# Outbreak investigation Tutorial

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# Objectives

- Understanding the steps to outbreak investigation
- Discussing the terminology
- Interpretation of epidemic curves
- Understanding different determinants of infectious disease (human, agent, environment)

# Steps for outbreak investigation

**Table 6.2 Epidemiologic Steps of an Outbreak Investigation**

1. Prepare for field work
2. Establish the existence of an outbreak
3. Verify the diagnosis
4. Construct a working case definition
5. Find cases systematically and record information
6. Perform descriptive epidemiology
7. Develop hypotheses
8. Evaluate hypotheses epidemiologically
9. As necessary, reconsider, refine, and re-evaluate hypotheses
10. Compare and reconcile with laboratory and/or environmental studies
11. Implement control and prevention measures
12. Initiate or maintain surveillance
13. Communicate findings

# Terminology

## What is meant by “cross-contamination”?

- It is the transfer of micro-organisms or toxins from foods, hands, utensils or food preparation surfaces to a food.
- (e.g. Transfer of micro-organisms from dirty hands of a food handler to food, transfer of micro-organisms from raw meat to food, transfer of micro-organisms from contaminated water to food.)

# Terminology cont.

- **What is meant by “infectious dose”?**

  - It is number of organisms that must be consumed in order to give rise to symptoms of a food-borne illness.

# Terminology cont.

**In order to detect the number of cases in an outbreak investigation, one must first identify a case definition.**

**What does "case definition" mean?**

- It is a group of criteria that helps us decide whether a person has a particular health-related condition or not. These criteria are usually specified by time, person and place.
- e.g. A group of students studying at KSU campus, who ate at the college of science cafeteria experienced diarrheal illness between the months of January and February.

# Terminology cont.

**In the Salmonella outbreak example, health care workers identified cases in "report cards" and then forwarded them to the local healthcare department. This helped the local health department to form a "line list" of cases.**

**What is "Line listing"?**

- It is a table that helps identify number of diagnosed cases and information relevant to disease outbreak. The columns represent specific patient information and the rows represent each case.

