including 457 males and 289 females; a difference between sexes was significant [23]. In Karbala, the first study conducted between 2009 and 2010 included 4,169 patients; 283 individuals were diagnosed with scabies, consisting of 193 males and 90 females [24]. The second study was conducted between 2017 and 2018, in which 115 cases of scabies (10.2%) were diagnosed among 1,120 patients who visited the dermatology clinic, comprising 66 males and 49 females [25].

In southern Iraq, a study reported that 455 (5%) patients with scabies (212 males and 243 females) were among 9,935 patients who visited the dermatology clinic at Al-Fayhaa Teaching Hospital, Basra. A study in DhiQar Governorate included 721 individuals with scabies, including 386 (53.5%) males and 335 (46.5%) females [26, 27].

The results of the current study show an approximately sevenfold increase in the national scabies rate between 2016 and 2019, which requires careful interpretation according to factors that may influence reported case numbers. Passive notification systems are sensitive to changes in patient attendance at clinics, diagnostic methods in practice, and reporting completeness processes in ways that population-based prevalence surveys are not, as the systematic review of global scabies prevalence in 2023 noted that a lack of standardized diagnostic criteria has obstructed accurate comparison of prevalence rates across countries [28].

Many factors may contribute to differences in scabies frequency between previous Iraqi studies and the current study. The most important is that all of these data sources capture only people who seek care. The previous studies were based on patients attending hospitals or clinics, and our data are passive notifications; neither is a field survey. The studies also differ in design, in the populations sampled, and in the educational level, economic status, and living conditions of those populations. Residential location is another data gap; a small number of the studies reported information about patients' Residential status. Sharing clothes, particularly among children, may also be one of the factors that contribute, although direct skin contact is generally considered the main route in ordinary scabies. None of these factors were measured in the present data, so they should be read as possible explanations.

It is noted that the reported scabies rate increased again in 2023, highlighting the need to examine health directorates where rates were substantially higher than the national average. The annual reporting of such large numbers of cases adds to the workload on healthcare services. Further studies are needed to evaluate the effects of factors on scabies rates, such as overcrowding, housing conditions, water accessibility, and residential status.

5 CONCLUSION

Based on data from the Iraqi Ministry of Health, there is a marked increase in the national scabies notification rate in the period between 2016 and 2019, and then a decline in the following years, with high differences across health directorates. Nineveh has had the highest rates among the four directorates most affected by the 2014-2017 displacement crisis, whereas Anbar had comparatively lower rates. As the data are based on passive notification, they do not support causal conclusions about displacement.

Limitations

Several limitations should be noted during interpretation of the current results. These include the lack of data for the years 2017–2018, leaving a gap in the surveillance period. These data represent passive notification surveillance rather than a nationwide field survey; the reported rate may be influenced by various factors such as healthcare and essential services access. Furthermore, the data do not provide individual-level information such as such as urban or rural residence, their educational attainment, and access to essential services.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare no conflict of interest

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