Surveillance
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- Surveillance is a very French word - both halves of it developed in a characteristically French way, from the Latin super (over) and vigilantia (watchfulness).

- The word came into English at the time of the French revolution

- Ongoing systematic collection, analysis, interpretation, and dissemination of health data.
- Public health officials use surveillance data to describe and monitor health events in their communities, set priorities, and to assist in the planning, implementation, and evaluation of public health interventions and programs.

Objectives of the Surveillance System of Egypt

- **Monitoring Health Events**
- **Link to Public Health Action**

Public Health Surveillance Keywords

systematic

ongoing

collection

analysis

interpretation

dissemination

health-related data

linked to public health practice

A new disease threatens…

- Imagine that X is a newly recognized infectious disease, already pretty widespread
- Further, imagine that you have just been appointed to be your community's Health Officer, with responsibility for controlling infectious diseases.
- Coming up with a plan for responding to X is your first big task in your new job

What would you need to know?

- How is X spread or acquired? What are risk factors for infection and disease?
- How long is the incubation period?
- When are people (most) infectious? (if at all)
- What is the natural history of disease?
  - What fraction of infected people get sick and when?
- What are its clinical characteristics?
  - How distinctive is it?
- How do you make the diagnosis?
  - Is there a good laboratory test?
  - Is there a good screening test?
  - Can you identify people who are infected but not sick?
- Is there an effective treatment?

What else would you need to know?

- How much disease is there currently?
  - Is it occurring endemically or in outbreaks?
- Is it putting people in the hospital, or killing them?
- Is the amount of disease going up or down?
- In what population groups is it most common?
  - Do the most-at-risk groups have ready access to clinical care?

Who is responsible?

Ministry of Health

+

Other governmental agencies

+

community participation

Monitoring Health Events

1. To identify disease patterns
2. To follow temporal (mid and long-term) trends and patterns of diseases
3. To detect sudden changes in disease occurrence and distribution
4. To identify changes in Agent, Host and, Environmental factors
5. To detect changes in health care practice

Link to Public Health Action

1. Investigation and control
2. Planning prevention programs
3. Evaluating prevention and control measures
4. Generating hypotheses and stimulating public health research

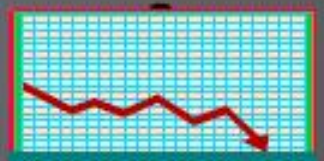
Information Loop of Public Health Surveillance

(involving health care providers, public health agencies, and the public)

