# Disease Surveillance

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# Summary of the CDC video

- Please watch the video

# What is surveillance?

"Systematic ongoing collection, collation, and analysis of data and the timely dissemination of information to those who need to know so that action can be taken."

World Health Organization

"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."

U.S. Centers for Disease Control and Prevention

# In other words: Surveillance

**Continuous and systematic vigilance over the occurrence and distribution of disease and events or conditions which increase the risk of disease**

# Surveillance: general objectives

- To follow trends in the health status of a population over time.
- To establish health care and public health priorities
- To ensure those with greatest need are prioritized.
- To detect and respond to epidemics
- To evaluate the effectiveness of programmes and services

# What are the specific objectives of surveillance?

- **The principal objectives are to :**
- **Give early warning of change of incidence- as with the recent increase in tuberculosis in many countries following along period of decline**
- **Detect outbreaks early**
- **Evaluate the effectiveness of interventions – the introduction of new vaccines , for instance**

# Examples of events that may require surveillance are:

- Epidemic diseases, e.g. measles, meningococcal meningitis

- Malnutrition

- Animal reservoirs and vectors of communicable diseases

- Environmental pollution, particularly of water

- Demographic events, such as births and deaths

# Assessment of whether targets have been reached

*Assume a national goal has been set to "Reduce malaria Deaths by 20% in the next five years"*

There is a baseline figure on malaria deaths
There is a way of monitoring trends in deaths over time

# Surveillance

- Surveillance can often produce information which is more timely than information gathered by other methods, such as surveys. It can also allow you to monitor trends more easily.

# Types of surveillance

- Surveillance can be classified into the following types:

- **_Passive surveillance:_** a system in which data generated without solicitation, intervention or contact by the health agency carrying out the surveillance. Other agencies initiate reporting.

- The data collator awaits its reporting , as with the British system of notifiable disease reporting

This figure is an example of data gathered by passive surveillance from the hospitals run by one organization:
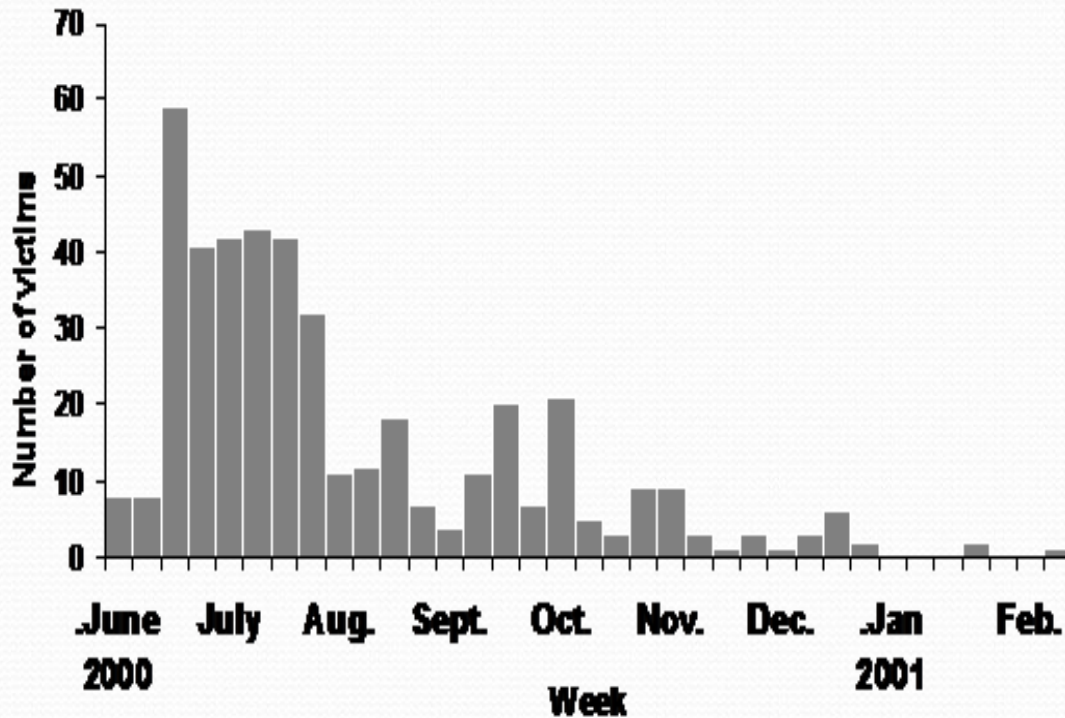
# Types of surveillance

