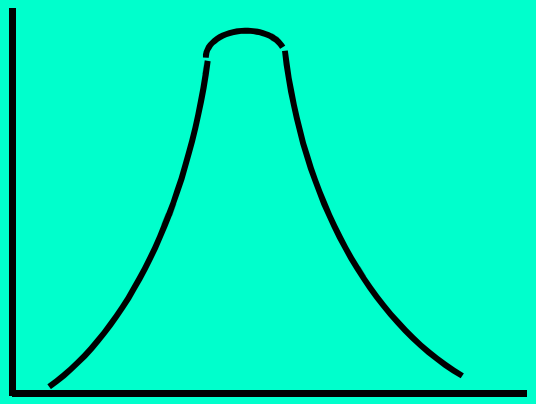
بسم الله الرحمن الرحيم

EPIDEMIC INVESTIGATION



Definition:

An epidemic is " the occurrence in a community or region of cases of an illness, specific health-related behavior, or other health-related events clearly in excess of normal expectancy" .

What is "clearly in excess" in one place and time period, may not be so in another context. An annual incidence of 2 million episodes of malaria may be 'expected' for India but if this were to occur in England, it would certainly be an outbreak!

Even one case of small pox today anywhere in the world (except due to accidental exposure in the labs which still store the virus) will be considered an outbreak because none is expected. Epidemics have not to be dramatic and sudden

Types of outbreaks

An outbreak can be explosive due to :

1. Point (common) source .

Alternatively, it occurs in a period of time, i.e.

2. Propagated (serial) outbreak .

In a **point-source outbreak**, susceptible individuals are exposed more or less simultaneously to one source of infection; there is a sudden peak in the incidence and quick fall. No fresh cases occur after some time .

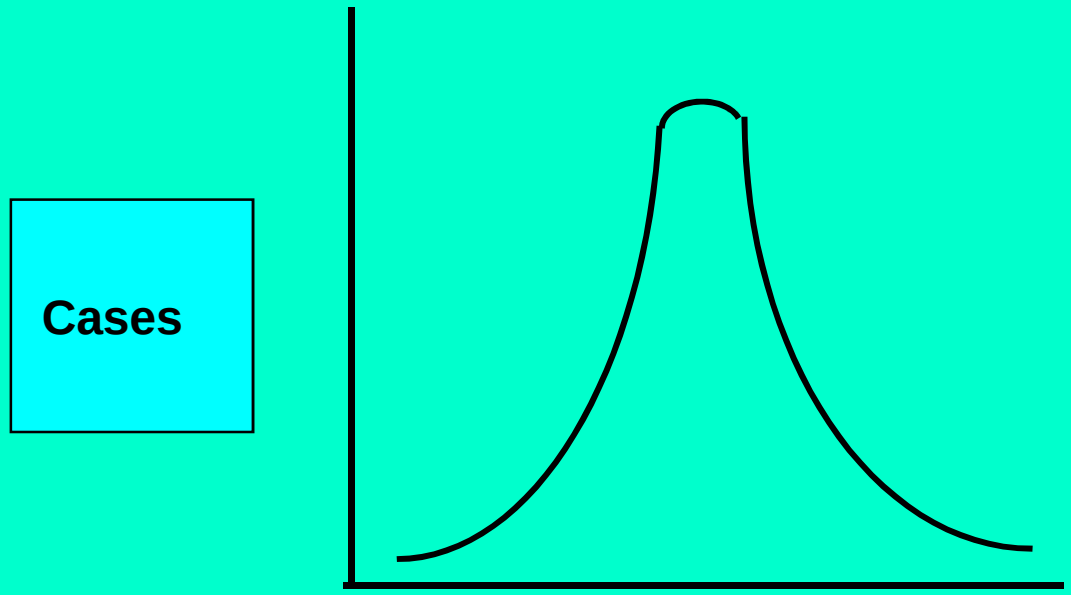


Fig 1 . point-source outbreak

Propagated outbreaks are more difficult to investigate and require more resources.
Usually several people have to be interviewed and describing the outbreak by time, person and place is a tough task.