Public

Health Care Providers

Health Agencie

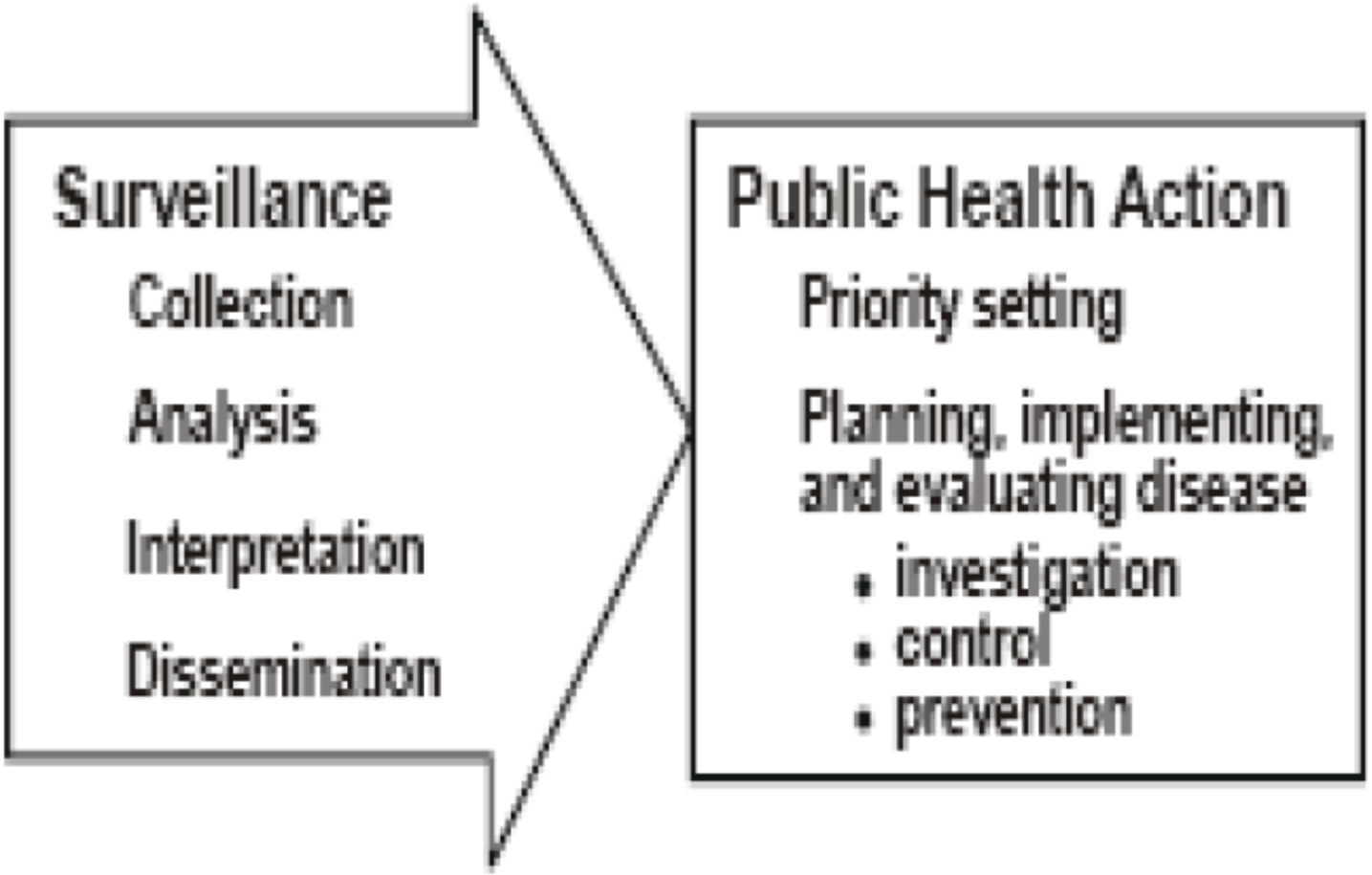


Analysis

Report s

Summaries, Interpretations, Recommendation s

The components of surveillance and resulting public health action



Collection of Data

Passive Data collection

- Mortality reports
- Morbidity reports
- Epidemic reports
- Laboratory data
- Demographic data
- Environmental data
- Special surveys (e.g. Hospital admission)
- Report of individual case investigations

Analysis of Data

- To Know the specific pattern of disease occurrence
- Descriptive analysis : Time, person, place
- Analytic analysis:
- Case- control study
- Cohort study