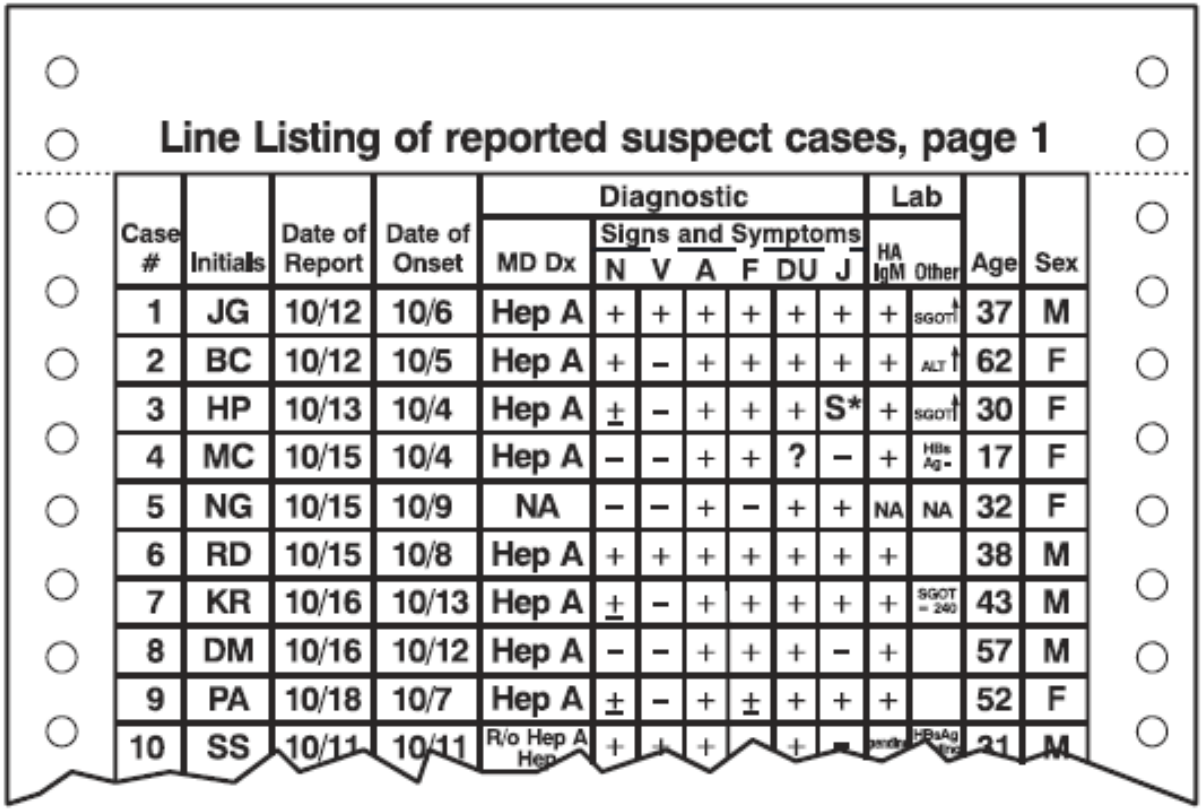
# Line listing

**What information would you like to include in the line list?**

- Identifying information: name, address, contact information.
- Demographic information: Age, sex, date of birth, current status(dead or alive)
- Clinical information: date of report, date of onset of symptoms, presenting symptoms, diagnosis, laboratory findings.
- Relevant risk factor information: last meal eaten (what and where), contact with animal, ingestion of undercooked meat, ingestion of water from contaminated source.

# Line list

**Figure 6.1**
**Example of line listing for an outbreak of hepatits A**



**Line Listing of reported suspect cases, page 1**

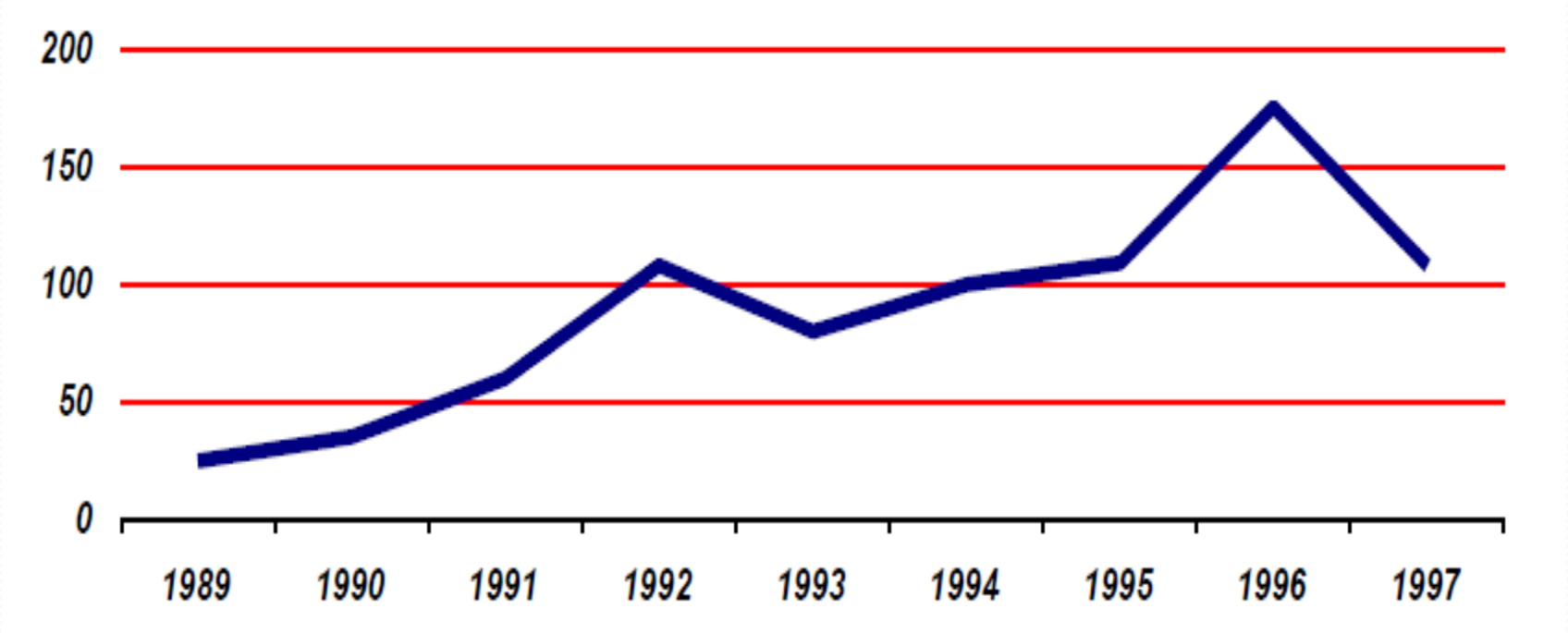
| Case # | Initials | Date of Report | Date of Onset | Diagnostic | | | | | | | | Lab | | Age | Sex |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MD Dx | Signs and Symptoms | | | | | | | HA IgM | Other | | |
| | | | | | N | V | A | F | DU | J | | | | | |
| 1 | JG | 10/12 | 10/6 | Hep A | + | + | + | + | + | + | | + | SGOT↑ | 37 | M |
| 2 | BC | 10/12 | 10/5 | Hep A | + | – | + | + | + | + | | + | ALT↑ | 62 | F |
| 3 | HP | 10/13 | 10/4 | Hep A | ± | – | + | + | + | S* | | + | SGOT↑ | 30 | F |
| 4 | MC | 10/15 | 10/4 | Hep A | – | – | + | + | ? | – | | + | Hbs Ag- | 17 | F |
| 5 | NG | 10/15 | 10/9 | NA | – | – | + | – | + | + | | NA | NA | 32 | F |
| 6 | RD | 10/15 | 10/8 | Hep A | + | + | + | + | + | + | | + | | 38 | M |
| 7 | KR | 10/16 | 10/13 | Hep A | ± | – | + | + | + | + | | + | SGOT = 240 | 43 | M |
| 8 | DM | 10/16 | 10/12 | Hep A | – | – | + | + | + | – | | + | | 57 | M |
| 9 | PA | 10/18 | 10/7 | Hep A | ± | – | + | ± | + | + | | + | | 52 | F |
| 10 | SS | 10/11 | 10/11 | R/o Hep A Hep | + | + | + | | + | – | | | HBsAg | 31 | M |

