

# Investigating a Paralytic Shellfish Poisoning in Gando Village, Wete District, Tanzania, July 2015

## Participant Guide

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# Investigating a Paralytic Shellfish Poisoning in Gando Village, Wete District, Tanzania, July 2015

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## Abstract

The investigation of foodborne outbreaks requires a multi-disciplinary set of skills. Frequently, foodborne-related outbreaks are poorly investigated due to lack of all required skills on the part of the investigators. This case study, based on a shellfish poisoning outbreak investigation conducted in Wete, Zanzibar in July 2015 by the Tanzania Field Epidemiology Training Program (TFETP), seeks to reinforce principles and skills in foodborne outbreak investigation. It is primarily intended for training public health practitioners in a classroom setting. Facilitating this case study should take approximately 3 hours.

## How to Use the Case Study

**General instructions:** Ideally, 1 to 2 instructors facilitate the case study for 10 to 20 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. Specific instructor's notes are included with each question in the instructor's version of this case study.

**Audience:** Residents in Field Epidemiology and Laboratory Training Programs (FELTPs), and others who are interested in this topic

**Prerequisites:** Before using this case study, case study participants should have received training in basic biostatistics in epidemiology, public health surveillance, and advanced epidemiology and outbreak investigation and response.

**Materials needed:** Laptop with Microsoft Excel or graph paper, Epi info software, flipchart or white board with markers

**Level of training and associated public health activity:** Intermediate outbreak investigation

**Time required:** 3 hours

**Language:** English

## Participant Guide

**Goal of Case Study:** To simulate a foodborne outbreak investigation

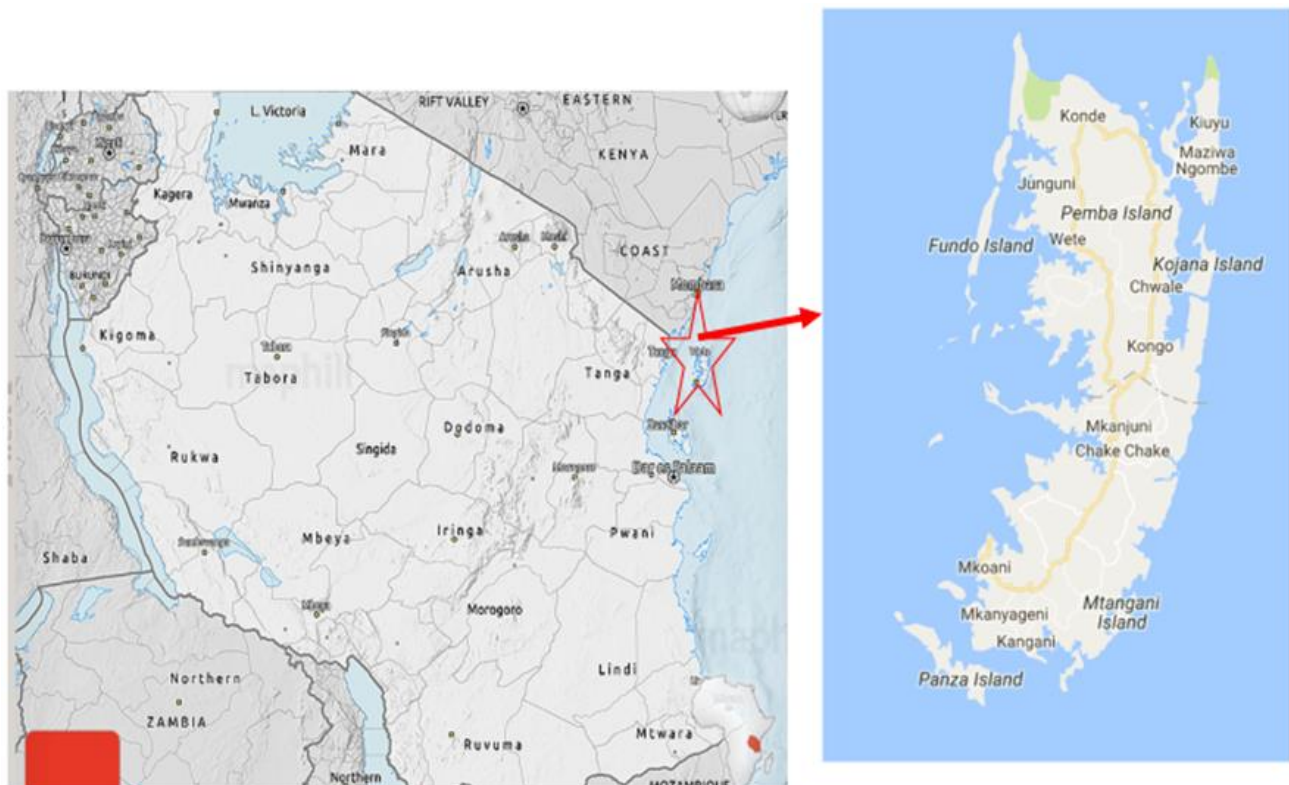
**Learning Objectives** – After completion of this case study, the participants should be able to:

1. List the criteria for deciding whether a field investigation is warranted
2. Develop objectives for an outbreak investigation
3. Identify the team members of an outbreak investigation
4. Develop a working case definition and define its components
5. Identify the components of a questionnaire
6. Use a line list
7. Draw and interpret an epidemic curve and describe its value
8. Determine the risk factors associated with the outbreak
9. Identify control and preventive measures and make recommendations

## Introduction

Neighboring the Indian Ocean off the coast of East Africa, Wete is the second largest urban center of Pemba Island in Tanzania. Wete has a population of 102,482 people and is administratively divided into 17 wards. [1][2] Gando is among the 17 wards. The residents in Gando are predominantly fishermen. [3]

**Figure 1: Map showing Wete District in Pemba Island, Tanzania**



On July 10, 2015, the Tanzania Field Epidemiology and Laboratory Training Programme (FELTP) received a report from the Epidemiological Unit of the Zanzibar Ministry of an unknown disease in Wete district,

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Pemba. The preliminary report indicated that from 3<sup>rd</sup> to 8<sup>th</sup> July 2015, a total of 31 residents of Gando reported at Hospital A with an unknown condition. Symptoms presented by the patients were itching, burning sensation of the body, numbness of the limb, general body pain, difficulty swallowing, weakness of the lower limbs, and a pricking sensation of the palm, throat and ear.

Question 1. Assuming the position of a surveillance officer, what questions might you ask before considering a course of public health action?

Question 2. What are some of the reasons you might use in deciding whether to launch a field investigation of an apparent outbreak?

## Part 1

On 12 July 2015, the investigation team from the Ministry of Health started an investigation. Up to 12<sup>th</sup> July 2015, there were 51 cases reported to the Gando health facility and 10 additional cases reported from Junguni ward. In response, National level decided to launch an outbreak investigation in Wete District.

Question 3. Assuming the position of a team lead, who will you identify as a member of the outbreak investigation team? Give reasons for your selection.

Question 4. List the steps in an outbreak investigation.



## Part 2

The investigation team reviewed hospital records and developed the line list. A questionnaire was administered to patients to gather more information on the event. The team developed a case definition based on the initially reported cases and further conducted active case search in the communities and updated the line list. The team summarized the sign and symptoms of the reported 61 cases as shown in Table 1.

**Table 1: Signs and symptoms associated with the illness among the cases, Wete District, July 2015**

Signs and symptoms	Frequency	Percent
Body itching	53	70
Diarrhoea	2	3
Ear needle prickling pain	16	21
Fever	19	25
Generalized body pain	20	27
Limb needling pain	47	63
Lower limb weakness	17	23
Nausea	0	0
Numbness of limbs	59	79
Painful micturition	0	0
Palm needle prickling pain	56	75
Tingling/numbness of the mouth	7	9
Vomiting	0	0
Weakness of limbs	2	3



Question 5. Describe the four components of an outbreak case definition.

Question 6: Construct a working outbreak case definition for this scenario

Question 7. If you were to develop a questionnaire for this outbreak, what information will you collect?

Question 8. What is a line list? Why do you think the investigation team developed a line list?

The team conducted an active case finding in Gando Village and a total of 75 cases meeting the case definitions were obtained. During interviews, the majority of cases had a history of eating seafood, especially shellfish, as well as other types of fish. A summary of the cases by date of onset of disease is given in Table 2. Fresh sea food samples were also collected for laboratory investigations. A total of 26 clinical specimens were also collected from patients for analysis at the National Institute for Medical Research in Dar es Salaam. Aliquots of the samples collected were also sent to the Government Chemist for toxicological analysis. All patients were discharged in an average of 36 hours with no deaths recorded. The team constructed an epidemic curve for all the cases that were reported.