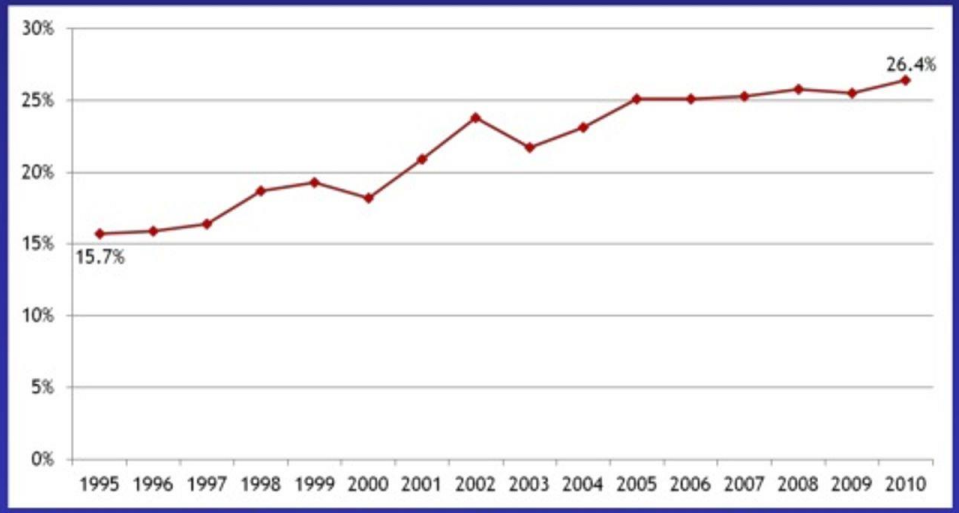
Interpretation of Data

- When surveillance for disease shows a pattern different than expected for population during a particular time and place, further investigation is needed.

Uses of Surveillance Data: Estimates of a Health Problem

- Quantitative estimates of the magnitude of a health problem
  - including sudden or long-term changes in trends, patterns

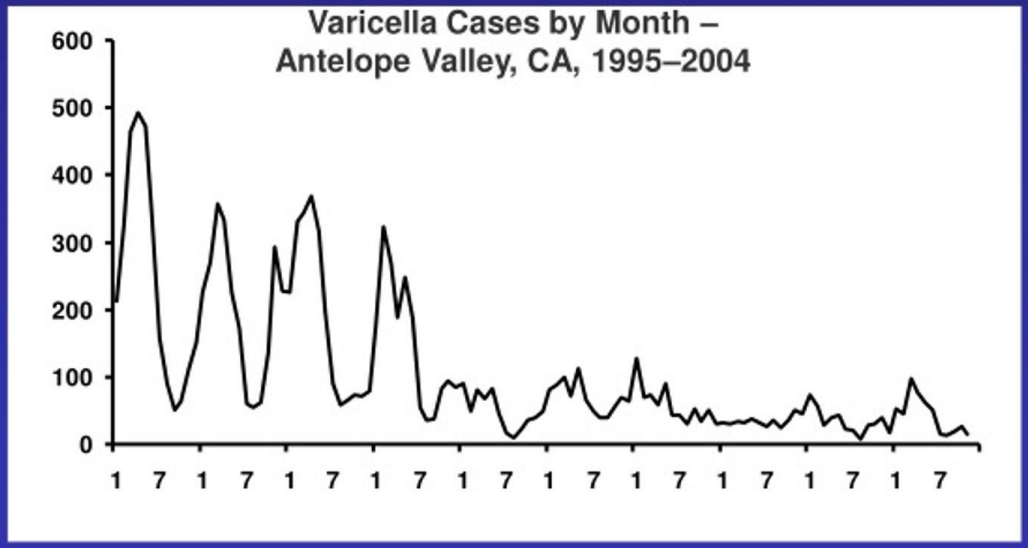
Percent of Adults Who Are Obese (BMI ≥30), Virginia, 1995-2010



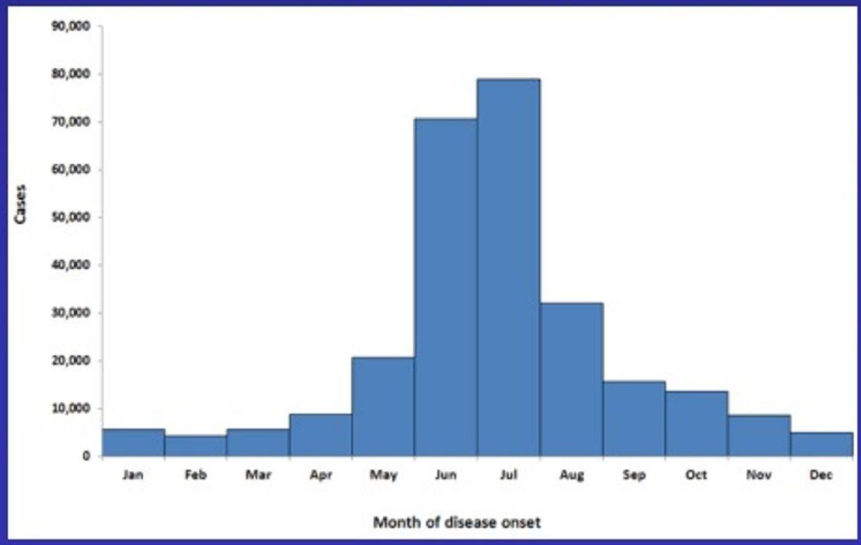
Source: Virginia Behavioral Risk Factor Surveillance System (BRFSS)

