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Research Article

**CUTANEOUS LEISHMANIASIS: EVALUATION OF 248 CASES  
IN SHUSHTAR COUNTY, SOUTH-WEST OF IRAN**Hamid Kassiri \*<sup>1</sup>, Parvaneh Farajifard<sup>2</sup><sup>1</sup> School of Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran<sup>2</sup> Student Research Committee, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran**Abstract:**

**Objectives:** leishmaniasis is one of six major tropical diseases that the World Health Organization has supported study and research about various aspects of the recommendations. Cutaneous leishmaniasis (CL) is considered a common parasitic disease. This study was performed to determine the frequency of patients with CL and the epidemiological situation in the county of Shushtar during 2009- 2013.

**Methods:** In this descriptive study, information about subjects such as age, gender, number and location of wounds, city or village, month and season collected and have been interpreted with SPSS software and descriptive statistics.

**Results:** Totally, 248 cases have detected during this study. About 82.7 percent percent of patients had more than 10 years of age and most cases (66.1 percent) were found in males. Nearly 48.4 percent of patients had one ulcer and 37.1 percentage of the wounds were observed on the hands and then in feet, face and in other parts of the body. Approximately 83.9 percent were in rural areas and most cases were in March month (16.9 percent).

**Conclusions:** According to the environmental conditions for sand fly activity in some months in this area prevention and treatment of patients in urban and rural areas of Shushtar is a key priority.

**Key words:** Epidemiology, Cutaneous Leishmaniasis, Iran.

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**INTRODUCTION:**

Leishmaniosis is a parasitic disease caused by a protozoan of the genus *leishmania*. The three main types of the disease include cutaneous, visceral, and mucocutaneous leishmaniosis which are seen throughout different parts of the world [1]. Cutaneous leishmaniasis (CL) is caused by *L. tropica*, *L. major* and *L. aethiopia* in old world. In new world *L. mexicana* and *L. brasiliensis* are involved. The CL agents in Iran are *Leishmania major* causing rural or wet form and *Leishmania tropica* causing urban or dry form of the disease. [2, 3].

The disease imposes economic burden on families, communities and countries, particularly in developing countries [4]. The Disability – Adjusted Life Years (DALY) due to leishmaniosis-induced disability is about 4.2 million years [5]. Pentavalent antimony (glucantime) is used for the treatment of disease. The medicine is expensive and requires multiple injections, and medicine resistance is common. In addition, local injection of the medicine around wound is painful [6]. They may also cause various and important side effects such as arrhythmia, increased pancreas and liver enzymes, leukopenia, anemia and thrombocytopenia, and in rare cases, cardiac toxicity and sudden death [5]. Cutaneous leishmaniosis may take several months to recover. Even with a successful treatment, a permanent scar may remain, resulting in mental and emotional problems for patients [7].

Leishmaniosis is endemic in 88 countries of four continents (22 in Europe and America and 66 in Asia and Africa), and it is the most important tropical and subtropical diseases after malaria. About 90% of CL is reported from Afghanistan, Brazil, Iran, Peru, Saudi Arabia, and Syria [8-12]. Cutaneous leishmaniosis has a high prevalence in Iran placing it in the first 7 countries of the world in terms of the disease prevalence. Annually, about 30,000 cases of leishmaniosis are reported in Iran [13-14]. Based on studies, the occurrence is actually higher by 4 to 5 times [15]. A cutaneous leishmaniosis focus in Iran includes provinces, such as, Esfahan, Khuzestan, Khorasan, Ilam, Kerman, Bushehr and Shiraz [16-19]. There are always new foci throughout the country where the disease is occurred and hence more people are affected. As a crucial point, the disease has become endemic in some parts of Iran where it was sporadic previously, and even has affected areas with no previous occurrence [20].

Fight against the disease has been considered always in Iran's national plans and the disease not only has not been eradicated despite extensive efforts and

national and international investments, but always has become more prevalent by the appearance of new foci of disease in the country. The national program of CL control has confirmed the necessity to determine the epidemiological characteristics of the disease in the affected foci. In addition, selections of an appropriate method for combating the disease and for increasing the success of control programs need the determination of the disease epidemiology in the affected foci. In recent years, several studies have been conducted in various regions of Iran on the epidemiology of CL. Due to low studies in recent years in the county of Shushtar in Khuzestan Province with high incidence of this disease, the present study aimed to investigate the epidemiology of CL in Shushtar from 2009 to 2013.

