

**B2.1c Descriptive epidemiology scenario-based exercise - Instructor guide**

**1. Scenario**

An outbreak of suspected leptospirosis occurred in the Lahij city of Yemen in August 2004. Leptospirosis is a bacterial disease that affects animals and humans. Symptoms are varied, from no symptoms at all to high fever, severe headache, chills, muscle aches, and vomiting, and may include jaundice (yellow skin and eyes), red eyes, abdominal pain, diarrhea, or a rash. Because these symptoms can occur with other diseases, the diagnosis should be confirmed with laboratory testing of blood or urine.

Leptospira organisms have been found in cattle, pigs, horses, dogs, rodents, and wild animals, which may be ill or asymptomatic. Humans become infected through contact with water, food, or soil containing urine from these infected animals. This may happen by swallowing contaminated food or water or through skin contact, especially with mucosal surfaces, such as the eyes or nose, or with broken skin. Outbreaks of leptospirosis are usually caused by exposure to water contaminated with the urine of infected animals. The incubation period between a person's exposure to a contaminated source and becoming sick is 2 days to 4 weeks (average 10 days). The disease is not known to be spread from person to person.

Investigators collected clinical and descriptive data from the 24 suspected cases.

**2. Questions and suggested answers**

**Question 1.** To summarize the descriptive epidemiology of this outbreak, which variables would you assess?

**Answer 1.** Descriptive epidemiology should include clinical features and information on time, place, and person. Variables to assess might include:

Clinical Time Place Person

fever Date of onset Home location Age

headache Date of hospitalization Sex

chills

muscle aches

vomiting

jaundice

red eyes

abdominal pain

diarrhea

rash

**Question 2.** Using the attached line listing, characterize the clinical features of the cases.

**Answer 2.** Not all clinical features are included in the line listing. Also, no clinical information is available for one case.

Fever 23 100%

Chills 23 100%

Headache

Severe 14 61%

Moderate 6 26%

Mild 1 4%

Myalgias 17 74%

Jaundice 7 30%

Red Eyes 1 4%

**Question 3.** Using the attached line listing, characterize the outbreak by person.

**Answer 3.**

Sex, male 14 58%

Age – could present mean, median, and/or frequency distribution

Mean = 36 years

Median = 29 years (average of 28 and 30 years)

0–9 years 2 8%

10–19 3 13%

20–29 7 29%

30–39 4 17%

40–49 1 4%

50–59 1 4%

50–69 6 25%

The mean and median are a little deceiving, because there is a bimodal distribution that can only be seen with the frequency distribution.

**Question 4.** Using the attached line listing and map, characterize the outbreak by place.

**Answer 4.** – see page 5

**Question 5.** Using the attached line listing and graph paper, characterize the outbreak by time.

**Answer 5.** – see page 6

You could subtract the shortest incubation period (2 days) from the date of onset of the first case (8/1) to speculate when the exposure may have been — around July 30. You could subtract the average incubation period (10 days) from the date of onset of the median case (12th case, 8/7) to speculate again when the exposure may have been — around July 29. These estimates are obviously quite close.

**Question 6.** Summarize your findings.

**Answer 6.**

Clinical: All cases had fever and chills, 87% had moderate or severe headache, and 74% had myalgias. 30% had jaundice, but only 1 (4%) had red eyes.

Person: A little more than half of the cases were male. There was a bimodal age distribution, with one peak at 20-29 years and another at 50-69 years.

Place: Although cases were scattered throughout the village, 16 cases occurred in the 33 households in the southern region. 6 cases occurred among the 24 houses in the northwest, and only 2 cases occurred among the 13 houses in the northeast.