Uses of Surveillance Data: Natural History of Disease

- Portrayal of the natural history of disease (clinical spectrum, epidemiology)

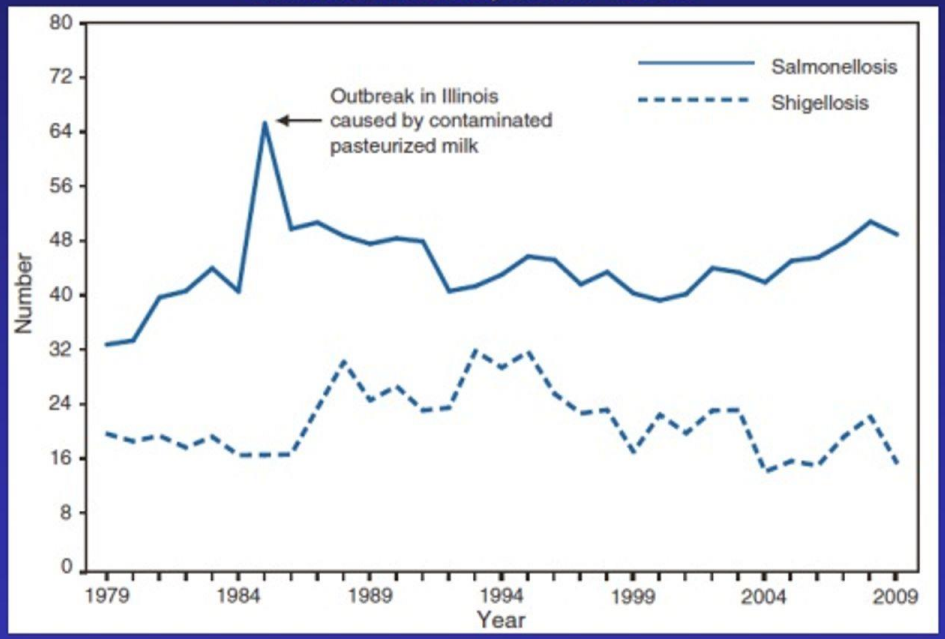


Confirmed Lyme disease cases, by month of disease onset, United States, 2001-2010



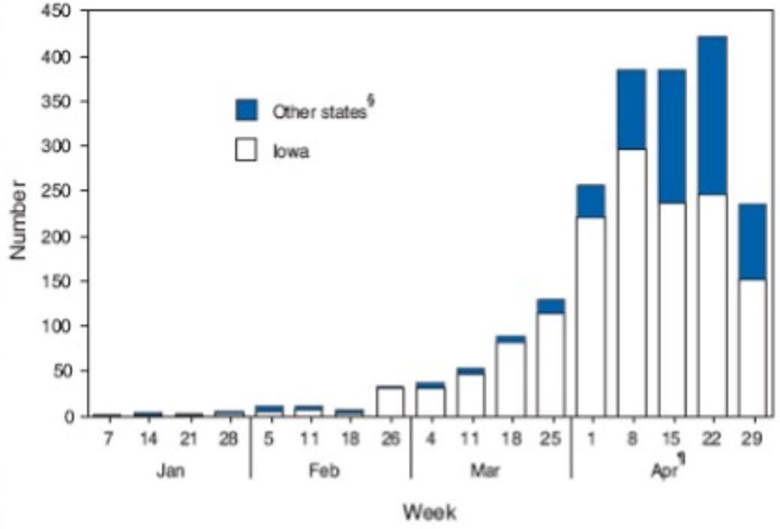
Uses of Surveillance Data: Detection of Epidemics

