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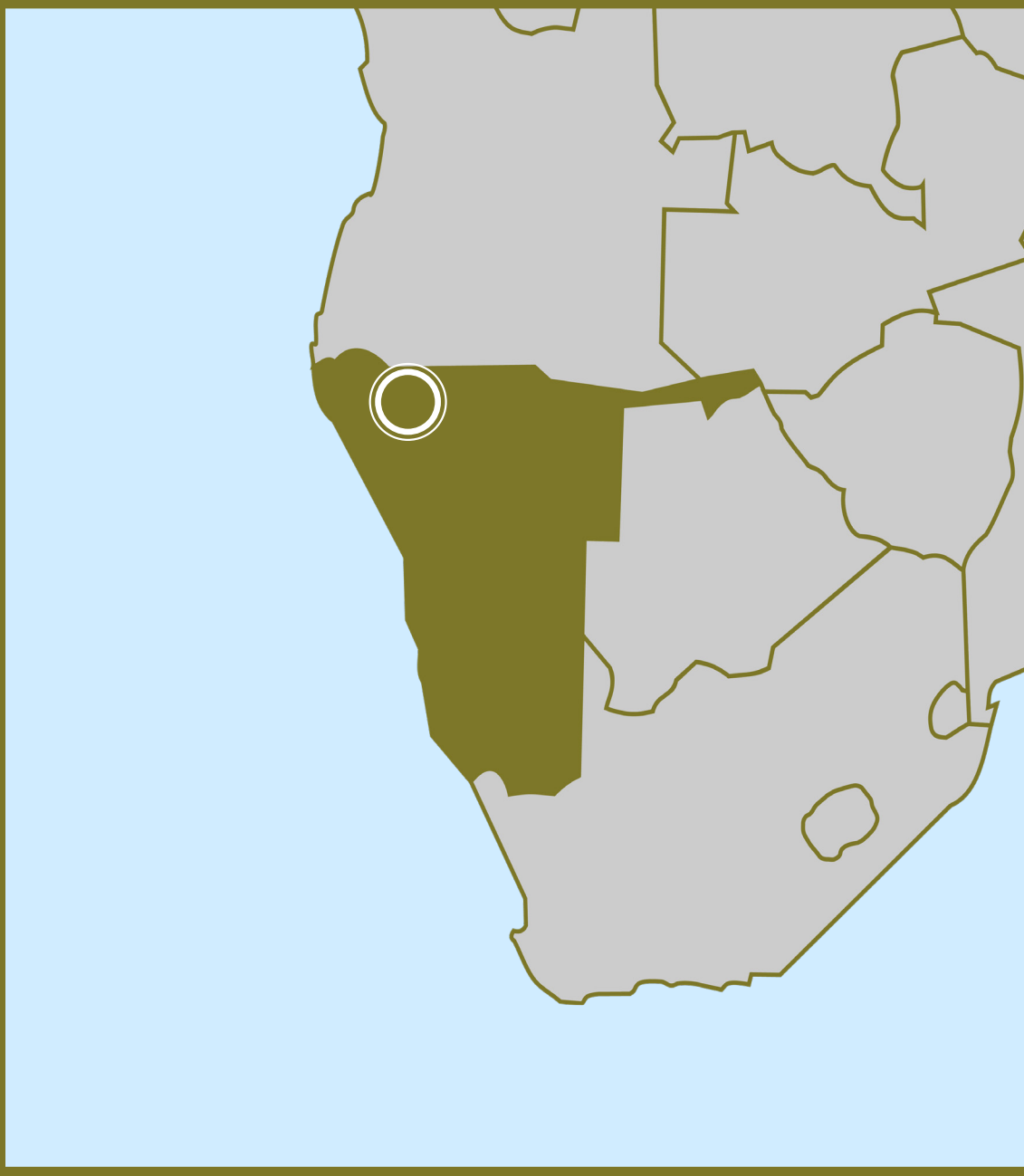
An Outbreak of Schistosomiasis in a Primary School in Omusati Region, Namibia, March, 2016

Participant Guide



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An outbreak of schistosomiasis in a primary school in Omusati region, Namibia, March, 2016

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Abstract

Schistosomiasis is endemic in some parts of northern Namibia and there is a control program in the country with the use of mass drug administration to control and prevent the disease. On the 1st March, 2016, there was a report of bloody urine among primary school pupils in a school in Omusati region Namibia. A team of health professionals was dispatched to investigate. This case study describes steps in conducting a schistosomiasis outbreak investigation and how to determine the risk factors. This describes how to calculate both the basic and analytical measures of association with 95% confidence intervals. This case study provides a step-by-step approach and can be used as a tool to teach the fundamental principles of outbreak investigation and response and how to measure the appropriate measures of association. This case study is targeted at intermediate- and advanced-level residents of the Field Epidemiology and Laboratory Training Program and other epidemiology trainees.

