Chapter

# Geopolitical and Geospatial Conflicts Affecting Cutaneous Leishmaniasis: Iraqi Cases, 2014-2015

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## Abstract

In Iraq, increment of cutaneous leishmaniasis (CL) was reported, a zoonotic type caused by *Leishmania major* and an anthroponotic type caused by *Leishmania tropica*. This is attributed to environmental changes, irregular construction, increased waste, and stray dogs in the cities. Internal displacement, poverty, and malnutrition play a role in the occurrence of disease. *Iraq* has been exposed to wars, civil war, widespread violence, and terrorism, Internal displacement of population, unlawful housing, shortage of municipal services, and accumulation of garbage have been increasing in the cities since 2003. Reports from Iraqi MOH documented an increase in the rate of CL. Eventually, case investigation, vector, and reservoir controls were suspended. Geopolitical conflicts and geospatial health deterioration contributed to an increase in various dominant reservoir species in these areas, particularly for ZCL, and the activity of the sand flies. A sudden sharp increase in CL cases was observed during 2003–2015. In conclusion, ongoing crises exposed Iraq to deterioration, collapse, and destruction of health system infrastructure and uncontrolled urbanization, all of which can act as risk factors for Leishmaniasis.

**Keywords:** Iraq, cutaneous, leishmaniasis, conflicts, 2014, 2015

## 1. Introduction

### 1.1 Background

Leishmaniasis is one of the most common zoonotic infectious diseases worldwide. It is ranked second in mortality and fourth in morbidity among all tropical diseases [1].

According to the species of Leishmania parasite, there are three main forms: cutaneous leishmaniasis (CL), mucocutaneous leishmaniasis (MCL), and visceral leishmaniasis (VL) [2]. CL is the most common form of the disease and the skin is the most affected exposed part of the body characterized with symptoms such as skin sores or skin infection, which starting with small nodules that slowly enlarge, then ulcerate, and end within approximately 1 year with a characteristic permanent, depressed and disfiguring scar (**Figure 1**) [3].

Leishmaniasis is considered as an emerging and remerging disease and a major public health problem in some regions, mainly in developing countries [4–6]. This phenomenon is attributed to environmental changes, irregular construction,

**Figure 1.**
*Lesions affect exposed areas.*

human activities, accumulation of waste, and increase in the number of stray dogs in the cities. Conflict, internal displacement, poverty, and malnutrition play a role in the CL occurrence and outbreak [3].

In 2012, the WHO estimated that about 350 million of the world population were at a risk of getting one form of leishmaniasis. Majority of cases (75%) are CL and MCL. Ninety-eight countries in four continents, including Latin America, Africa, Asia, and South Europe, reported cases of the disease [7, 8].

CL is endemic in Iraq and its neighboring countries; Syria, Saudi Arabia, and Turkey [9, 10]. In these countries, Sand-fly vectors and the reservoir for leishmaniasis species; dogs, foxes, rats, jerboas, and other small mammals have been described. Conflicts, violence, civil war, terrorism, limited funding, and internal displacement are *labeled* as predisposing factors to a reemergence of *the disease* in the Middle East [8, 11]. Consequently, the incidence of CL increases and becomes a public health problem, usually affecting poorer communities [12].

The epidemic of CL might occur when large numbers of nonimmune humans become exposed to infection for the first time. Travels from nonendemic areas to endemic areas during activities such as wars, military exercises, civilian works, and tourism may result in outbreak of the disease in certain populations [13].

In endemic areas, building mud houses near the natural habitats of the vector and the reservoir hosts increases human–sand fly contact and thus increases the risk for human Leishmaniasis [14].

## 2. Leishmaniasis in Iraq

Leishmaniasis is known to be endemic in Iraq since 3000–2000 B.C. and has been described for the first time by Abu Bakr Muhammad ibn Zakariya' al-Razi, one of

the greatest names in medieval medicine, in 1500 A.D. [15, 16]. A common name of CL in Iraq is Baghdad boil, which suggests the disease has a long history in Iraq [17].

Two types of CL were reported in Iraq, a zoonotic type caused by *Leishmania major* and an anthroponotic type caused by *Leishmania tropica* [18]. Rural areas in Iraq are described as source of infection and endemicity because of the presence of animal reservoirs (rodents, dogs, and foxes) for ZCL and the use of clay to build some of the houses in villages in these areas [19, 20]. Underdeveloped clay buildings facilitate sand-fly breeding because they maintain a sufficient level of moisture which is important for the sand-fly a larval habitat. The human population in these regions more exposed to a sandfly bite due to their work mainly in the farms [18, 21, 22].

The incidence rate of disease is higher among males than females nearly in all age groups [23, 24]. Males were found to be more vulnerable to CL infection due to the nature of the Iraqi culture that they are mainly responsible for family finance and support, thus making them more exposed to the infectious agents and young males playing outdoors without clothes and swimming in the rivers or lakes due to constant power outage.