SALMONELLOSIS and SHIGELLOSIS
Number* of reported cases, by year
United States, 1979-2009



*In thousands
Slide from CDC 2009 Annual Summary

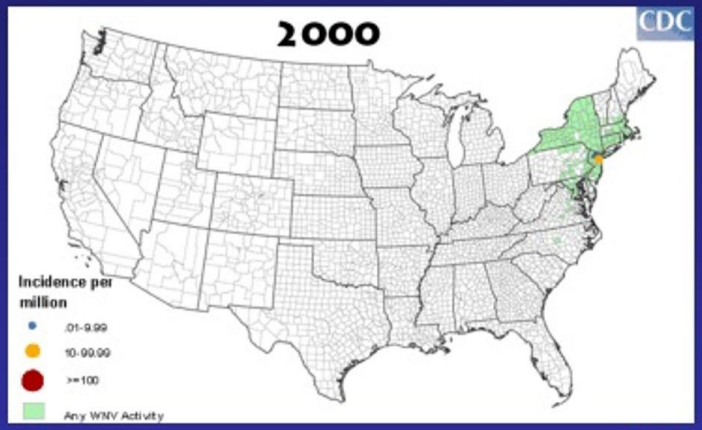
FIGURE 3. Number* of reported mumps cases linked to multistate outbreak, by week of onset† — United States, January 1– May 2, 2006

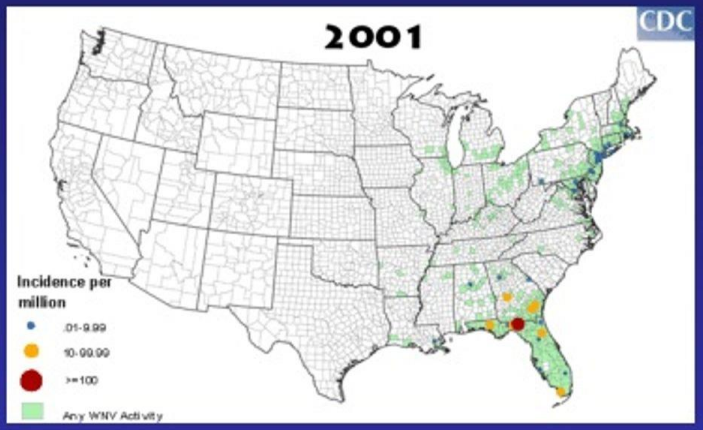


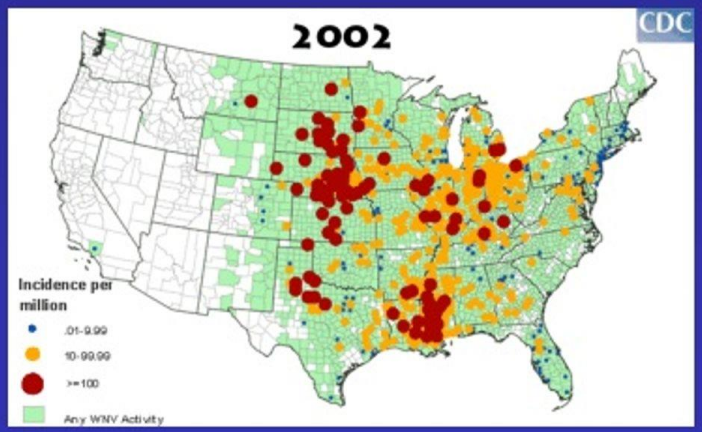
* n = 2,073.
† Week of symptom onset for 1,880 (91%) cases, week of laboratory diagnosis for 131 (6%), week of report for 50 (2%), week of diagnosis for 11 (<1%), and category unknown for one (<1%).
§ Colorado, Illinois, Kansas, Minnesota, Mississippi, Missouri, Nebraska, Pennsylvania, South Dakota, and Wisconsin.
¶ Data for April are preliminary.