How to Use the Case Study

General instructions: Ideally, 1 to 2 instructors facilitate the case study for 15 students in a classroom or conference room. The instructor should direct participants to read a paragraph out loud, going around the room to give each participant a chance to read. When the participant reads a question, the instructor directs all participants to perform calculations, construct graphs, or engage in discussions. The instructor may split the class to play different roles or take different sides in answering a question. As a result, participants learn from each other, not just from the instructors. There are also specific instructor's notes that are included with each question in the instructor's version of this case study.

Audience: Residents in the 9-month intermediate and the 2-year advanced Field Epidemiology Training Programs (FETP), Masters of Public Health Training Programs, and others who are interested in this topic**.**

Prerequisites: Before using this case study, participants should have received lectures or other instruction in outbreak investigation, epidemiological study designs and measures of association.

Materials needed: Laptop with Microsoft Excel, Epi-info or graph paper, flipchart or white board with markers and calculators

Level of training and associated public health activity: Intermediate and Advanced – Outbreak investigation

Time required: Approximately 3 hours

Language: English

Participant Guide

Goal of Case Study: To understand the process of investigating a schistosomiasis outbreak

Learning Objectives: After completion of this case study, the participants should be able to:

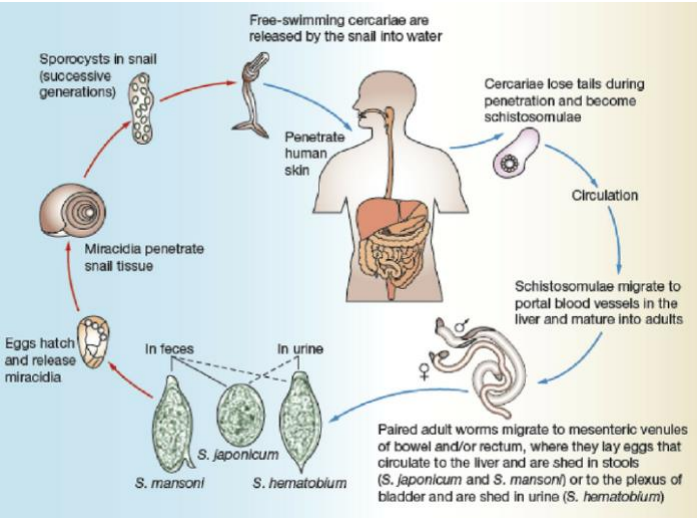
1. Recognize when an event is an outbreak
2. List and describe the steps in an outbreak investigation
3. Develop a case definition in an outbreak setting
4. Develop a line list and know the importance of a line list
5. Describe the magnitude of the outbreak (person, place and time)
6. Calculate the appropriate measure of association with 95% confidence interval (CI) for an analytical study
7. Describe an outbreak report and develop an abstract for the report

Introduction

Schistosomiasis is an acute and chronic parasitic disease caused by blood flukes (trematode worms) of the genus Schistosoma. People are infected during routine agricultural, domestic, occupational and recreational activities, which expose them to infested water. Lack of hygiene and certain play habits of school-aged children such as swimming or fishing in infested water make them vulnerable to infection. [1] Transmission occurs when people suffering from schistosomiasis contaminate freshwater sources with their excreta containing parasite eggs which hatch in water. The eggs that reach freshwater then hatch and release free-living ciliated miracidia which then infect a suitable snail host. In the snail intermediate host, it undergoes asexual replication and produces infective cercariae which infect humans when they come into contact with the infested water [1]. Contact with fresh water usually result from swimming, bathing, drinking and playing in the water. The lifecycle of schistosomiasis is shown in figure 1. The major symptoms of urinary schistosomiasis are hematuria (bloody urine)[1] with dysuria, suprapubic discomfort and fever.

In the northern part of Namibia including Omusati region, there have been previous reports of urinary schistosomiasis [2,3] and there are also programs in place for prevention and control. However, no study has demonstrated the usual prevalence of cases within the region.