CL manifestations increase in October, peak in January, and then gradually decline, reaching their lowest level in August. Two-thirds of the cases were reported between December and March [25]. The difference in seasonal peak can be attributed to the presence of different types of reservoirs widespread in these areas, in particular for the ZCL, and to the activity of sandflies, which extends from April to November and reaches its peak in September to October [26].

Iraq has been exposed to wars, civil wars, widespread violence, and terrorism. Internal displacement of population, unlawful housing, shortage of municipal services, constant power outage, accumulation of waste, and uncontrolled stray dogs and animals in the cities since 2003 contributed to many CL outbreaks [9, 27] (**Figure 2**). In 2009, the Baghdad governorate reported CL outbreak with a high incidence of 45.5/100,000 population (**Figure 2**) [26, 28].

In 2014, the ISIS seized large areas of Iraqi lands that caused large internal displacement of the residents; they were mostly nonimmune and malnourished who moved to live in an endemic area with poor housing camps, lack of sanitation and water supply, and increased waste and garbage around their camps (**Figure 3**).

**Figure 2.**
*Predisposing factors for CL occurrence.*

**Figure 3.**
*IDPs camps.*

**Figure 4.**
*Underdeveloped mud houses.*

In addition, living in illegal underdeveloped mud houses with cracked walls, low socioeconomic status, and constant power outage may be playing as a risk factor for Leishmaniasis outbreak (**Figure 4**) [13, 29].

Sleeping without an insecticide-treated bed net outside the house due to a constant power outage and keeping domestic animals inside or around their houses are another risk factors for the transmission of the disease to human (**Figure 5**) [14, 30].

The conflicts had a negative impact on the health system in Iraq; many health programs were including the prevention and control measures of Leishmaniasis were affected. Eventually, an outbreak of Cutaneous Leishmaniasiss occurred in 2015 [9, 31].

Geopolitical conflicts and geospatial health deterioration contributed to an increase in various dominant reservoir species in Iraq, particularly for ZCL, and the activity of the sand flies [8]. There was a sudden, sharp increase in CL cases from 2671 cases in 2014 to 17,264 cases observed in 2015, and an outbreak was reported (**Figure 6**) [31].

**Figure 5.**
*Human behaviors.*

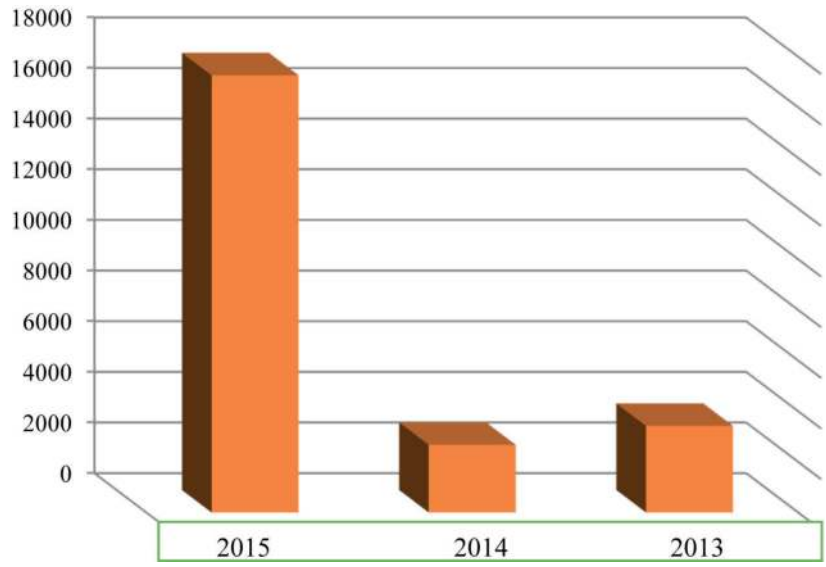


**Figure 6.**
*Cutaneous leishmaniasis cases, Iraq, 2013–2014.*

All Iraqi governorates reported CL cases during the CL outbreak in 2015, and the incidence rate was 49/100,000 population. The majority of cases, 4460 (25.8%), was observed in the Diyala governorate. Therefore, violence and conflicts had a negative impact on CL occurrence [11, 32].

## 3. Conclusion

An increment of CL was reported during the last years in Iraq. Violence, conflicts, internal displacement, bad socioeconomic status, and poor environmental sanitation play a big role in the proliferation of insect vectors and animal reservoir that lead to disease occurrence.

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## Conflict of interest

The authors have no conflict of interests.

## Abbreviations

| | |
|---|---|
| CL | cutaneous leishmaniasis |
| MCL | mucocutaneous leishmaniasis |
| VL | visceral leishmaniasis |
| WHO | World Health Organization |
| PKDL | post kala-azar dermal Leishmaniasis |
| ZCL | zoonotic cutaneous leishmaniasis |
| ACL | anthroponotic cutaneous leishmaniasis |
| CDC | Center of Diseases Control in Atlanta |
| ISIS | Islamic State in Iraq and Syria |
| MoH | Ministry of Health |
| CDC/Baghdad | Communicable Diseases Center |

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