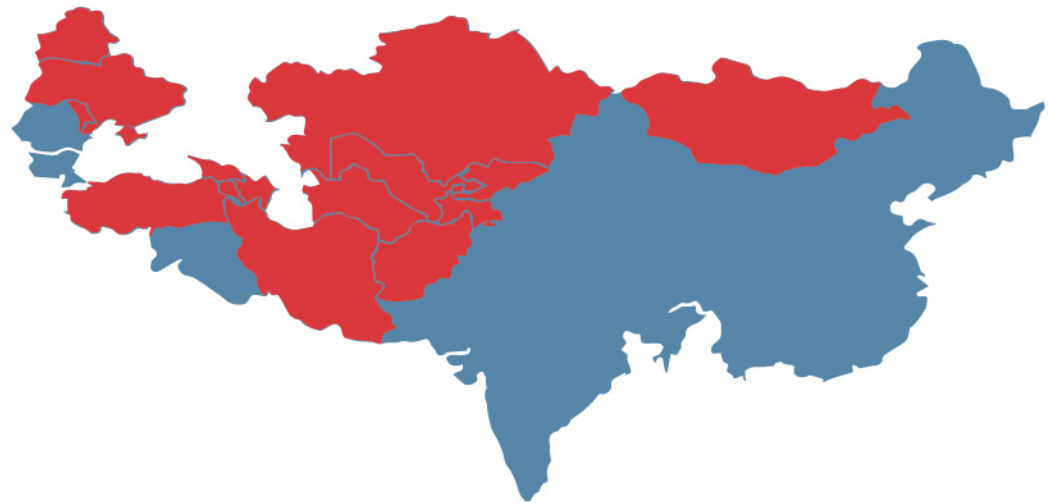


The Pan African
Medical Journal

**Learning from
Practice: Public
Health Teaching
Case Studies
from Eastern
Europe and
Central Asia**

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ISSN: 1937 – 8688

An Open Access
Journal published by
The PAMJ



EMPHNET
The Eastern Mediterranean
Public Health Network

PanAfrican
Medical
Journal

Cutaneous leishmaniasis surveillance report in Saudi Arabia, 2017-2018

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How to Use the Case Study

General instructions: This case study should be used as adjunct training material for novice epidemiology trainees to reinforce the concepts taught in prior lectures. The case study is ideally taught by a facilitator in groups of about 20 participants. Participants required to take turns reading the case study, usually a paragraph per student. The facilitator guides the discussion on responses to questions. The facilitator may make use of flip charts to illustrate certain points. Additional instructor's notes for facilitation are coupled with each question in the instructor's guide to aid facilitation.

Audience: This case study was developed for novice field epidemiology students. These participants are commonly health care workers working in the county departments of health whose background may be as medical doctors, nurses, environmental health officers or laboratory scientists who work in public health-related fields. Most have a health science or biology background.

Prerequisites: Before using this case study, participants should have received lectures on disease surveillance and outbreak investigation.

Materials needed: Flash drive, flip charts, markers, computers with MS Excel and Epi info.

Level of training and associated public health activity: Novice – surveillance investigation.

Time required: 2-3 hours **Language:** English

Abstract

Background: Leishmaniasis is a protozoal disease caused by more than 20 *Leishmania* species. Over 90 sandfly species are known to transmit *Leishmania* parasites. There are three main forms of the disease including visceral, cutaneous, and mucocutaneous. In Saudi Arabia, cutaneous leishmaniasis (CL) poses a persistent public health challenge, despite efforts to control it. The aim of this study is to describe the demographic and geographic characteristics of Cutaneous Leishmaniasis cases reported by the national surveillance in Saudi Arabia in 2017 and 2018.

Methods: Data obtained from the Health Electronic Surveillance Network (HESN) for confirmed CL cases across Saudi Arabia. The analysis included variables such as age, gender, nationality, region, diagnosis date, and epidemiological week.

Results: A total of 827 cases were included, with 397 cases in 2017 and 430 cases in 2018. Ahsa had the highest rates in both years. Most cases were males (81.86%), with a mean age of 29.98 years. CL was more common among Saudi nationals (51.15%) than other nationalities, and cases peaked in February and were lowest in July.

Conclusion: The highest number of CL reported in the Western and Eastern regions of Saudi Arabia. National and regional studies are needed to guide the development of evidence-based diagnostic and management guidelines for CL control.

Goal of the Case Study

The goal of this case study is to provide participants with the opportunity to learn and apply epidemiological methods to analyze surveillance data on Cutaneous Leishmaniasis in Saudi Arabia, focusing on understanding disease trends, demographic factors, and geographic distribution to guide public health interventions.

Learning Objectives:

By the end of this study, participants should be able to:

1. **Define Cutaneous Leishmaniasis (CL) and describe its epidemiology** in Saudi Arabia.
2. **Writing surveillance reports.**
3. **Interpret epidemiological data** to understand trends, risk factors, and transmission dynamics of CL.
4. **interpret epidemic curves.**
5. **Use mapping tools** to assess the geographic distribution of cases and guide public health interventions.
6. **Recommend appropriate measures** to prevent further spread of the disease.