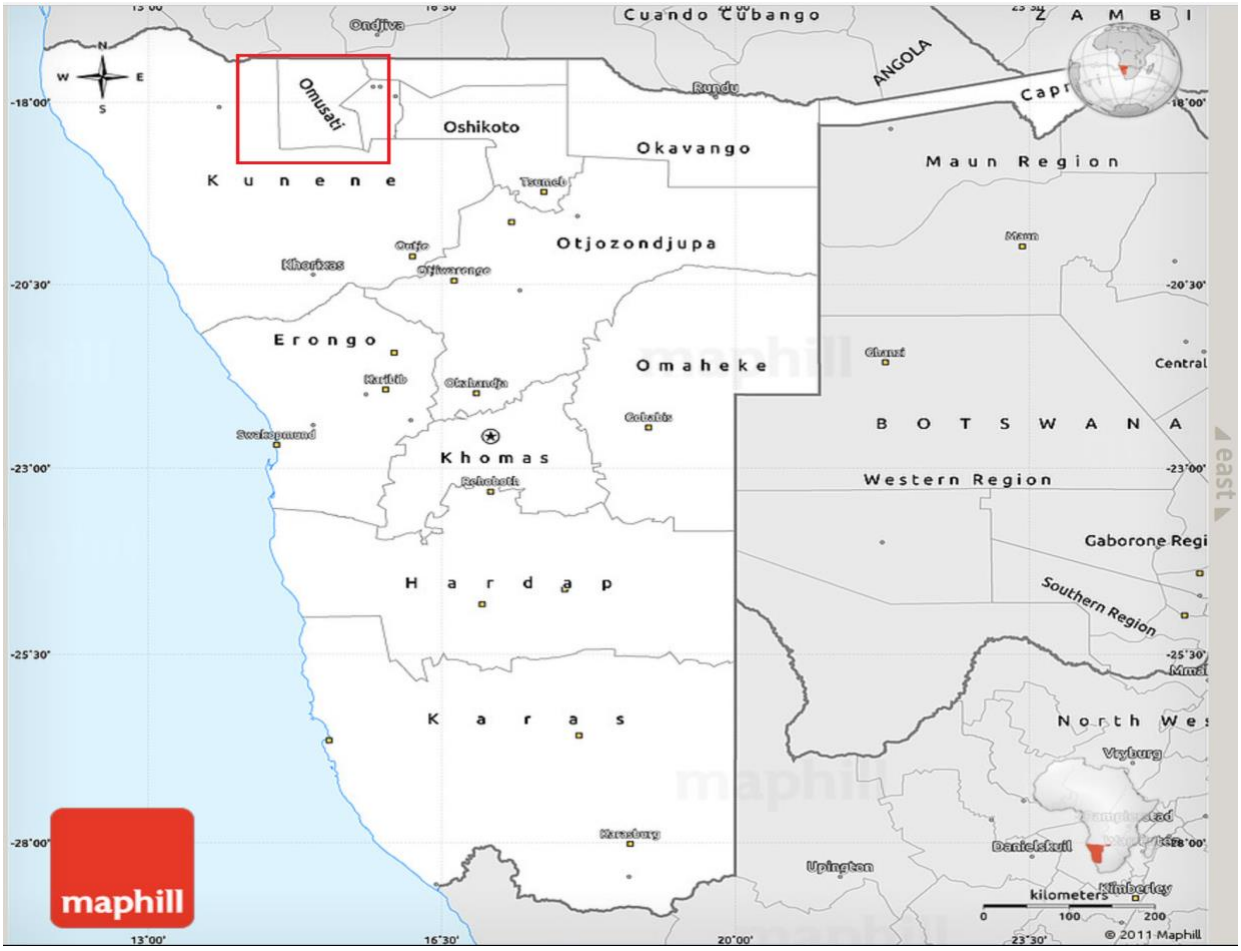
Figure 1: Life cycle of Schistosomiasis [4]



Part 1

On 1st March 2016, the principal of a primary school in Omusati region, Namibia reported a cluster of school children complaining of passing bloody urine with and without dysuria (painful urination) to the Regional Health Directorate of the Ministry of Health and Social Services. Omusati region is in the Northern part of Namibia and is dry, clay-soiled in most parts and vulnerable to flooding. It has a canal which carries water from the Ruacana river to Oshakati, passing through Outapi. Water from this canal has been used to irrigate a large, government-run farm at Etunda where crops such as maize, watermelon and bananas are grown. Community members use canal water for domestic use and agricultural purposes. There is a big pond and other several small ponds in the region, where most community members swim and collect water for domestic use.