- ***Active surveillance*** – the organization conducting surveillance initiates procedures to obtain reports

- The data collator checks that the reporting agency is indeed collecting the source data , and doing so as completely as the collection mechanism allows

# Types of surveillance

- **Negative surveillance:** where the data collator presses the collector to report even the absence of cases.

- This is the typically required for uncommon disorders so that the collator can be sure that a 'nil report' truly reflects zero incidence over the period and not simply a failure to report.

- Paediatric surveillance units around the world use negative reporting schemes.

# Sentinel surveillance

- Instead of attempting to gather surveillance data from all health care workers, a sentinel surveillance system selects, either randomly or intentionally, a small group of health workers from whom to gather data.

- These health workers then receive greater attention from health authorities than would be possible with universal surveillance.

- Sentinel surveillance also requires more time and resources, but can often produce more detailed data on cases of illness because the health care workers have agreed to participate and may receive incentives.

- It may be the best type of surveillance if more intensive investigation of each case is necessary to collect the necessary data.

- For example, sentinel influenza surveillance in the Jordan collects nasopharyngeal swabs from each patient at selected sites to identify the type of influenza virus. Collection of such data from all health workers would not be possible.

# Mortality surveillance

- Another type of surveillance is often done for deaths.
- In most countries, the health authorities require that each death in the population be reported or registered. These reports are then periodically counted up to calculate a death rate. Death registration systems are universal, albeit of widely differing quality and completeness.

- Why is death a common condition under surveillance?

Death is the final common outcome of severe disease. If you can only measure one condition to follow the health status of a population, death is probably the best. If the death rate in a population is normal, the health status of the population is probably not very bad.