S* = scleral
N = nausea
V = vomiting
A = anorexia
F = fever
DU = dark urine
J = jaundice
HA IgM = hepatitis A IgM antibody test

**In a Salmonella outbreak in the Caribbean, after surveillance of reported cases, they found that cases reported in the country were actually LOWER than what was expected. Why is that?**

- This is because of 2 reasons:
- There might be a problem in the reporting system (under-reporting, delay in reporting)
- There might be a problem in disease diagnosis and detection (lack of accurate microbiology techniques)

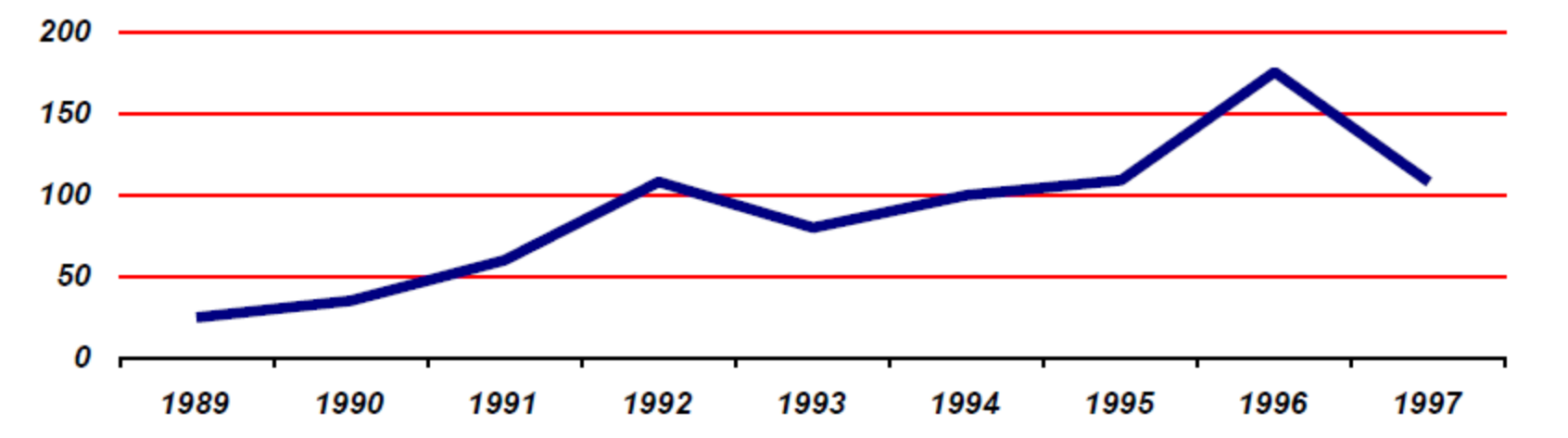
## Figure 1. Laboratory confirmed cases of Salmonella by year of diagnosis in Trinidad and Tobago, Years 1989-1997.