Disclaimer:

This case study was done as part of training in the Field Epidemiology Training Program (FETP) in Saudi Arabia. The findings, interpretations, and conclusions here don't necessarily represent the official policies or views of the FETP or any affiliated organizations.

Introduction

Leishmaniasis is a neglected tropical disease (NTD)^[1] caused by a protozoan parasite. There are over 20 different species of Leishmania. The parasite is transferred to humans by the bites of sandflies and more than 90 different species of this vector are known to be capable of transmitting the disease^[2, 3].

Questions 1: What are "Neglected Tropical Diseases"? Why are they called "neglected"? And provide another example besides Leishmaniasis.

There are three types of leishmaniasis: cutaneous (CL), visceral and mucocutaneous leishmaniasis of which is the most common type of leishmaniasis globally^[4]. Leishmaniasis is still prevalent in Saudi Arabia and remains a public health concern, despite extensive attempts to mitigate its impact^[4]. Cutaneous Leishmaniasis (CL) is the most common type of disease in the kingdom^[5].

Questions 2: Explain more about types of leishmaniasis and its epidemiology globally. Which type of these protozoal diseases are the most severe type?

The establishment of the Leishmaniasis Control Program (LCP) in 1978 has significantly contributed to reducing the impact of Leishmaniasis^[6].

CL cases are documented in several regions across Saudi Arabia, with concentrated outbreaks detected in Qaseem and Riyadh (Central), Al Ahsa (East), Aseer (Southwest), Ha'il, and Madina (Northwest)^[5]. Controlling Leishmaniasis in Saudi Arabia is particularly challenging due to the existence of several Leishmania parasites and a wide range of sandfly species, as well as the continuous population movements and urbanization^[7, 8].

Figure 1: Administrative regions of Saudi Arabia

Part 1: Story

Saudi Arabia spans approximately 2,000,000 square kilometers, making it one of the largest countries in the region, with diverse landscapes ranging from vast deserts to lush oases. Among these is the Al Ahsa Oasis, located between Riyadh and Dammam, stretching into the Empty Quarter and listed as a UNESCO World Heritage site. It stands as one of the largest natural oases globally, illustrating the country's complex geography and climatic diversity.

In early 2019, the Head of the Vector-Borne Diseases Department at the Ministry of Health (MOH) in Saudi Arabia convened a meeting with his team to address the rise in cases of cutaneous leishmaniasis (CL). Despite ongoing efforts to control this neglected tropical disease, cases continued to be reported, posing a challenge to the Kingdom's health goals as part of Saudi Vision 2030. This vision included the roadmap to prevent, control, eliminate, or eradicate 20 neglected tropical diseases (NTDs).

A review of data from the Health Electronic Surveillance Network (HESN) revealed an increase in cutaneous leishmaniasis cases, totaling 827 cases across both years. Notably, the regions of Al Ahsa and Al Madinah exhibited consistently higher numbers of cases, continuing their long-standing reputation for elevated CL prevalence.

In response, the Ministry initiated a comprehensive review of surveillance data to uncover the factors contributing to the rise in cases. This initiative aimed to better understand the demographic characteristics, geographic distribution, and seasonal trends of CL cases, formulating evidence-based recommendations to improve control measures and guide future interventions.

Question 3: Calculate the rate of cases per 100000 considering the number of cases in 2017 as 398 and in 2018 as 429? Did you see any increase or decrease?

Part 2: Methods

The data obtained through passive surveillance from cutaneous Leishmaniasis cases reports on Health Electronic Surveillance Network (HESN) which is notified within 24 hours (Cat II). Data includes only confirmed CL cases among all regions in Saudi Arabia from all population - Saudi and non-Saudi – in period of two years: 2017 and 2018.

Question 4: Develop an appropriate case definition for Cutaneous Leishmaniasis. And explain the importance of well-developed case definition on CL surveillance.

Variables include age, gender, nationality, region and admin region, date of diagnosis and Epi week. consequently, we decide to set the pediatric age at 14 years old and lower as these are the ages treated by pediatric facilities in Saudi Arabia. Therefore, the age should be divided into five groups. The first one is the pediatric group and the other are adult groups. The 14 Cases with missing values were excluded whenever detected throughout the analysis which accounts for 1.66 % of the total cases (841). We investigate demographics of the patients by estimating frequencies. Incidence rate was estimated by dividing the number of cases on the mid-year population of Saudi Arabia and mid-year population of every single region or admin.

data is anonymized. There was no direct interaction or interference with human beings. The privacy and confidentiality of all the subjects were maintained throughout the process.

Part 3: Results

A total of 827 cases of cutaneous leishmaniasis in Saudi Arabia were included in this analysis 397 cases in 2017 with rate= 1.219 per 100000 and 430 cases in 2018 with rate= 1.286 per 100000.

