Leishmaniasis in Iraq: Endemic Persistence Amidst Conflict and Displacement

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Abstract

Leishmaniasis remains a neglected yet persistent public health challenge in Iraq, where both cutaneous (CL) and visceral leishmaniasis (VL) are endemic. This review examines how decades of armed conflict, mass displacement, and healthcare system deterioration have facilitated the resurgence and geographic spread of the disease, including into previously unaffected regions such as Kurdistan. Vulnerable populations, particularly children, rural residents, and internally displaced persons (IDPs), bear the brunt of the disease due to poor sanitation, limited healthcare access, and inadequate vector control. Despite high treatment success rates with intralesional

sodium stibogluconate, delayed diagnosis and restricted drug availability hinder effective management. Diagnostic limitations and underreporting further obscure the true disease burden. However, localized programs, such as the successful VL control initiative in Thi Qar province, demonstrate the potential impact of targeted public health responses. Key recommendations include strengthening national surveillance, decentralizing diagnostic and treatment services, implementing context-specific vector control, and integrating leishmaniasis care into humanitarian aid for displaced populations. Public awareness campaigns should be tailored to local cultural and media contexts. Addressing leishmaniasis in Iraq requires a coordinated, multisectoral approach that considers the ongoing conflict, fragile health infrastructure, and regional mobility patterns. Cross-border cooperation and sustained support from international partners are essential to mitigate further spread and reduce disease burden.

Keywords: Conflict; Displacement; Iraq; Leishmaniasis; Public health.

1. Context

Leishmaniasis is a vector-borne parasitic disease caused by the obligate intracellular protozoa *Leishmania* and transmitted by phlebotomine sandflies (1). The disease is caused by multiple subspecies that have variable geographic distribution worldwide (2). There are three main forms of the disease: cutaneous leishmaniasis (CL), mucosal leishmaniasis (ML) and visceral leishmaniasis (VL, also called Kala azar) (2). CL is the most common and least serious form characterized by skin ulcers that can lead to disfiguring scars at the site of sandfly bites (3). Up to a million of new CL cases occur worldwide annually, most of them in the Americas, the Mediterranean basin, the Middle East and central Asia (4). ML affects mucosal sites of head and neck region and leads to facial disfiguration years after the initial infection (5). The majority of these cases Bolivia, Brazil, Ethiopia and Peru (4). VL is characterized by slow onset of fever, weight loss, hepatomegaly, splenomegaly, and anemia and is usually fatal if left untreated (6). Up to 90000 new VL cases occur worldwide annually, most of them in the Brazil, east Africa and India (4). Leishmaniasis is a neglected tropical disease that puts a huge burden on the impoverished societies and gains lesser attention than malaria, tuberculosis and HIV (7). This results in significant social, economic, psychologic and health burden on the countries that are already strained by other endemic diseases, public health challenges and infrastructure limitations (8). Middle east is a region that is endemic to multiple neglected tropical diseases and experienced continuous regional conflicts which aids in the spread of such infections (9). In Iraq, both CL and VL are endemic and have long presented public health challenges. However, in recent years, the burden of leishmaniasis has increased due to a combination of worsening conflict, large-scale population displacement, and deteriorating health infrastructure particularly following the ISIS insurgency (2014–2017). New epidemiological patterns have emerged, including a noticeable rise in CL cases in previously unaffected regions such as the Kurdistan provinces of Erbil, Duhok, and Sulaymaniyah. These trends are compounded by climate change, weakened vector control

programs, and the health system's inability to effectively respond. Despite sporadic local reports, there remains a lack of comprehensive, updated reviews that analyze the full scope of these developments. Therefore, this review is timely and necessary to synthesize current data, assess contributing factors, and provide targeted recommendations for disease control in a rapidly changing Iraqi context.

2. Data Acquisition

We aimed at conducting a review about leishmaniasis in Iraq focusing on epidemiology, contributing factors and recommendations to tackle this growing problem. We used Google Scholar and PubMed as the primary databases for literature search. The following specific keywords were used in the search strategy: "leishmaniasis," "epidemiology," "Public health," "conflict," "displacement," "recommendations," "Iraq." These terms were used to ensure a focus on relevant studies addressing epidemiological trends in leishmaniasis in Iraq. Our search was limited to articles published in English. After the search was conducted, the titles and abstracts of retrieved articles were assessed for relevance. These articles were then reviewed to evaluate their alignment with the scope of this review. Non-relevant studies, review articles without primary data, and papers addressing topics outside the scope of leishmaniasis in Iraq were excluded. In such an approach, a curated selection of articles was obtained, providing a good basis for a comprehensive review of the trends in leishmaniasis infection specific to the region of Iraq.