- **What is missing in figure 1? Do you think it is a proper epidemic curve?**

- **What would you label the Y axis and what would you label the X axis?**
- **What do you notice about the number of cases between 1992 and 1996?**
- **What could be reasons for that?**
  - 1-Increase in the number of reporting, because of improved methods of reporting.
  - 2-Improved method of diagnosis.
  - 3-Improved surveillance that detects number of cases better.

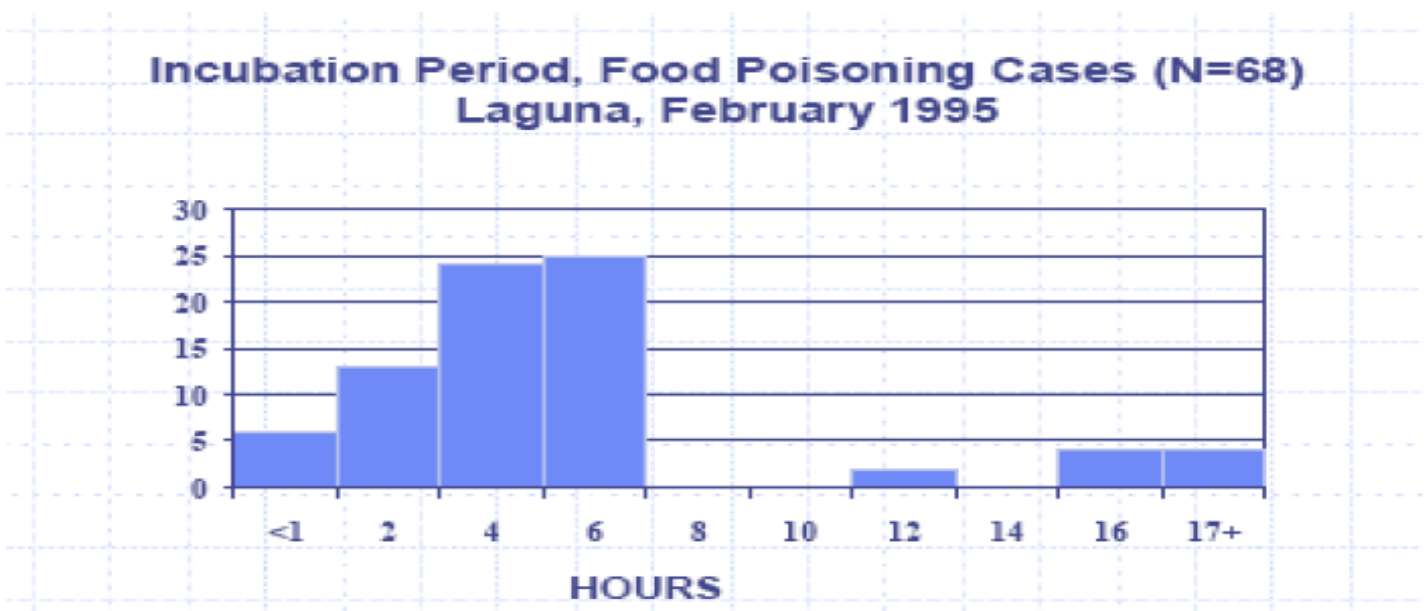
# Figure 1. Laboratory confirmed cases of Salmonella by year of diagnosis in Trinidad and Tobago, Years 1989-1997.