**MATERIALS AND METHODS:**

With an area of 2436 km<sup>2</sup>, Shushtar County is located in the north of Khuzestan Province, Iran, from 48°35'E to 49°12'E and from 31°36'N to 32°26'N. A population of 191,000 people (census 2011) are leaving in Shushtar, ranking it as the fifty-seventh County in Iran in terms of population. It is the fourth largest County in Khuzestan after Ahvaz metropolis and Dezful and Abadan Counties in terms of population. Shushtar is in the center of Khuzestan toward the north. In terms of natural features, the ending slopes of the Zagros Mountains and Dez River form the east and west boundaries of the county, respectively. The average height of Shushtar above sea level is 150 meters and the height of the central point of Shushtar is 65 meters above sea level.

This cross-sectional study was conducted on patients with CL who visited the health centers of Shushtar from April 2009 to March 2013. After performing the necessary tests (preparation of ulcer smear, staining and viewing with a microscope) and confirmation of the disease, the patients information was recorded in special questionnaire and they received the required treatment. The information included gender, residence area, month, season, number of ulcers on the body, age group and site of ulcers on the body. Data were analyzed with SPSS.

**RESULTS:**

Since April 2009 to March 2013, information of 248 patients with CL in Shushtar was recorded. According to the mean population of Shushtar during these 5 years that is more than 190,000 people and the number of recorded cases, the mean incidence of disease in these years was 2.63 cases in 10,000 people. The results showed that during the five years, the disease has been declining. The trend of the disease in 2009-2013 is presented in Figure 1.

Based on gender, 66.1% of patients were male and 33.9% were female (Table 1). In terms of age, the highest frequency (36.7%) was observed in the age group 20-29 years. Almost three-quarters of the patients were in the age group under 30 years (Table 2). In terms of month, the highest and the lowest incidence of the disease were found in March (n= 42, 16.9%) and August (n=6, 2.4%) (Table 3 and Figure 2). According to season, 49 patients (19.7%) were bitten by infected sand flies in the spring, 20 (8.1%) in the summer, 56

(22.6%) in the fall, and 123 (49.6%) in the winter (Table 4).

Of all recorded cases, 208 cases (83.9%) were living in rural areas and 40 (16.9%) in urban areas (Table 5). Regarding the ulcer site on the body, 37.1% was on the hands, 30.3% on the feet, 12.1% on the faces, and 20.5% on the rest of the body (Table 6). In terms of number of ulcers, 48.4% had one lesion, 30.6% two lesions, and 21% three or more lesions (Table 7).