# Collection of information

- Geographic subunits

- Age

- Sex

# Important concepts in surveillance

## The surveillance arc
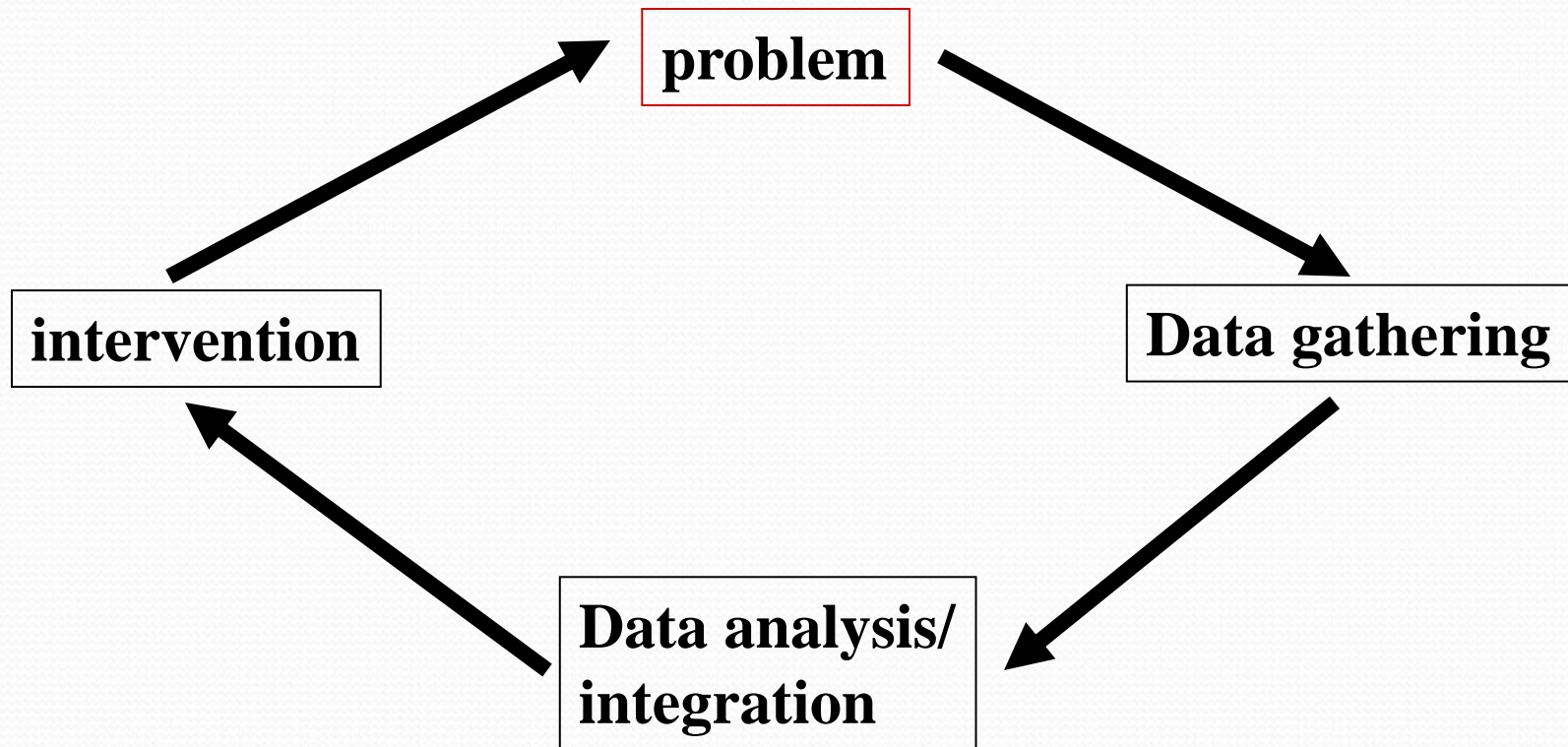
If data are to be used for decision-making, they need to be made