**In what year were the reported confirmed cases the most?**

**In what year were the reported confirmed cases the least?**

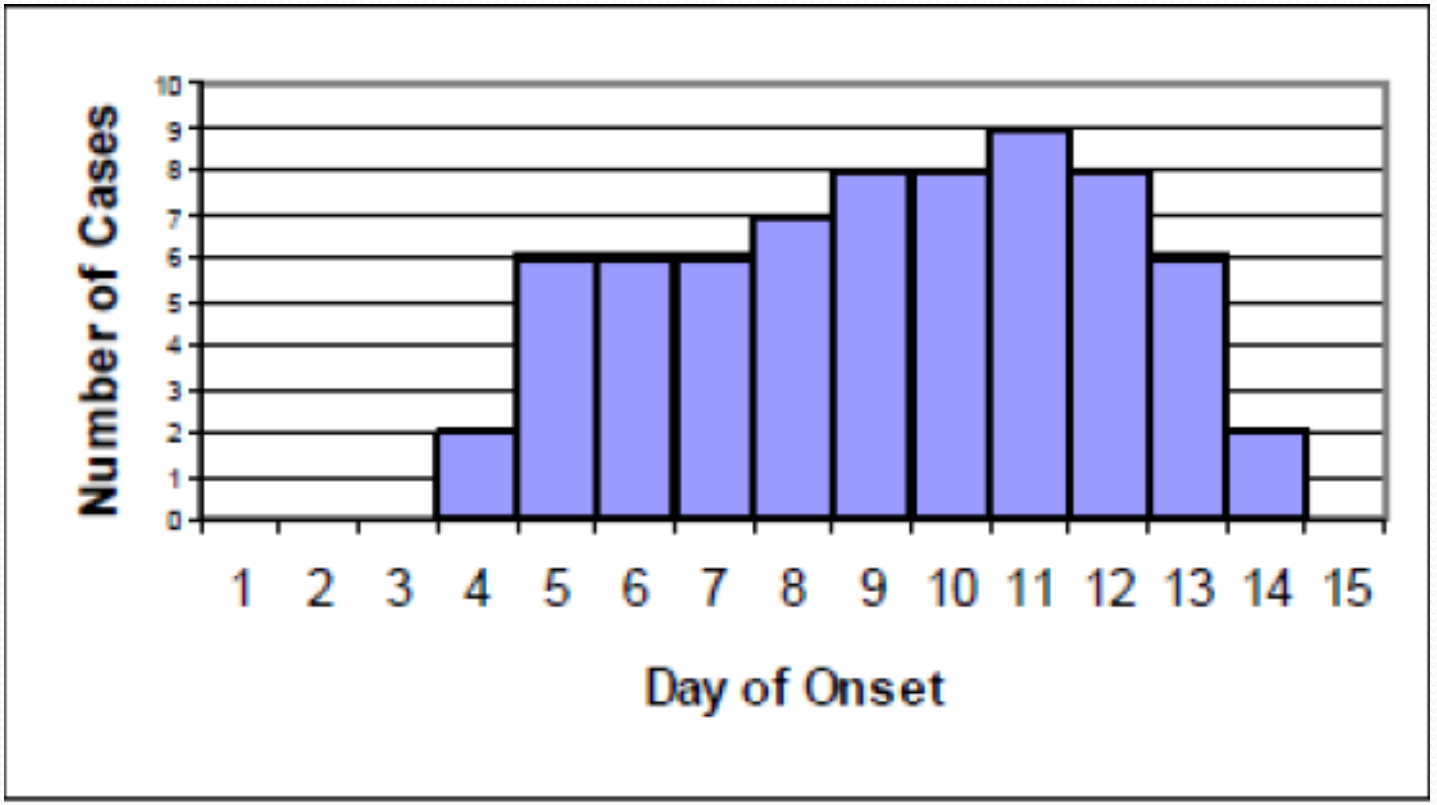
**68 residents of Laguna presented with symptoms of vomiting, diarrhea and abdominal pain, over a time period of 17 hours. After thorough surveillance, the investigators came up with the following epidemic curve.**