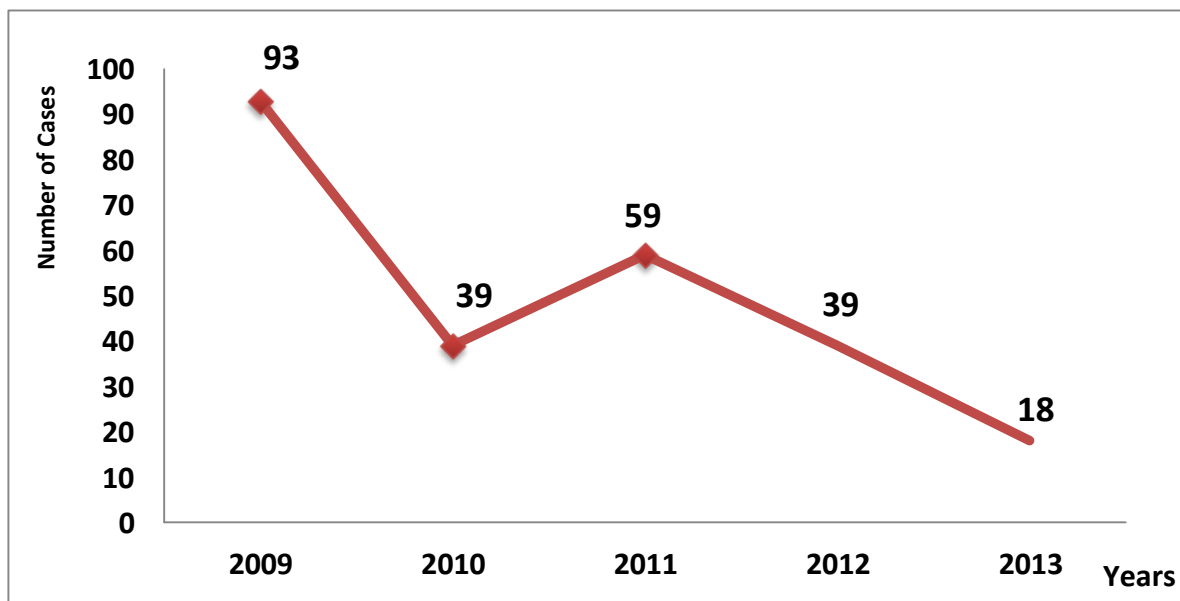


Figure 1: Trend of cutaneous leishmaniasis cases, Shushtar County, Southwestern Iran (2009-2013).

Table 1: Distribution of cutaneous leishmaniasis cases according to the gender, Shushtar County, Southwestern Iran (2009-2013).

Gender	Male	Female	Total
Years	No. (%)	No. (%)	No. (%)
2009	75 (80.6)	18(19.4)	93 (100)
2010	23 (59.0)	16(41.0)	39(100)
2011	34 (57.6)	25 (42.4)	59 (100)
2012	20 (51.3)	19 (48.7)	39 (100)
2013	12 (66.7)	6 (33.3)	18 (100)
Total	164 (66.1)	84(33.9)	248 (100)

**Table 2: Distribution of cutaneous leishmaniasis cases according to the age group Shushtar County, Southwestern Iran (2009-2013)**

Years	2009	2010	2011	2012	2013	Total
Age group	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
<5	9 (9.7)	3 (7.7)	7 (11.9)	6 (15.4)	2 (11.1)	27(10.9)
5-9	7 (7.6)	2 (5.1)	2 (3.4)	5 (12.8)	0 (0.0)	16 (6.4)
10-19	13 (14.0)	12 (30.7)	14 (23.7)	9 (23.1)	3 (16.7)	51(20.6)
20-29	54(58.0)	10 (25.6)	16 (27.1)	5 (12.8)	6 (33.3)	91 (36.7)
30-39	3 (3.2)	4 (10.3)	8(13.6)	8(20.5)	2(11.1)	25 (10.1)
40-49	3 (3.2)	4 (10.3)	5(8.4)	2(5.1)	2(11.1)	16(6.4)
>50	4 (4.3)	4 (10.3)	7 (11.9)	4(10.3)	3(16.7)	22 (8.9)
Total	93(100.0)	39 (100.0)	59 (100.0)	39(100.0)	18 (100.0)	248(100)

**Table 3: Distribution of cutaneous leishmaniasis cases according to the month, Shushtar County, Southwestern Iran (2009-2013).**

Year	2009	2010	2011	2012	2013	Total
Month	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
April	4 (4.3)	6(15.4)	2 (3.4)	3 (7.7)	4 (22.2)	19 (7.7)
May	11 (11.8)	4 (10.2)	3 (5.1)	4 (10.2)	1 (5.6)	23 (9.3)
June	5(5.4)	1 (2.6)	0(0.0)	1 (2.6)	0(0.0)	7 (2.8)
July	4 (4.3)	1 (2.6)	0 (0.0)	2(5.1)	0 (0.0)	7 (2.8)
August	2 (2.1)	1 (2.6)	0 (0.0)	3(7.7)	0 (0.0)	6(2.4)
September	4(4.3)	1 (2.6)	2(3.4)	0(0.0)	0 (0.0)	7(2.8)
October	14(15.1)	1 (2.6)	4(6.8)	3(7.7)	0 (0.0)	22 (8.9)
November	10(10.8)	3 (7.7)	2(3.4)	1(2.6)	0 (0.0)	16(6.5)
December	6 (6.4)	7 (17.9)	3(5.1)	2 (5.1)	0(0.0)	18 (7.3)
January	18 (19.4)	3 (7.7)	12(20.3)	6(15.4)	2 (11.1)	41(16.5)
February	6 (6.4)	7(17.9)	14 (23.7)	5(12.8)	8 (44.4)	40 (16.1)
March	9(9.7)	4 (10.2)	17(28.8)	9(23.1)	3 (16.7)	42(16.9)
Total	93 (100)	39(100)	59 (100)	39(100)	18(100)	248 (100)