Figure 2: Map of Namibia showing Omusati region



Source: http://www.maphill.com/namibia/simple-maps/silver-style-map/ accessed August 30, 2016

Figure 3: A satellite map of study area (Omusati region) showing the water bodies

Question 1. Define an outbreak. What will constitute an outbreak of schistosomiasis? What is the difference between an outbreak and an epidemic? What is a pandemic?

Part 2

A team was formed from the Omusati regional Health Directorate, Namibia on 1st March, 2016 to investigate the suspected cases of bloody urine with and without dysuria. The team prepared for the investigation and visited the school on 2nd March, 2016. The objectives of the investigation were to determine the causative agent, the mode of transmission, and factors for the development of the disease. On arrival, the school management briefed them on the situation and then proceeded to interview and interact with the school children. After interviewing about 20 school children with the symptoms the team determined that they had bloody urine with or without dysuria, fever or fatigue. Urine samples were taken for laboratory tests. The team then developed a case definition which was used to identify additional cases.

Question 2. Who should be part of the investigation team? Justify the inclusion of each member listed.

Question 3. List the key steps in an outbreak investigation and outline the key activities under each step.

Question 4. Define a case definition in an outbreak situation and list the criteria for developing a case definition during an outbreak.

Question 5. From the information provided, develop a suitable case definition for this outbreak.

The team conducted an active case search with the aim of identifying all the suspected cases in the school to collect important demographic and clinical information to help assess risk factors for acquiring the infection. They recorded the key characteristics and used them to develop a line list. A total of 125 school children were identified as suspected cases.

Question 6. What is a line list, and what is the use of a line list in an outbreak investigation?

Question 7. What variables will you select in developing a line list for this outbreak?

Part 3

The laboratory report was received on 16th March, 2016 with results of *Schistosoma haematobium* ova isolated in the urine samples. Prevention and control strategies were implemented. The school children who had symptoms were treated with Praziquantel tablets. The regional health management team also embarked on awareness creation in the community on schistosomiasis and its preventive measures.

A total of 468 children were in the school of which 262 were males. The mean age of cases and controls was 11.3 years and 11.0 years respectively.

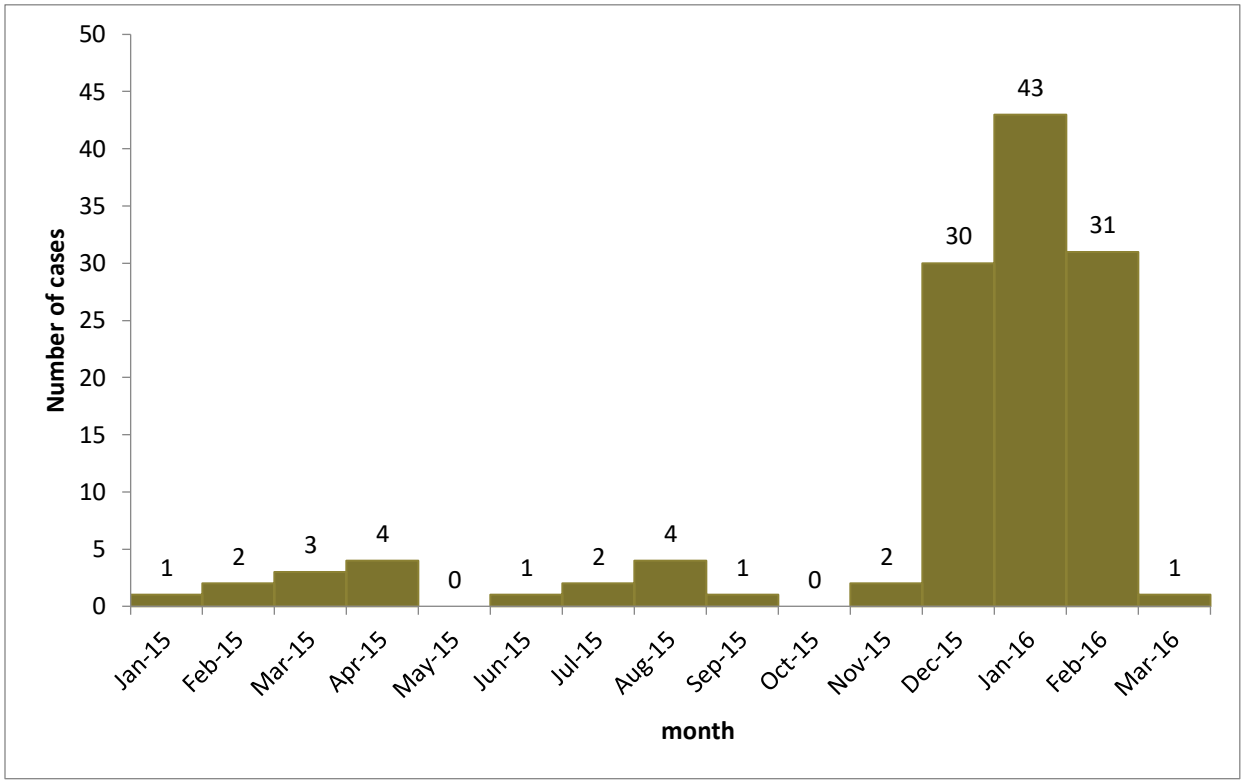
Table 1: Age and sex distribution of children with schistosomiasis in a primary school in Omusati region Namibia, March, 2016

