

## Disease Surveillance

Surveillance is “the ongoing systematic collection, analysis and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know. The final link in the surveillance chain is the application of these data to prevention and control. A surveillance system includes a functional capacity for data collection, analysis and dissemination linked to public health programmes.” (CDC-Centers for Disease Control and Prevention)

Surveillance therefore is

- An ongoing activity
- To detect changes in trends or distribution of a disease
- With the aim of facilitating disease control

An effective surveillance system should be

- Practical
- Uniform
- Rapid

### *Uses of Surveillance Data*

The historical use of surveillance was to support control of communicable diseases. Probably the earliest recorded use of surveillance was in Venice in 1348 when the public health authorities boarded arriving ships to see if anyone on board had plague, and if so, to prevent them from leaving the ship. William Farr, who headed the statistical department of the Registrar's Office for England and Wales around 1850, is regarded as the father of modern surveillance. He collected, analyzed and interpreted data on vital statistics, and disseminated the information in reports, newspapers and medical journals.

A key use of surveillance is to identify outbreaks of infectious diseases at an early stage. Recently, the technique of surveillance has also been used in the control of non-communicable diseases such as cancer, atherosclerosis, drugs and injuries. Surveillance data could be used to:

- identify outbreaks
- focus interventions against a specific disease
- monitor the effectiveness of control programs
- quantify a health problem
- make sure that a new drug is safe
- set priorities for public health interventions

### *Sources of Surveillance Data*

Surveillance data can be obtained from a number of sources as listed below. Accuracy of surveillance data could be improved by using more than one method of data collection.

#### **1. Reporting of notifiable diseases**

A notifiable disease is a disease cases of which have to be reported to government authorities as an obligation. When a disease is labeled notifiable in a country, health professionals are required by law to report all suspected cases of this disease to a local authority, which then reports to a national

centre. Historically, this method has been used to assist the control of infectious diseases such as plague and cholera. Based on severity, transmissibility and urgency, health authorities decide and update their list of notifiable diseases.

#### Advantages of notifiable data:

- Comprehensive coverage of the country or wide geographical area
- Low cost
- Quickly available to undertake necessary action to control outbreaks

#### Disadvantages:

- Inaccuracy of diagnosis because diagnosis is usually based on clinical features and there are no standard clinical features for all diseases
- Incomplete data about the disease and possibly data not representative to different areas
- Little data collected on each case

### **2. Sentinel reporting schemes**

Some countries have a system of sentinel surveillance by a number of selected primary health facilities. These selected facilities are asked to submit regular reports on all cases of specified diseases that they have diagnosed within a specified time period. In the UK, this system is used to monitor influenza. Health facilities are selected on the basis of their willingness to participate and their patient population in relation to the target population

#### Advantages of sentinel data:

- More accurate data
- Rapid
- More data can be collected on each case including laboratory data
- Can monitor trends of disease occurrence

#### Disadvantages:

- Less complete coverage of the country and geographical area
- Less useful for rare diseases

### **3. Laboratory surveillance**

Laboratories are asked to report results of their relevant microbiological investigations to a central agency to monitor. Surveillance using laboratory reports of *Salmonella* serotypes allows outbreaks due to a specific serotype to be identified. Surveillance of laboratory reports of the antibiotic sensitivities can identify emergence of resistant strains and help appropriate use of antibiotics.

#### Advantages:

- High diagnostic accuracy
- Availability of additional laboratory information

#### Disadvantages:

- Small sample of all cases, which may not be representative
- Depends on the pattern of laboratory use by individual doctors
- Limited clinical information available
- Only useful for diseases which have a diagnostic test

#### **4. Serological surveillance**

Surveillance of diseases by examining blood samples for antibodies against the causative agents. The blood samples are usually collected for other purposes. This method can be used to monitor immunization level of the population against vaccine-preventable diseases. It is also useful to monitor diseases with a high proportion of sub-clinical cases e.g. hepatitis B.

#### **5. Other sources of surveillance data**

A wide variety of sources of data can be used for surveillance purposes. Hospitals records could be checked periodically for the number of admissions due to a certain condition. This has been used as a rapid method of AIDS surveillance in some countries. Data from other sources such as school or work absentee rates due to minor illnesses could be used for surveillance of influenza or diarrhea.

#### ***Active and passive surveillance***

Passive surveillance means a system in which the recipient waits for the provider to report cases. Examples include disease notification systems, as discussed previously. Active surveillance means that cases are actively sought out. This may be by checking that the data supplied by the provider are complete, but may involve other methods, such as community surveys to actively search for cases. For example, in the eradication of smallpox, as the disease became rarer, cases were actively sought. Each time a case was identified, additional efforts were made to control the disease and prevent its spread.

#### ***Priorities for Surveillance***

Resources are not sufficient to undertake surveillance for all diseases, therefore surveillance must be prioritized. The diseases selected for surveillance varies depending on the health situation in the country. Criteria used to decide which diseases should have the highest priority include

- Incidence of the disease
- Severity of the disease
- Cost of surveillance
- Preventability
- Transmissibility and outbreak potential
- Public interest and media attention

#### ***Planning a Surveillance System***

If we decided to establish a new surveillance system for a disease, we have to do it with proper planning including the following steps:

1. Establish the objectives of the surveillance system
2. Develop a case definition
3. Develop data collection mechanisms
4. Field testing the methods
5. Data analysis
6. Interpretation of the findings
7. Dissemination of information
8. Evaluation of the system