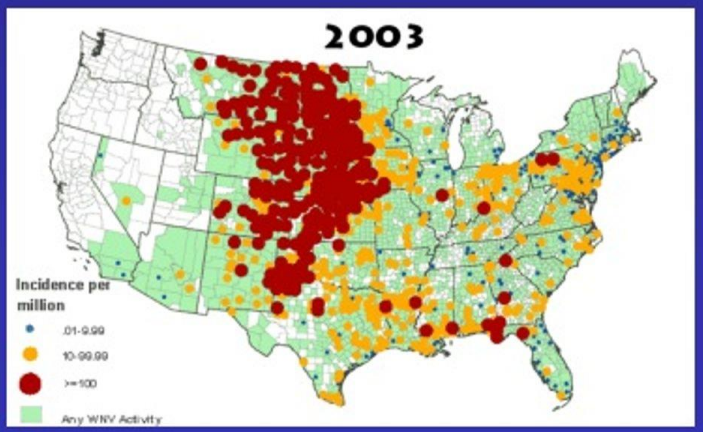
Uses of Surveillance Data: Distribution & Spread of a Health Event

- West Nile Virus in the US, 2000-2003



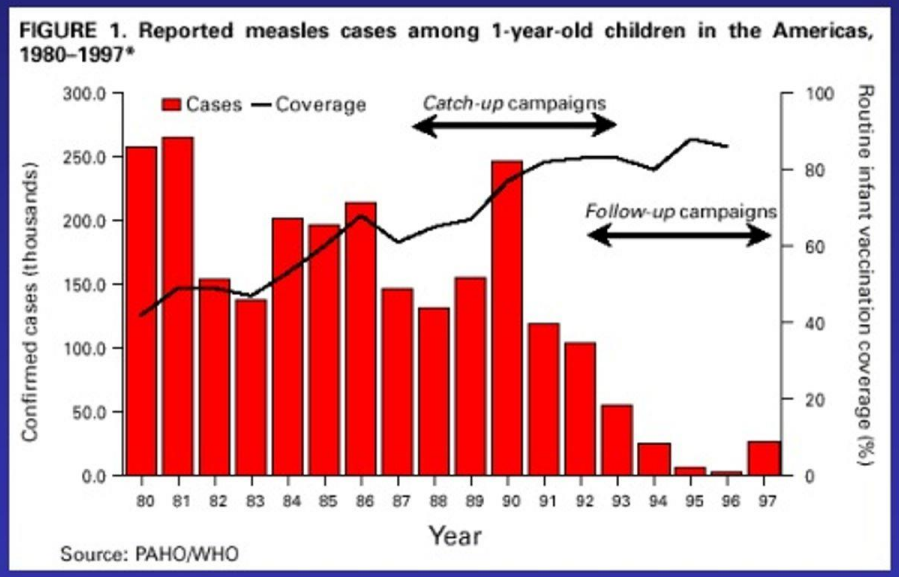


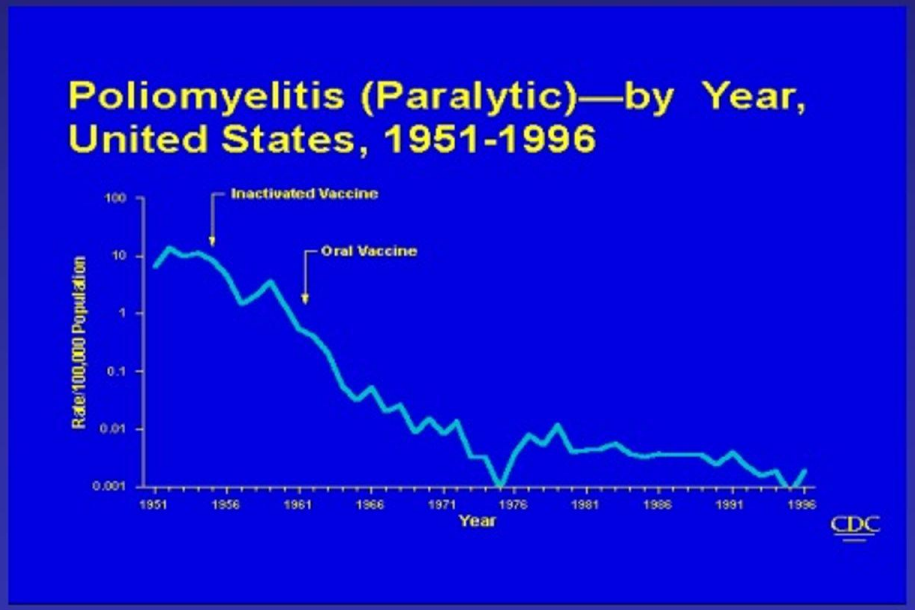