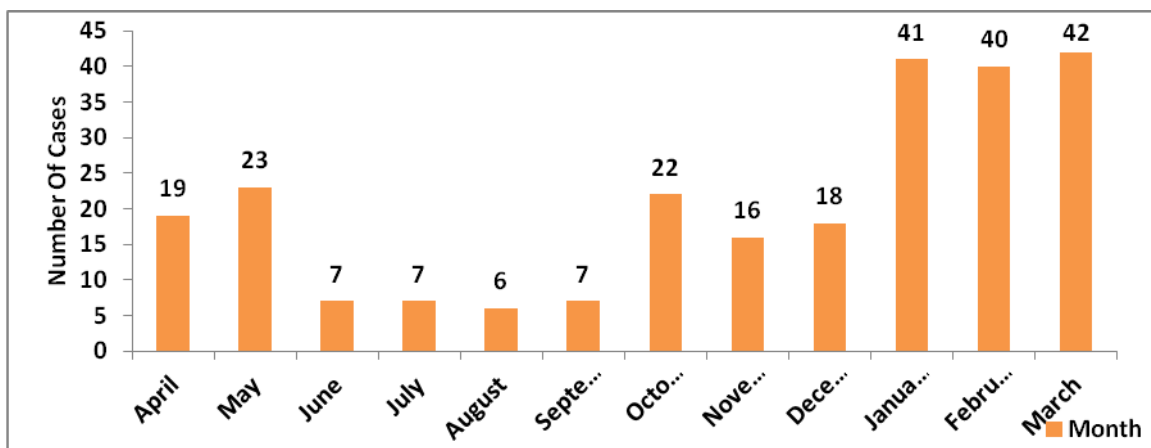


Figure 2: Frequency distribution of cutaneous leishmaniasis cases by the month in Shushtar County (2009-2013).

Table 4: Distribution of cutaneous leishmaniasis cases according to the season, Shushtar County, Southwestern Iran (2009-2013).

Year	2009	2010	2011	2012	2013	Total
Seasons	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Spring	20 (21.5)	11 (28.2)	5 (8.5)	8 (20.5)	5 (27.8)	49(19.7)
Summer	10 (10.7)	3 (7.7)	2 (3.4)	5 (12.8)	0 (0.0)	20(8.1)
Autumn	30(32.3)	11(28.2)	9 (15.2)	6 (15.4)	0 (0.0)	56(22.6)
Winter	33(35.5)	14(35.9)	43 (72.9)	20(51.3)	13 (72.2)	123 (49.6)
Total	93 (100)	39 (100)	59 (100)	39 (100)	18(100)	248 (100)

Table 5: Distribution of cutaneous leishmaniasis cases according to the residential area, Shushtar County, Southwestern Iran (2009-2013).

Residential Area	Urban	Rural	Total
Years	No. (%)	No. (%)	No. (%)
2009	6 (6.5)	87(93.5)	93 (100)
2010	2 (5.1)	37(94.9)	39(100)
2011	19 (32.2)	40 (67.8)	59 (100)
2012	9 (23.1)	30 (76.9)	39 (100)
2013	4 (22.2)	14 (77.8)	18 (100)
Total	40 (16.1)	208(83.9)	248 (100)

**Table 6: Distribution of cutaneous leishmaniasis cases according to the ulcer sites on the body, Shushtar County, Southwestern Iran (2009-2013).**