Time: 19 cases occurred between August 3 and August 10, with the earliest case on August 1 and 3 later cases between August 11 and August 17. Given leptospirosis’ incubation period of 2 days to 4 weeks, these cases are consistent with a point source exposure (i.e., they all fit within one incubation period) that may have occurred around July 29 or 30.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Symptoms | Sex | House | Age (yr) | Date of onset of symptoms | Date of hospitalization | Fever | Chills | Headache | Myalgia | Jaundice | Red eyes |
| 1 | Y | M | 23 | 54 | 08/09 | 08/09 | Y | Y | Moderate | n | Y | n |
| 2 | Y | M | 57 | 69 | 08/05 | 08/07 | Y | Y | none | n | n | n |
| 23 | Y | M | 65 | 61 | 08/01 | 08/06 | Y | Y | Severe | Y | n | n |
| 24 | Y | F | 58 | 63 | 08/07 | 08/10 | Y | Y | Severe | n | n | n |
| 25 | Y | M | 13 | 9 | 08/06 | 08/12 | Y | Y | Severe | n | n | n |
| 26 | Y | F | 33 | 37 | 08/12 | 08/14 | Y | Y | Moderate | Y | Y | n |
| 27 | Y | F | 5 | 44 | 08/08 | 08/10 | Y | Y | Severe | Y | Y | n |
| 28 | Y | M | 5 | 17 | 08/08 | 08/11 | Y | Y | Severe | Y | Y | n |
| 29 | Y | F | 45 | 28 | 08/10 | 08/10 | Y | Y | Moderate | Y | n | n |
| 71 | Y | M | 38 | 28 |  |  |  |  |  |  |  |  |
| 102 | Y | M | 17 | 21 | 08/05 | 08/09 | Y | Y | Severe | Y | n | n |
| 103 | Y | M | 8 | 30 | 08/05 | 08/06 | Y | Y | Severe | Y | n | n |
| 109 | Y | M | 9 | 22 | 08/10 | 08/12 | Y | Y | Severe | Y | n | n |
| 110 | Y | M | 35 | 67 | 08/04 | 08/06 | Y | Y | Severe | Y | Y | Y |
| 113 | Y | F | 47 | 9 | 08/17 | 08/17 | Y | Y | Severe | Y | n | n |
| 114 | Y | M | 39 | 38 | 08/15 | 08/15 | Y | Y | none | n | n | n |
| 115 | Y | M | 14 | 22 | 08/03 | 08/06 | Y | Y | Severe | n | n | n |
| 116 | Y | F | 3 | 19 | 08/10 | 08/11 | Y | Y | Severe | Y | n | n |
| 118 | Y | F | 3 | 22 | 08/07 | 08/12 | Y | Y | Moderate | Y | n | n |
| 119 | Y | M | 30 | 19 | 08/05 | 08/08 | Y | Y | Mild | Y | n | n |
| 120 | Y | F | 12 | 35 | 08/04 | 08/09 | Y | Y | Severe | Y | Y | n |
| 122 | Y | F | 2 | 64 | 08/06 | 08/11 | Y | Y | Moderate | Y | n | n |
| 123 | Y | M | 16 | 27 | 08/10 | 08/12 | Y | Y | Moderate | Y | n | n |
| 126 | Y | F | 25 | 61 | 08/10 | 08/11 | Y | Y | Severe | Y | Y | n |



Figure 3. Number of cases by date of onset of illness, leptospirosis outbreak, Lahij, August 2004

X-axis uses 1-day intervals



Figure 4. Number of cases by date of onset of illness, leptospirosis outbreak, Lahij, August 2004

X-axis uses 3-day intervals



|  |
| --- |
| **Disclaimer**  **WHO Health Security Learning Platform - Training Materials**​  These WHO Training Materials are © World Health Organization (WHO) 2022. All rights reserved.​  Your use of these materials is subject to the “[WHO Health Security Learning Platform, Training Materials – Terms of Use](https://extranet.who.int/hslp/?q=content/terms-use)”, which you accepted when downloading them and which are available on the Health Security Learning Platform at: <https://extranet.who.int/hslp>  ​  ​  Should you adapt, modify, translate, or in any other way revise the contents of these materials, you shall not imply that WHO is any way affiliated with such modifications and shall not use the WHO name or emblem in such modified materials. ​  ​  Should you adapt, modify, translate, or in any other way revise the contents of these materials, you shall acknowledge the source of the material providing the following attribution: “These training materials are a modified version of the Rapid Response Teams Advanced Training Package (available at: https://extranet.who.int/hslp/), which is © the World Health Organization (WHO), 2022, and used with permission from WHO. WHO disclaims any responsibility for any modifications to, or revisions of, the WHO copyrighted materials.”  ​  Further, please inform WHO of any modifications of these materials that you use publicly, for record-keeping purposes and continued development, by emailing [ihrhrt@who.int](mailto:ihrhrt@who.int)​ |