	Number of school children affected	Population of children in the school
Age group (years)		
6 - 9	40	158
10 - 13	47	174
14 - 18	38	136
Sex		
Male	75	262
Female	50	206
Total	**125**	**468**

Question 8. Calculate the overall attack rate of Schistosomiasis in the primary school and the age- and sex-specific attack rates among the school children.

An epidemic curve (epi curve) of the outbreak is shown below:

Figure 4: A epidemic curve of schistosomiasis outbreak in a primary school in Omusati region, Namibia, March, 2016



Question 9. Interpret the epi curve provided.

Question 10. What analysis can be performed to describe the distribution of the cases by place?

Question 11. At this stage of the investigation, what additional activities can be performed to find out the exposures or risk factors of the outbreak?

Question 12. Indicate the suitable analytical studies that can be conducted and justify the best design for the situation.

The investigators proceeded with an unmatched case control study to determine the risk factors for the schistosomiasis outbreak in the primary school. They hypothesized that a water body in the Omusati region was the cause of the schistosomiasis outbreak. There were 125 cases of schistosomiasis identified in the school and the investigators decided to use a 1:1 case-to-control ratio. Controls were pupils from the same class = who did not have symptoms (bloody urine, with or without dysuria, fever or dizziness). Controls were selected randomly. Both cases and controls were interviewed on the basic demographic characteristics, clinical symptoms and risk factors for schistosomiasis. A summary table for the results of the case control study with the exposure to the use of the water body is shown in Table 2.

Table 2. Number of schistosomiasis cases and control in a primary school in Omusati region, exposed to the water body, March 2016

Exposure		Cases	Control
Swimming / playing / walking in a water body	Yes	121	110
	No	4	15

Question 13. What is the appropriate measure of association for the case control study conducted? Calculate the measure of association with 95% Confidence interval and interpret.

Part 4

As part of the investigation, the team wrote various reports at different stages of the investigation which were sent to relevant stakeholders.

Question 14. What is an outbreak report?

Question 15. How many reports are to be written in a typical outbreak investigation? Name them and indicate when during the investigation each report has to be written.

Question 16. Describe the content of each report in an outbreak investigation.

Question 17. Given the information provided about the outbreak, write a structured abstract (approximately 300 words) on this outbreak report and identify the key audience for this report.

Conclusion

Urinary schistosomiasis is a neglected tropical disease which affects mostly children who swim or play in stagnant waters/ponds contaminated with snails infested with *Schistosoma haematobuim*. It causes complication such as anemia and bladder cancer in the long term. An outbreak of schistosomiasis occurred in a primary school in Omusati region. Fresh water source was the cause of the outbreak. Health promotion activities on prevention of schistosomiasis were administered in the school and the community and the affected children were treated with praziquantel.

It is therefore important to investigate schistosomiasis outbreaks and control them to avoid long-term exposure among children. The investigation report should be shared with all relevant stakeholders including opinion leaders and the municipality, so that they can enforce laws and regulations to prevent the exposure of the community to schistosomiasis.

Background Reading

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Competing Interests

The authors declare no competing interest.

Author's Contributions

The case study was conceptualized by Kofi Mensah Nyarko. All authors contributed to the design, drafting and critical revision of the intellectual content of this case study.

Acknowledgements

We wish to thank Africa Field Epidemiology Network (AFENET) and Emory University for their support.

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