available and understandable to public health decision makers in a timely fashion.
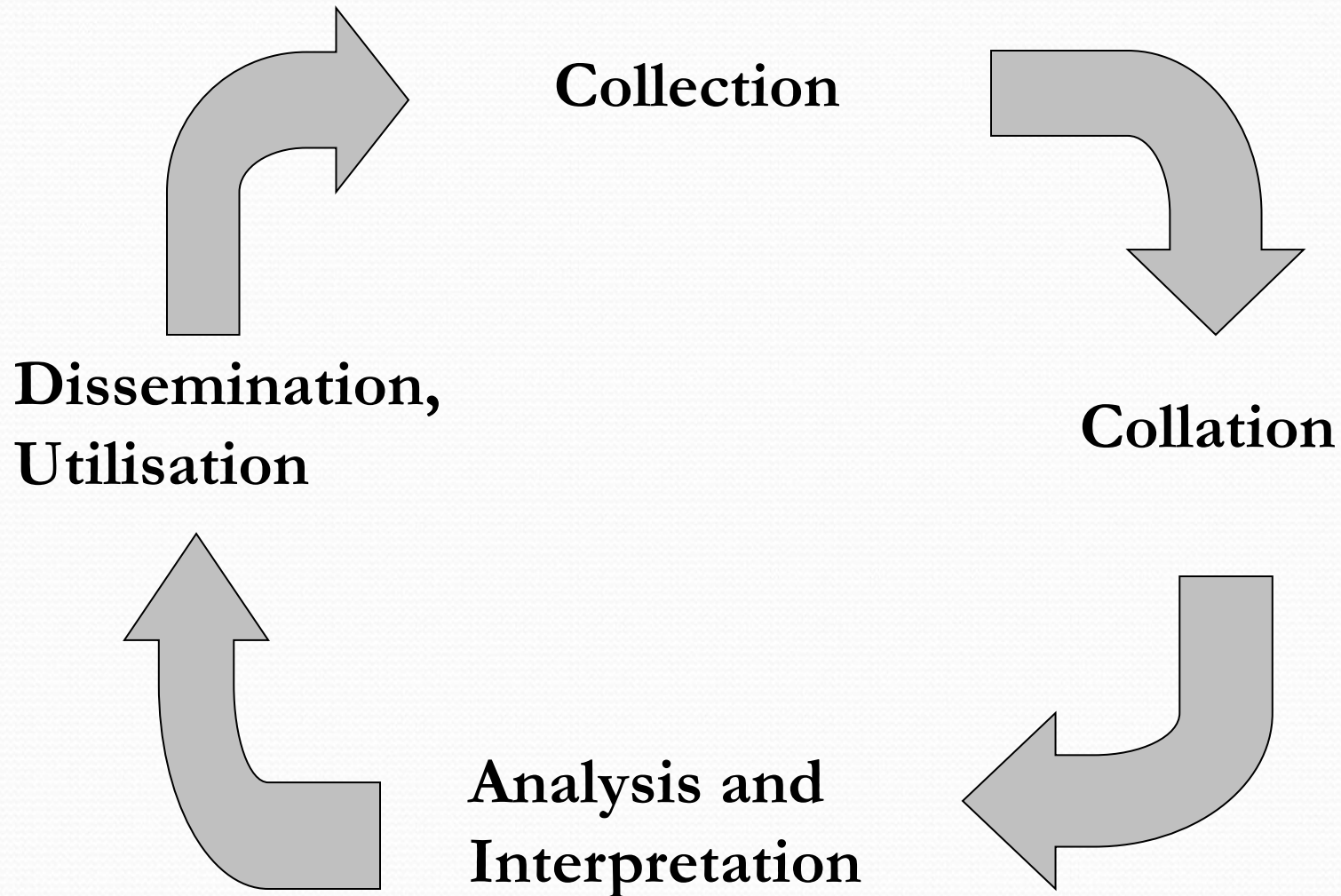
Problems:
- Data analysis
  gathering, summary, dissemination
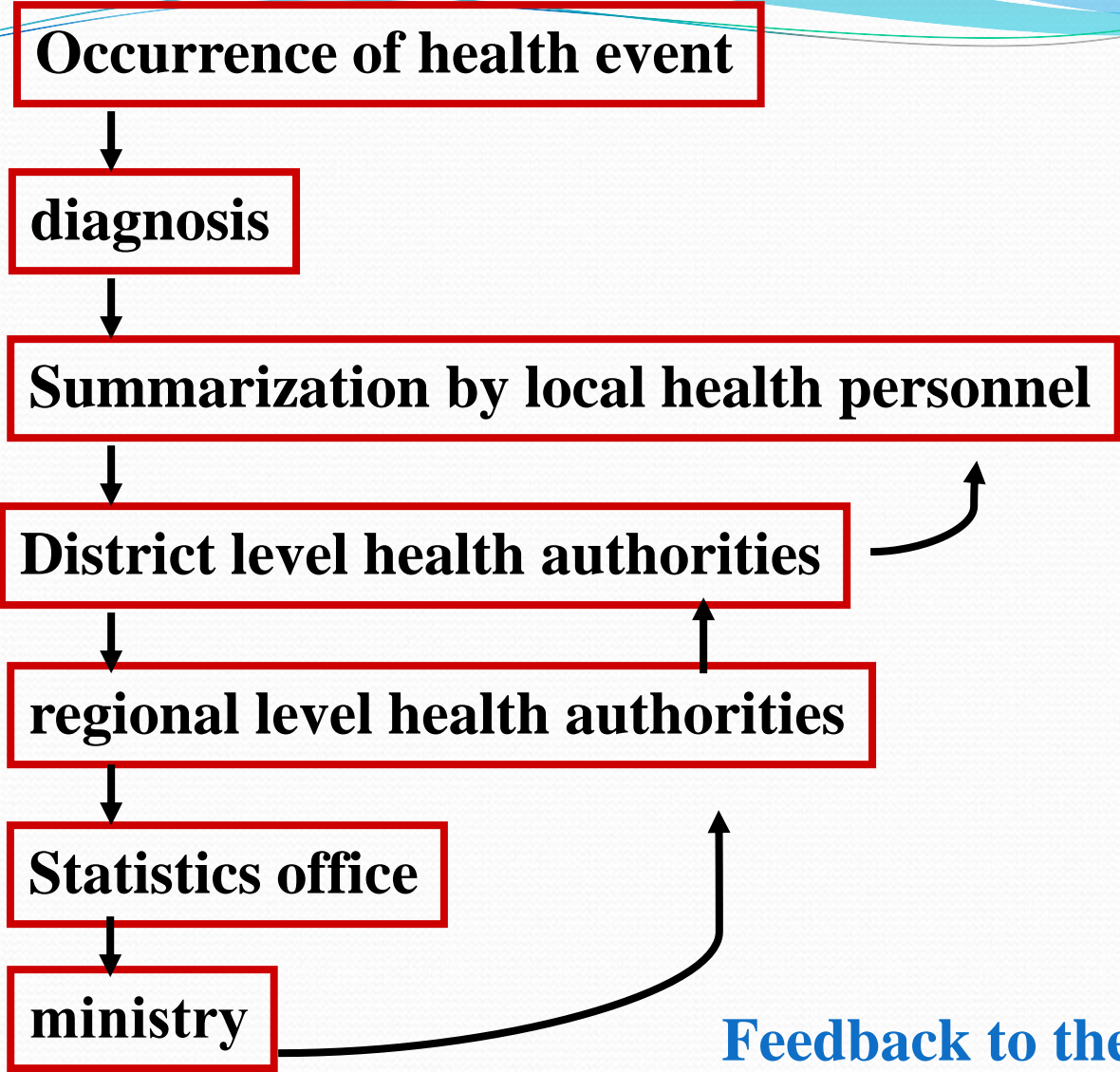- Interventions