3. Results

3.1 Epidemiological trends and case distribution

Leishmaniasis has been endemic in all parts of Iraq except for the three northeastern provinces of Kurdistan region; Sulaymaniyah, Erbil and Duhok. Both CL and VL have been reported, though CL represents the majority of cases and is locally known as the “Baghdad boil”. The middle of Iraq has long been infested with VL with 12038 cases recorded between 1971-1984, most of them in children of rural areas (10). The country has experienced the highest burden of leishmaniasis in early years of war with 45.5 cases per 100 000 people in 1992 (7). In 2001, World Health Organization (WHO) reported an incidence of 10.9 cases of VL per 100 000 people in central and southern provinces (10). The number of VL cases reduced from 3 218 cases in 2004 to 1 049 cases in 2008 due to the efforts of the Iraqi health ministry and WHO (7). Data from the national surveillance program show that VL incidence per 100 000 people was 2.6 in 2007, 3.1 in 2008, and 4.8 in 2009 (11). Two studies utilized surveillance database from the Iraqi Ministry of Health for the years 2011-2013 and reported a total of 7112 cases of CL and 2787 cases of VL in that period (12, 13). From April 2015 until April 2016, 571 cases of CL were diagnosed in Kirkuk (14). Kurdistan region was long free of the CL and no cases were recorded before 2010. Thereafter, the number of cases reported in the region have increased from 15 in 2010 to 34 in 2011 to 88 in 2014

(10). An outbreak of 234 cases of CL has affected Erbil province in 2015 (15). From 2015-2017, 1264 cases of CL were diagnosed in Erbil (16). In Sulaymaniyah, a cross-sectional study reported 1334 cases of CL during 2017-2021 (17). While Duhok province is traditionally free of sandflies, a study has documented 451 cases of CL among internally displaced people from the Nineveh province who resided in Duhok between 2015-2017 (18). The main reason behind the emergence and the rising number of cases in Kurdistan region remains conflict and displacement of people from other endemic regions of the country (10, 16-18). Importantly, the first native case of CL in Duhok province emerged in 2023 and no recent studies have documented the incidence in this region (19). During 2016-2017, A study reported 1539 patients with CL in Nineveh province (20). The infection has spread significantly in recent years with a total of 8691 cases of reported by WHO in 2020 (21). Most of the mentioned studies demonstrate that the disease is more common in males, younger people, and rural areas.

3.2 Conflict and its impact on disease dynamics

Iraq has been torn by years of war, invasion, population displacement, ongoing instability and epidemics. These factors have severely weakened the healthcare infrastructure and contributed to the spread of diseases (22). At times, it has dealt with multiple outbreaks while still recovering from the effect of preceding wars (23). A number of studies has confirmed the transmission of leishmaniasis between borders such as Iran and Syria and from travelling such as Chinese workers returning home or U.S. soldiers who served in Iraq (24-27). This pattern of spread emphasizes that leishmaniasis is not only a local concern but also a regional and global public health issue. Despite this risk, there is limited documentation of coordinated regional surveillance or joint control programs. Strengthening cross-border collaboration in vector control, case detection, and data sharing could play a critical role in mitigating transmission. Currently, Iraq's efforts appear largely domestic, with little evidence of formal cooperation with neighboring countries on leishmaniasis control. As discussed previously, many of the outbreaks of the disease in the region were either during war or among displaced people in residential camps. A case-control study reported that Diyala province had the highest rates of VL (21.91%) and CL (13.85%) from 2014 to 2017. This was during military operations when most Diyala residents were displaced (28). Internally displaced populations and refugees are especially vulnerable to leishmaniasis. The ISIS invasion of Iraq in 2014 led to one of the biggest outbreaks of leishmaniasis in the region after the war and most of the cases were recorded in displaced people. As stated previously, a study has documented 451 cases of CL among internally displaced people from the Nineveh province between 2015-2017, while a different study recorded 288 cases of CL in internally displaced school-aged children from Nineveh governorate between 2016-2019 (18, 29). Another study focusing on Sinjar region which was almost completely invaded by ISIS, also recorded 294 cases of CL in preschool children in just first three months of 2019 (29). Displacement often results in overcrowded living conditions, poor sanitation, inadequate shelter, and limited access to healthcare, all of which disrupt routine vector control programs and disease surveillance systems. This results in increased