3.1 demographics

Age ranged between one year to (max.= 78 in 2017 and 91 years old in 2018). Most cases were among males; 84.89% in 2017 and 79.07% in 2018 (table 1).

Question 5: Calculate the mean and standard deviation for age in 2017 and 2018 and verify the answers given in above description. Use the dataset given at the end of this case study.

Question 6: Use an appropriate graph to represent gender distribution of cutaneous leishmaniasis cases in Saudi Arabia in 2017 and 2018. And explain the disparity in the occurrence of cutaneous leishmaniasis cases between the two genders.

The cases among non-Saudis were slightly higher in 2017 with 52.64% in comparison to Saudis, in 2018 the percentage of Cutaneous leishmaniasis cases among Saudis reached 54.65%. The highest number of reported cases was seen in age groups **30 -44 Years** followed by **15 - 29 Years**, and according to geographical regions, Eastern and Western are the highest. (table1)

Questions 7: develop a table for demographics of Cutaneous leishmaniasis in Saudi Arabia 2017 and 2018

regional incidence rate for the two years showing that in 2017 Ahsa have the highest rate, followed by Najran while Hail, Jazan, Makkah and Northern, have the lowest rates. In 2018, Ahsa maintained the highest rate and reported cases among all the regions, the lowest was Northern with zero reported cases followed by Hail, Jazan and Makkah with 1 reported case in each of the regions (table 2).

in 2017 the highest reports were in western region (159) followed by the Eastern region (130), while the lowest number seen in central region (21). In 2018 the Eastern region showed the most reported cases (120) followed by western region (102). the northern region has the fewest reported cases in 2018 (32).

Question 8: develop a table for the Distribution of Cutaneous leishmaniasis cases in Saudi Arabia, 2017 and 2018 by region.

Question 9: calculate the incidence rate for Alahsa, and Almadina regions for both 2017 and 2018.

3.2 Trends

In 2017 The number of reported cases peaked in February then it declined until it increased again in august and October, while in 2018 the peak was seen in September.

Question 10: develop a graph and explain the trend of Cutaneous Leishmaniasis cases in 2017 and 2018. identify the months where the highest and lowest reports are.

3.3 epidemic curve

The highest number of reported cases in 2017 seen between the 6th and 12th weeks (beginning of February and end of march) then other peaks seen in 33rd week (mid of august) and in 40th week (beginning of October). The lowest is seen number of reports seen on the 26th, 27th and 37th weeks.

in 2018 like the previous year the highest peak is seen on the 6th week (beginning of February) then again in 36th week. The lowest cases were seen on the 25th week with only one reported case.

Question 11: Create an epidemic curve for reported cases of Cutaneous Leishmaniasis in the years 2017 and 2018. And what specific public health measures would you suggest? Consider the timing of the actions, such as when to implement vector control measures and when to conduct public awareness campaigns.

3.4 Mapping

Question 12: generate maps to represent the distribution of Cutaneous Leishmaniasis cases in Saudi Arabia in 2017 and 2018.

Part 4: Discussion

Question 13: Based on the seasonal patterns, regional distribution, and demographic factors influencing cutaneous leishmaniasis (CL) cases in Saudi Arabia, which critical interventions should be prioritized to mitigate the disease burden? How urbanization, agricultural changes, and population movement for factored into these public health interventions?

In this report we found out that the number of the reported cases was higher in Eastern and western regions of the kingdom and regional incidence rate in 2017 and 2018 showed that al Ahsa have the highest rate, followed by al Madinah, Beshah and al Qassim, which is aligned with previous data in kingdom. The urbanization, the changes in the agricultural schemes and climate change in Saudi Arabia, is affecting the distribution of sand flies and animal reservoir of parasites^[9], and the presence of Al ahsa oasis in the Eastern part of KSA, these factors played big role in the endemic status of CL in these regions. further analysis of this data showed that the highest number of reported cases was between beginning of February and end of march then other peaks mid of august. The lowest number is seen around the month of July which is lined up with MOH data for CL^[10], which follows a seasonal distribution parallel with the known activity of the sandfly^[9]. and the variation in the incubation period, for example the incubation period of L.

tropica is 2 to 8 months and usually present with dry ulcerative lesions. The incubation period of L. major is less than 4 months^[10].

This data shows a high number of cases among adults age groups, one of the factors that played role in this result is the agricultural work and among jobs seeking immigrants and expats.

generally, CL is more common in males than females and more prevalent in adults This could be due to the customs used by females in Saudi Arabia, males in Saudi Arabia tend to be more exposed to the sand fly ^[8]

There are many challenges facing the kingdom in fighting cutaneous leishmaniasis like rapid urbanization and the huge population movement for work or religious reasons, whom a great number comes from CL endemic countries^[8]. The cutaneous forms of the disease represent a major socio-economic pressure on women and children by aesthetic disfigurement and social stigma, the possibility of normal interpersonal relations, which may cause affected people to refrain from seeking treatment.

Part 5: conclusion and recommendations

Question 14: conclude and provide recommendations.

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