Years	2009	2010	2011	2012	2013	Total
Ulcer sites	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Hands	24 (25.8)	19 (48.7)	24 (40.7)	15 (38.5)	10 (55.5)	92(37.1)
Feet	34 (36.6)	13 (33.3)	16 (27.1)	10 (25.6)	2(11.1)	75 (30.3)
Faces	5 (5.4)	4 (10.3)	9 (15.2)	8(20.5)	4 (22.2)	30(12.1)
Trunks	3(3.2)	1 (2.6)	1 (1.7)	1 (2.6)	1 (5.6)	7 (2.8)
Hands and feed	21 (22.6)	2 (5.1)	3(5.1)	3(7.7)	0(0.0)	29(11.7)
Necks	0 (0.0)	0 (0.0)	0(0.0)	0(0.0)	1(5.6)	1(0.4)
Faces and Feed	0 (0.0)	0 (0.0)	3 (5.1)	0(0.0)	0(0.0)	3 (1.2)
Faces and Hands	6 (6.4)	0 (0.0)	3 (5.1)	2 (5.1)	0 (0.0)	11(4.4)
Total	93(100.0)	39 (100.0)	59 (100.0)	39(100.0)	18 (100.0)	248(100)

**Table 7: Distribution of cutaneous leishmaniasis cases according to the number of ulcers on the body, Shushtar County, Southwestern Iran (2009-2013).**

Number of Ulcers Years	1 No (%)	2 No (%)	3 No (%)	4 No (%)	Total No. (%)
2009	49 (52.7)	32 (34.4)	9 (9.7)	3 (3.2)	93 (100)
2010	28 (71.8)	10 (25.6)	1 (2.6)	0 (0.0)	39 (100)
2011	22 (37.3)	18 (30.5)	10 (16.9)	9 (15.3)	59 (100)
2012	13 (33.3)	12 (30.8)	3 (7.7)	11 (28.2)	39 (100)
2013	8 (44.5)	4 (22.2)	4 (22.2)	2 (11.1)	18 (100)
Total	120 (48.4)	76 (30.6)	27(10.9)	25(10.1)	248(100)

**DISCUSSION:**

Cutaneous leishmaniasis is one of the major global health problem especially in tropical and subtropical countries and its distribution has exceeded 88 countries in recent years. More than 12 million people worldwide are infected with the disease and at least 350 million people are at risk.

The present study was done through passive patient finding, therefore, if patient finding in Shushtar is done actively, the incidence will be more. The results of this study showed that the mean incidence of CL in the county of Shushtar was 2.63 in 10000 people. The highest incidence of CL in Shushtar was in 2009. The incidence rate in this year was about 4.89 per 10000 people.

Doroodgar *et al.* reported the disease incidence as 3.76 patients per 10000 population in Kashan in 2007 [21].

Field surveys show that with the implementation of control programs including fighting with reservoirs and vectors and use of personal protective tools during recent years have significantly declined the prevalence of CL in these areas. However, according to national profile, the disease has an upward trend [21, 22]. It seems that due to the increasing number of susceptible population in the infected foci and the existence of suitable ecological conditions for reservoirs and vectors of the disease in the county, if the control programs are not continued, the cases of CL may suddenly increase in the coming years. The growing trend of CL in Iran and its change to a major health problem in many provinces indicates the importance of this disease and the necessity to pay attention to epidemiological monitoring of the disease to accurately recognition the infected regions and control its fluctuations. These fluctuations were very severe in some areas, such as Bushehr Province. Two

major epidemics were occurred in this province in 1988 and 1997 with an incidence of 5.25 and 6.57 per 1000 population, respectively [22].

Culture, behavior, occupation and type of cover for different ethnic groups of Iran have caused more affection of males than females with CL. Studies by Hamzavi in Kermanshah [23], Ebadi in Esfahan [24], Feiz Haddad in Shadegan [25], Kassiri in Shush [26], Kassiri in Ganaveh [27] and Doroodgar in Kashan [21] showed that the prevalence of the disease in males was more than females. The results of this study are consistent with the findings of these researchers. Fazaeli *et al.* examined around 3100 residents of Mirjaveh County in Sistan - Baluchestan Province during 2007-2008 and found no significant difference between the sexes in terms of infection rate [28]. But according to studies by Talary in Kashan [29], Ebadi in Esfahan [24], Karimi Zarchi in Sarakhs [30] and Doroodgar in Kashan [21], the infection rate was higher in females. The higher occurrence of the disease in females in these studies was related to economic activities and carpet weaving of women in dim rooms and basements. In these areas, sand flies are also active at days and continue to blood feeding from humans [31]. High incidence of the disease in men than women in this study and similar studies can be attributed to many reasons such as engagement of a majority of men as seasonal migrant labor, working in outdoor places, covering less than women, more traffic through abandoned places and desert areas, and the higher likelihood to contact with sand flies at evening and night [32].