# Steps involved in surveillance

There are four steps:
- Data collection
- Data collation
- Data analysis
- Dissemination.
- Action may or may not flow from the last.

# Flow of Surveillance Data



Collection

Collation

Analysis and Interpretation

Dissemination, Utilisation

**Occurrence of health event**

↓

**diagnosis**

↓

**Summarization by local health personnel**

↓

**District level health authorities**

↓

**regional level health authorities**

↓

**Statistics office**

↓

**ministry**

**Feedback to the previous level within the data collection system**

| Communicable disease | | |
|---|---|---|
| Acute flaccid paralysis | Anthrax | Ringworm |
| Polio | Rabies | Leishmaniasis |
| Measles | Rubella | Plague |
| Acute watery diarrhoea | Influenza-like illness | Leprosy |
| Hepatitis A | Foodborne disease | Yellow Fever |
| Hepatitis B | Typhus | Relapsing Fever |
| Meningitis | Tuberculosis | SARS |
| Bloody diarrhoea | Typhoid & Para Typhoid Fever | H1N1 |
| Malaria | Mumps | Coronovirus |
| HIV | Chicken pox | West Nile virus |
| Syphillis | Brucellosis | Crimean Congo Fever |
| Gonorrhoea | Scarlet fever | Acute diarrhoea |
| Diphtheria | Tetanus | Dengue Fever |
| Typhus | Pertussis | Rift valley Fever |
| Animal bite | Bilharzia | Hydatidosis |
| Scabies | | |
| **Non-communicable disease** | | |
| Hypertension | Diabetes | |
| Asthma | Chronic obstructive pulmonary disease | |
| Neoplasms | Haemophilia | |
| **Mental health** | | |
| Alcohol use disorders | Substance use disorders | |
| Stress related disorders | Psychosis (including Schizophrenia) | |
| Depression (moderate to severe) | Epilepsy/seizure | |
| Severe emotional disorder | Self-harm/suicide | |
| Behavioural disorder | Bipolar disorder | |
| Developmental disorder | Anxiety disorders | |
| Dementia | Obsessive compulsive disorder | |
| Unexplained somatic complaint | | |

# In summary: surveillance can:

- Detect outbreaks
- Detect public health threats
- Detect infectious cases (case finding)
- Monitor trends in a target population
- Monitor exposed individuals for symptoms
- Monitor treated individuals for complications
- Direct public health interventions
- Evaluate public health interventions
- Generate hypotheses for further evaluation