Source:
http://www.wpro.who.int/internet/files/eha/dir/Disaster%20Preparedness%20and%20Response/Outbreak%20Investigation.pdf

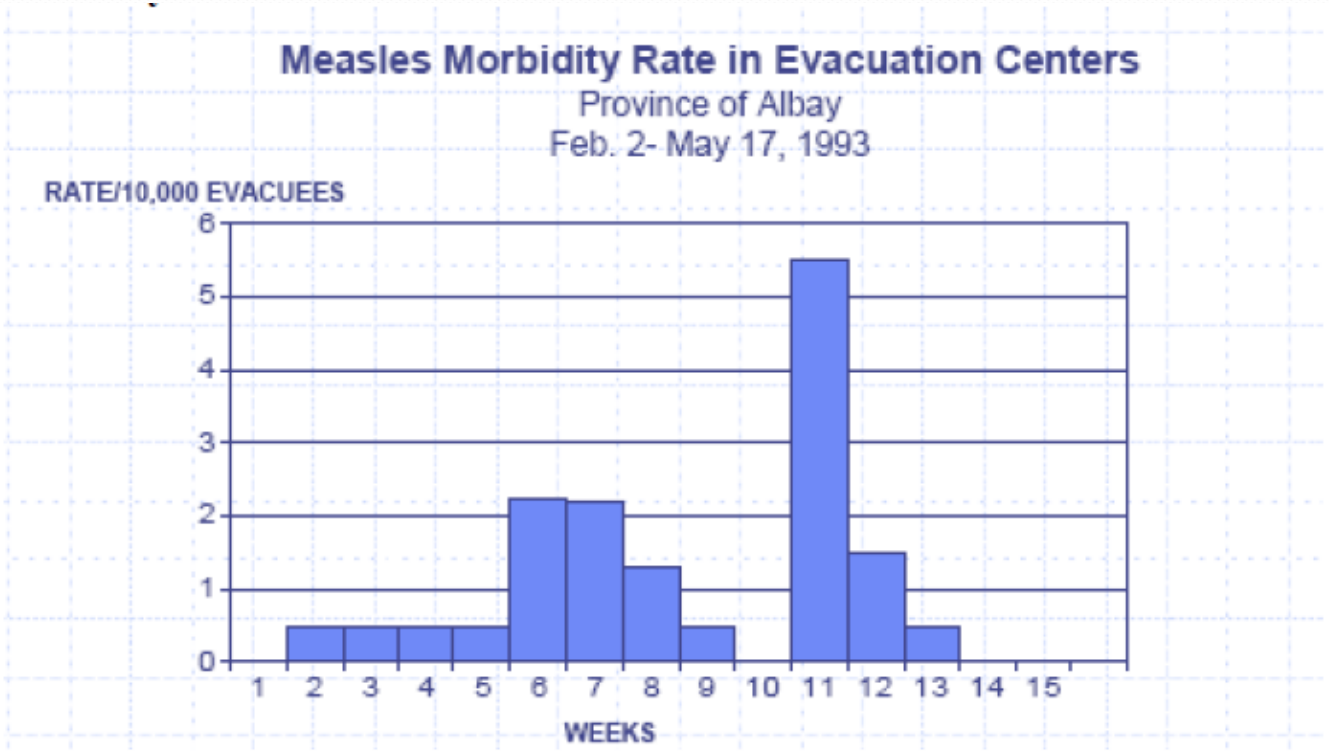
- **What type of outbreak is this? Why?**

# Epidemic curve that shows the number of cases detected with Hepatitis A infection.




- **What type of outbreak is this? Why?**

# The following figure was drawn from an outbreak of measles in evacuation centers in Albay, 1993.




Source:
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- **What type of outbreak is this? Why?**

# Please complete the table bellow about Non-

| Item | Explanation |
| --- | --- |
| Signs and symptoms | |
| Risk factors | |
| Mode of transmission | |
| Diagnosis | |
| Prevention and control measures | |

# Thank you!