In this study, the age group 20-29 years (58%) had the highest rate of affection. In Kashan County, Doroodgar *et al.* (2007) reported the highest and the lowest frequency of active ulcer in the age group 20-29 years (23.3%) and 0-9 years (7.8%), respectively [21]. Fazaeli *et al.* in a study in Mirjaveh County, observed the highest number of ulcers and scar in children under ten years which had a statistically significant difference with other age groups [28]. But in a study after the earthquake of Bam County (southeast of Iran) in 2004, Sharifi *et al.* showed that in rural communities, most cases of the disease occurred in age groups of ten years or younger [33]. Sofizadeh *et al.* (2009-2010) reported the highest frequency of the disease in Gonbad-Kavoos County (north of Iran) in children under ten years old [34].

In this study, the most common site of ulcers was on the hands (37.1%) and then the feet (30.3%). In terms of active ulcers number on the body, 48.4% of patients had one ulcer, 30.6% two ulcers, and 21% three or more ulcers. In a study in Kermanshah

Province, the highest number of ulcers was seen on the face and neck (28%), feet (22%), and other parts of the body (1%). In addition, the number of active ulcers on patients' bodies was 1-23 with an average of 2.24 per person. Totally, 54.5% of patients had one ulcer, 19.2% two ulcers, 9.6% three ulcers and others four or more ulcers [23]. In a study by Sharifi *et al.*, ulcers were on the face in 47% of patients and only one ulcer was observed in 77.9% of them [33]. According to Soofizadeh *et al.* in Gonbad- Kavoos County, the highest number of ulcers was found on the hands (42.3%) and 37.9% of the patients had one wound [34]. In a study in Pakdasht, Tehran, the highest ulcers were seen on feet and then on hands [35]. Given the shortness of mouth parts in sand flies and their inability to blood feeding from the covered areas of a host, these parts are at lower risk of sand flies bites and hence the occurrence of dermal ulcers is lower in these organs than other parts of the body. The chemical and olfactory attractions such as the concentration of carbon dioxide which is more in hands and feet than the rest of the body help sand flies select and prefer these organs and a suitable host.

The weather is one of the most important factors affecting CL. In this study, the highest disease cases were occurred during the winter months (49.6%) and the fall (22.6%). In study of Khatam, Yazd Province, 2004-2013, the most cases were seen in the autumn (34.8%) [19]. The study showed that the disease has seasonal distribution in Shushtar and its incidences are not the same during the year and this is a feature of rural CL. Since Shushtar is a tropical region, autumn and winter are quite favorable seasons for reproduction and activity of sand flies. But in very hot seasons like summer and months of June to September, the lowest number of cases were observed in Shushtar which is due to reduced activity and proliferation of the vectors at this time of year. Therefore, one can easily deduce that in this county, either urban or rural areas, the disease is distributed locally and easily by sand flies. Local transmission phenomena in the presence of proper reservoirs can be intensified; this may lead to complete occurrence of the disease in the region and increase disease in this county and other favorable regions of the province.

In this study, the number of cases of CL among villagers was far higher than in urban areas. Sharifi *et al.* pointed out the reemerging of CL caused by *Leishmania tropica* in rural areas of Bam County after the earthquake [33]. This can be attributed to old places and straw and mud made houses in rural areas, occupation of the people of the region, lack of timely

treatment of the disease and human population density as a reservoir in the areas. Therefore, it is necessary to take essential measures to reduce the incidence of the disease on rural areas [36].

### CONCLUSIONS:

Given the complications, treatment costs, and prevention of mental trauma due to CL, effective measures should be made to prevent this disease. Installing net on windows and doors, sleeping under mosquito nets and using mosquito repelling tools can be effective in the prevention of the disease. Educating the community about the importance of full body cover, environmental health activities including collection of garbage and construction debris, fighting disease reservoirs and vectors, as well as early diagnosis and treatment of infected people can help reduce the disease in the region.

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### CONFLICT OF INTEREST STATEMENT:

The authors report no conflict of interest.

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