exposure to sandflies and reduces the ability to detect and treat infections early. Armed conflict also hampers drug supply chains and public health outreach, leading to shortages in diagnostics and treatment for leishmaniasis. Disruption of vaccination campaigns and insecticide spraying further contributes to the failure of disease containment efforts (30).

3.3 Diagnosis and treatment challenges

The diagnosis of leishmaniasis can be challenging as the symptoms overlap with other diseases. There are a variety of investigation, each with unique advantages that can aid in the diagnosis. These include microscopic methods (e.g. Giemsa staining, fluorescent microscopy), serological tests (e.g. ELISA, IFAT), culture (e.g. bone marrow, splenic aspirate), Direct Agglutination Test (DAT) and molecular techniques (e.g. PCR, LAMP) (31). DAT method has been used with very high sensitivity and specificity in the region (32). PCR has been used in Iraq with 92% sensitivity and 100% specificity (33). Molecular testing allows for identification of specific subspecies that might lead to different forms of the disease (34). However, these techniques are not uniformly available across the country. High equipment costs, limited reagent supply, and a shortage of trained personnel significantly restrict access to molecular and advanced serological diagnostics, especially in rural or conflict-affected areas. The regional conflict has significantly undermined the proper diagnostic facilities. Clinicians usually rely on clinical picture with serological tests to initiate treatment and this results in severely underreported number of cases (7).

Spontaneously healing lesions can be observed. Pentavalent antimonials (sodium stibogluconate and meglumine antimoniate) are the first-line treatment and are used topically to treat majority of cases (35). Pentamidine and amphotericin B are the second-line therapy that require long courses of treatment (36). Local administration, along with heat therapy and cryotherapy are used to treat CL while parenteral administration is used for ML and VL. a study done in Sinjar region in northern Iraq, intralesional administration of sodium stibogluconate was 99% (291/294) effective in the treatment of CL (29). The prior study in Nineveh demonstrated a similar success rate of 98.7% (533/540) of the same treatment (20). In another study, the cure rate same treatment in a group of 94 children with CL under the age of two was 84.4% (37). Another study used the same treatment in a group of internally displaced school-age children and with a success rate of 98% (282/288) (38). Parenteral therapy with sodium stibogluconate has been 100% effective in treatment of VL in children of Iraq (39). Despite these high treatment success rates in clinical studies, systemic barriers significantly limit real-world outcomes. The availability of these medications is concentrated primarily in urban centers, while the majority of leishmaniasis cases occur in rural and underserved areas. Fragile supply chains which are exacerbated by conflict, poor infrastructure, and funding gaps, lead to frequent stockouts of antileishmanial drugs. Moreover, affordability remains a major concern, as out-of-pocket costs can be prohibitive for displaced or low-income populations. Those who need therapy have to start it soon as delayed diagnosis can be

disfiguring and fatal but the challenge of delayed presentation, delayed diagnosis and unavailability of treatment in rural areas are barriers to effective therapy.

3.4 Public health response and control measures

Given the regional conflict and rising cases of leishmaniasis in other provinces, a control program was implemented in Thi Qar province in 2003 to prevent an impending outbreak of VL. The program was meant to integrate several efficient and affordable measures included: screening of sandflies infected with leishmaniasis, residual insecticide spraying, supplying of bed-nets to high-risk areas, education campaign to raise public awareness of VL, teaching healthcare staff about the diagnosis and treatment modalities of VL and a supply of sodium stibogluconate was delivered. The program was successful as documented by a 55% reduction of the number of VL cases from 2003 to 2004 while it was continuing to spread in other provinces (40). However, this success was not replicated in other provinces due to a lack of coordinated national strategy, inconsistent funding, variable local capacity, and ongoing conflict in many regions. In provinces more severely affected by displacement or insecurity, sustained vector control efforts and health education campaigns were difficult to implement. Furthermore, decentralization of health services led to disparities in provincial responses and limited sharing of best practices like those used in Thi Qar. A study found that fogging and bed-net use were not effective in controlling the spread of the disease because the housing and human behavior in the area provided a suitable environment for the spread the infection (28). Camp Ramadi which was a U.S. military facility had a vector control program where light traps and ultra-low volume insecticide were used to control the spread of leishmaniasis (41). The most common source of information regarding leishmaniasis among general population was internet and television thus educational campaigns need to target these portals (42).