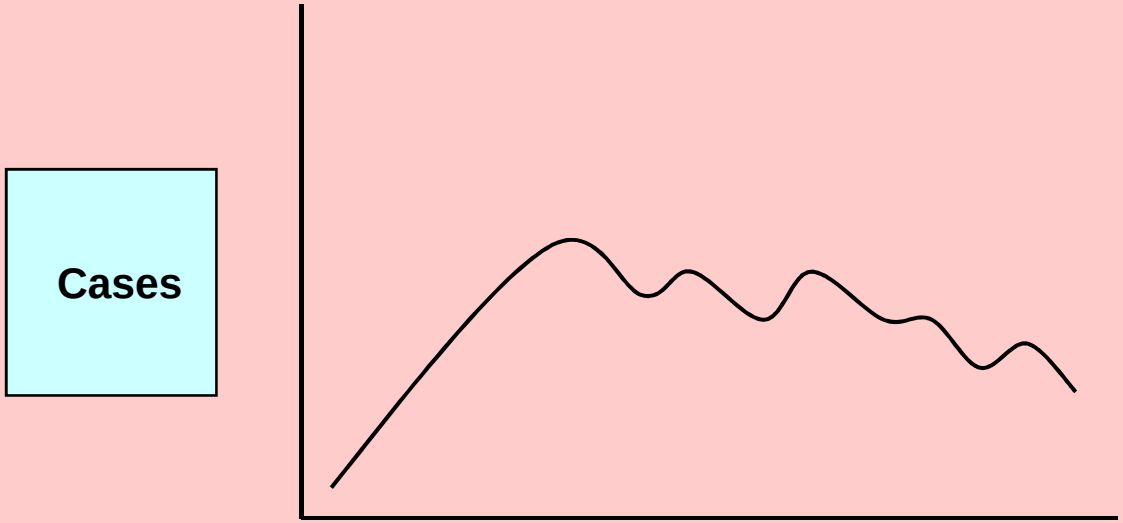


Fig 2 . Propagated Outbreak

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Food poisoning outbreaks tend to be point source, explosive events.

Usually, by the time they are detected and investigated, the outbreaks will

have begun to decline. This makes it difficult to abort or control such

outbreaks. Propagated outbreaks are more difficult to investigate and

require more resources. Usually several people have to be interviewed and

describing the outbreak by time, person and place is a tough task.

It is commonly believed that only infectious diseases can occur as epidemics.

This is certainly not true.

Any disease or event which occurs in excess of the expectation is an outbreak. Thus a sudden increase in the incidence of diabetes can also be called an outbreak. A large increase in the number of deaths in a population will also qualify to be called an outbreak of deaths .

The steep rise in the incidence of Coronary Heart Disease in the western population in the later half of this century has been called an epidemic.

The incubation period of an outbreak of CHD has been computed to be 10 years.

The outbreak of methyl mercury poisoning involving fish in Japan (Minamata disease) is another example of an outbreak which is non-infectious in origin.

How are outbreaks detected?

1. Surveillance systems: these are systems which routinely monitor events and involve systematic, ongoing collection of data and dissemination .

2. Hospital data: Hospitals are another source of information. Large number of cases being admitted in hospitals can point to outbreaks [e.g. dengue outbreak in Madras]

3. Data from Laboratories: Microbiological data from labs can also point to outbreaks [e.g. V. cholerae 0139 detection in a city was done using cholera isolates from the microbiology lab]

4. Media: It is quite common to see reports of outbreaks appearing in the lay press and media. In countries like India where no surveillance systems exist, lay press is an important source of information about outbreaks.

Steps in an outbreak investigation

1. Ensure the existence of an epidemic:

This is an important first step. Real epidemics have to be distinguished from pseudo-epidemics which arise because suddenly more cases may be detected (either due to better surveillance or greater awareness about the disease). Confirmation of the existence of an epidemic is much easier if some idea about the normal endemic level of a disease is already known. In fact, if a good surveillance and reporting mechanism exists, epidemics can be picked up very early and aborted.

Steps in an outbreak investigation

2. Confirm the diagnosis :

This is vital for control of the epidemic. Confirmation of clinical suspicion is usually done by lab diagnosis. At times, due to poor or absent lab support the diagnosis may never be confirmed. In some instances, lack of familiarity with a certain disease may lead to delayed diagnosis e.g. plague hemorrhagic fever.

3. Estimate the number of cases:

Estimation of the total number of cases will be possible only if a proper 'case definition' is made. House-to-house surveys may be necessary at period intervals to estimate the total number of affected individuals and also pick up new cases as and when they occur. Estimation allows one to compute the incidence rates (attack rates). This needs to calculate the well persons as well for the sake of comparison and estimation of proportions.

Steps in an outbreak investigation

4. Assess the data in terms of time, person and place:

An epidemic curve (e.g. Fig 1) is useful in describing the time trend of the epidemic. Spot maps are useful in identification of clustering of cases in certain geographic locations. This, in turn, may point to a possible source of contamination.

5. Determine who is at risk of having the health problem:

Once the overall attack rate is computed, it is important to see who is more affected by the outbreak (for example, are children affected more than adults; are females affected more than males; are users of a certain water source more affected than others; are vaccinated children more affected than unvaccinated children, etc.).

Steps in an outbreak investigation

6. Develop an explanatory hypothesis:

At this stage of the investigation, an explanatory hypothesis is usually made. This should involve the possible etiological organism, method of transmission and possible source (reservoir) of infection.

7. Compare the hypothesis with established facts:

Once a hypothesis is made, it is compared to the standard literature on known microorganisms and their epidemiology. This will support the hypothesis.

8.Plan a more systematic study:

The best way of confirming the hypothesis is to perform a well planned study. Usually case-control studies are done to confirm the etiological hypothesis. A case-control study involves comparing cases and non-cases (controls) with respect to exposure factors (e.g. food stuffs eaten, activities prior to the outbreak, etc.).

Steps in an outbreak investigation

9. Prepare a -written report:

Once the investigation has confirmed the hypothesis, the entire process should be written up as a complete report. Publication in a journal is a logical end point to the whole process. The report should be comprehensive and will be a very useful document for future work. Feedback to the affected community is an important aspect and should not be overlooked.

10. Propose and implement control measures :

This, ultimately, is the main purpose of an epidemic investigation. Control measures should be initiated as early as possible during the investigation. At times, control measures can be initiated even without knowing the exact etiology. It is important to involve the affected community in the investigation and control of the outbreak. This will empower the community to handle similar problems better.