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**Table 2: Distribution of cases by date of on set, Wete District, July 2015**

Date of reporting at the facility	Onset date	Number of cases		Number of deaths
		Male	Female	
06-07-2015	03-07-2015	1	0	0
05-07-2015	04-07-2015	2	3	0
07-07-2015	05-07-2015	2	7	0
07-07-2015	06-07-2015	1	5	0
09-07-2015	07-07-2015	2	5	0
09-07-2015	08-07-2015	0	4	0
11-07-2015	09-07-2015	2	9	0
13-07-2015	10-07-2015	8	10	0
13-07-2015	11-07-2015	2	3	0
14-07-2015	12-07-2015	0	3	0
14-07-2015	13-07-2015	2	2	0
16-07-2015	14-07-2015	1	0	0
16-07-2015	15-07-2015	0	1	0

Question 9. What is an epidemic curve? Indicate the information that can be derived from an epidemic curve.

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Question 10. Using Table 2, construct an epidemic curve and interpret it.

### Part 3

The team decided to conduct an analytical study to determine the probable exposure for the disease.

Question 11. Suggest the best study design and measure of association for assessing the risk factors for this outbreak.

The team considered a case as any member of the population who has developed a disease or is reported to have had a disease of interest. A control was defined as a member of the population who was not ill. Both cases and controls were interviewed using standardized questionnaires. Eighty-one people were eligible as controls. History of food eaten was taken. The following were the foods that were reported to be eaten regularly by those who reports sick. Of the 75 ill residents, 5 ate sardines, 56 ate shellfish, 64 ate other kind of fish, 6 ate rice, 9 ate maize. Of those who did not get sick, 10 ate sardines, 19 ate shellfish, 70 ate other fish, 12 ate rice and 15 ate maize.

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Question 12. Calculate the measures of association for these exposures and interpret your results in simple terms.

VARIABLES		ILL	NOT ILL	MEASURE OF ASSOCIATION (95%CI)
SARDINES	Yes	5	10	
	No	70	65	
SHELL FISH	Yes	56	19	
	No	19	56	
OTHER FISH	Yes	64	70	
	No	11	5	
RICE	Yes	6	12	
	No	19	63	
MAIZE	Yes	9	15	
	No	66	60	

Question 13. Based on the preliminary findings above, what control and prevention measures do you think the investigating team should implement?



## Conclusion

After instituting control measures, there were no more cases reported as of August. Shellfish and fish samples were collected from the Gando Sea for toxicological analysis. Water samples were also collected from two points (water source and end use tape) for toxicological analysis. In addition, blood samples from the cases were collected. The toxicological analysis tested for the presence of pesticides, alkaloids and heavy metals. The water samples revealed the presence of anatoxin. Anatoxin is a potent alkaloid toxin derived from a species of cyanobacteria. In humans, exposure to cyanotoxins can occur in various ways; however, the oral route is the most common. This is mainly through drinking water, or by eating contaminated foods; it may even involve ingesting water during recreational activities.[9]

## Background Reading

- Guideline for Investigation and Control; Foodborne Disease Outbreaks, WHO, 2008
- Ussi A, Kishimba R, Mghamba J, Ahmed A, Urrio L, Sembuche S, *et al. Outbreak investigation of Shellfish poisoning in Gando, Wete in Pemba, Tanzania, July 2015*. 2015.Guideline for Investigation and Control; Foodborne Disease Outbreaks
- Guideline for Specimen collection, packaging and transportation
- Principles of Epidemiology: Lesson 6, Section 2, Self-Study Course SS1978/CDC

## Competing Interests

The authors declare no competing interest

## Authors' Contributions

Mrs Asha Khamis Ussi, Ali Mohamed, Janneth Maridadi Mghamba, Ahmed Abade, Senga Sembuche, Nsiande Lema, Rogath Kishimba, Loveness John Urrio and Innocent Semali did the Outbreak investigation, data collection, analysis and final report. Loveness Urrio wrote the Manuscript under supervision of Joseph Asamoah Frimpong and Meeyoung Park. All authors approve of the manuscript before publication.

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