3.5 Future directions and recommendations

Based on the epidemiological trends, conflict-related challenges, and the success of Thi Qar control program, the following recommendations are proposed to effectively reduce the burden of leishmaniasis in Iraq:

- Strengthen surveillance and reporting systems: Establish a centralized, electronic surveillance platform led by the Ministry of Health that integrates molecular diagnostic data and frontline case reporting. This will enable real-time monitoring and rapid response, especially in newly affected areas such as the Kurdistan region.
- Improve diagnostic capacity: Expand access to reliable diagnostic tools by setting up well-equipped laboratories in each governorate and deploying mobile diagnostic units to rural and conflict-affected regions. Training healthcare workers in sensitive methods like PCR and DAT is essential to improve early detection and reduce underreporting.

- Ensure availability and accessibility of treatment: Decentralize the distribution of first-line antileishmanial drugs, such as sodium stibogluconate, by creating buffer stocks at provincial levels and facilitating drug supply to peripheral health centers. Early treatment access is critical to reducing morbidity and mortality, especially for vulnerable groups like children and displaced persons.
- Develop integrated, context-specific vector control programs: Design vector management strategies tailored to local environmental and social factors, combining insecticide spraying with community-led sanitation, housing improvements, and habitat reduction. Engaging local communities will be vital to sustaining vector control efforts.
- Implement targeted public health education campaigns: Utilize trusted media platforms, including television, and the internet, to deliver culturally appropriate messages focused on disease prevention, recognition, and treatment options. Special attention should be given to at-risk groups such as rural populations and internally displaced persons.
- Integrate leishmaniasis control into humanitarian and cross-border health initiatives: Collaborate with international organizations and neighboring countries to embed control efforts within refugee health programs and regional disease management frameworks. Coordinated action is necessary to address cross-border transmission and provide equitable care to displaced and vulnerable populations.

By implementing these recommendations through multisectoral collaboration among government agencies, non-governmental organizations, and international partners, Iraq can make significant progress towards reducing the incidence and impact of leishmaniasis despite the ongoing challenges posed by conflict and displacement.

3.6 Limitations

This review has several limitations. First, reliance on national surveillance data may underestimate the true burden of leishmaniasis due to underreporting, particularly in rural and conflict-affected areas. Second, the literature search was limited to English-language sources available through PubMed and Google Scholar, which may have excluded regionally published studies in Arabic or Kurdish. Third, the review did not include unpublished grey literature, which may contain operational insights from NGOs or local health authorities. These gaps highlight the need for more inclusive, multi-language research and improved disease surveillance across Iraq.

4. Conclusions

This review reveals a shifting epidemiological landscape of leishmaniasis in Iraq, driven by conflict, displacement, and fragile health infrastructure. Unlike prior literature, it highlights the emergence of new endemic zones, particularly in the Kurdistan region, and the disproportionate impact on internally displaced persons and children — groups previously underrepresented in

national data. By synthesizing surveillance trends, conflict-related health disruptions, and treatment challenges, the review emphasizes that leishmaniasis is no longer confined to traditional hotspots and requires a reorientation of public health responses. A notable contribution of this review is its integration of recent post-ISIS displacement trends with disease spread, underscoring the importance of embedding disease control in humanitarian and reconstruction agendas. As Iraq faces continued instability and environmental shifts, leishmaniasis control must move beyond reactive measures toward a national, conflict-sensitive strategy that ensures diagnostic and treatment access for vulnerable populations. Policymakers must prioritize sustainable interventions, multisectoral coordination, and targeted public health education to mitigate future outbreaks.

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- Acquisition of data: NRH and ARH.
- Drafting of the manuscript: HJA.
- Critical revision of the manuscript for important intellectual content: ARH and NAFA
- Administrative, technical, and material support: NAFA
- Study supervision: NRH

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