Uses of Surveillance Data: Evaluating Control & Prevention Measures

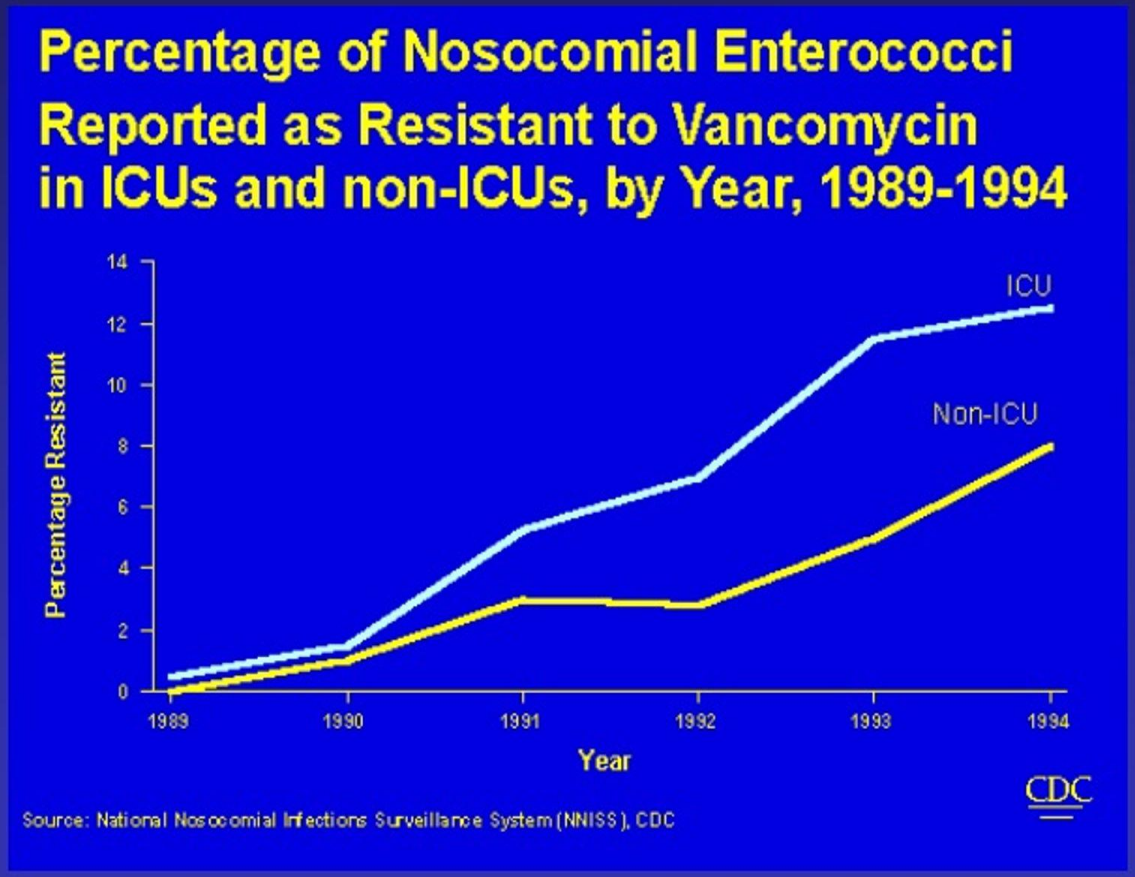
Effectiveness of vaccine introduction





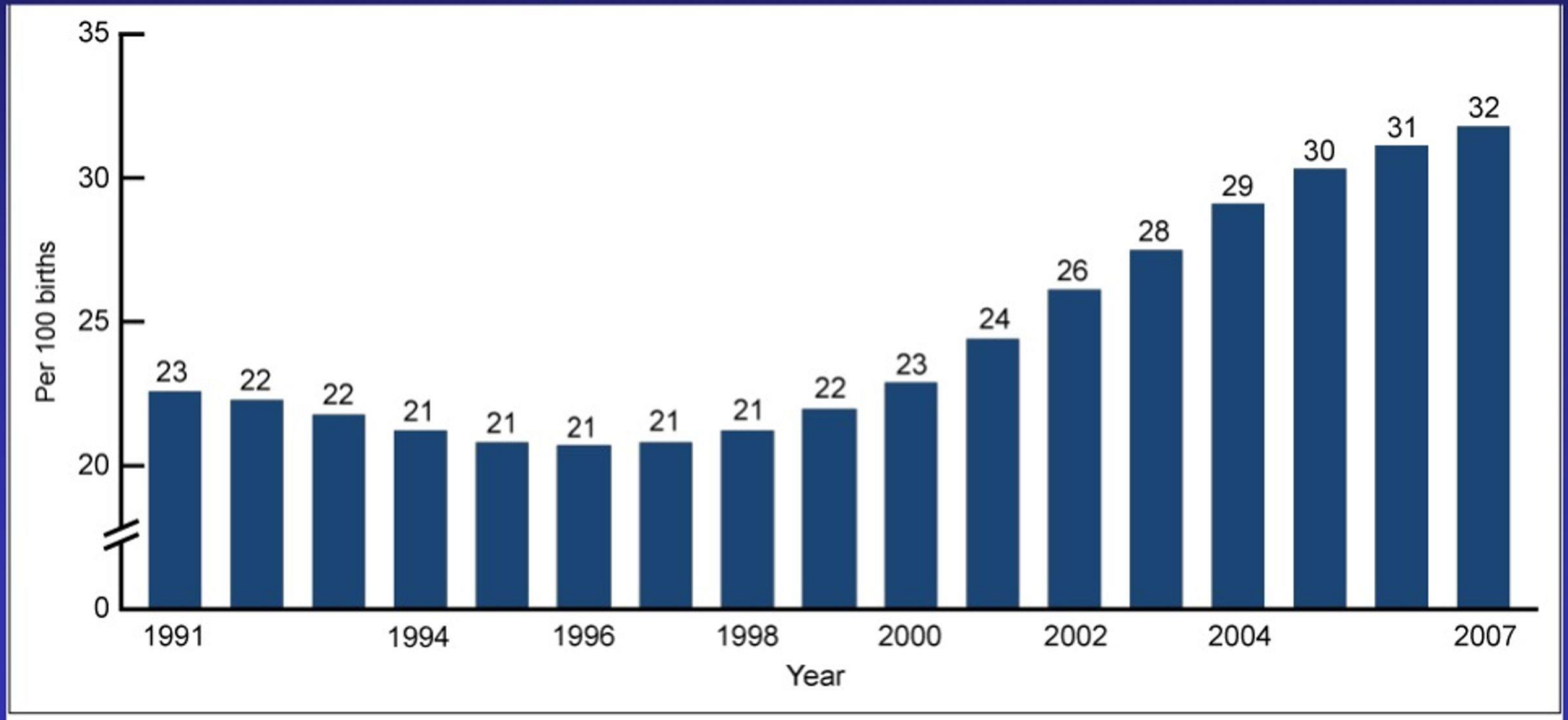
Uses of Surveillance Data: Monitoring Changes

- Monitoring changes in infectious agents and host factors



Uses of Surveillance Data: Detecting Changes in Health Practice

Cesarean delivery rates: United States, 1991-2007

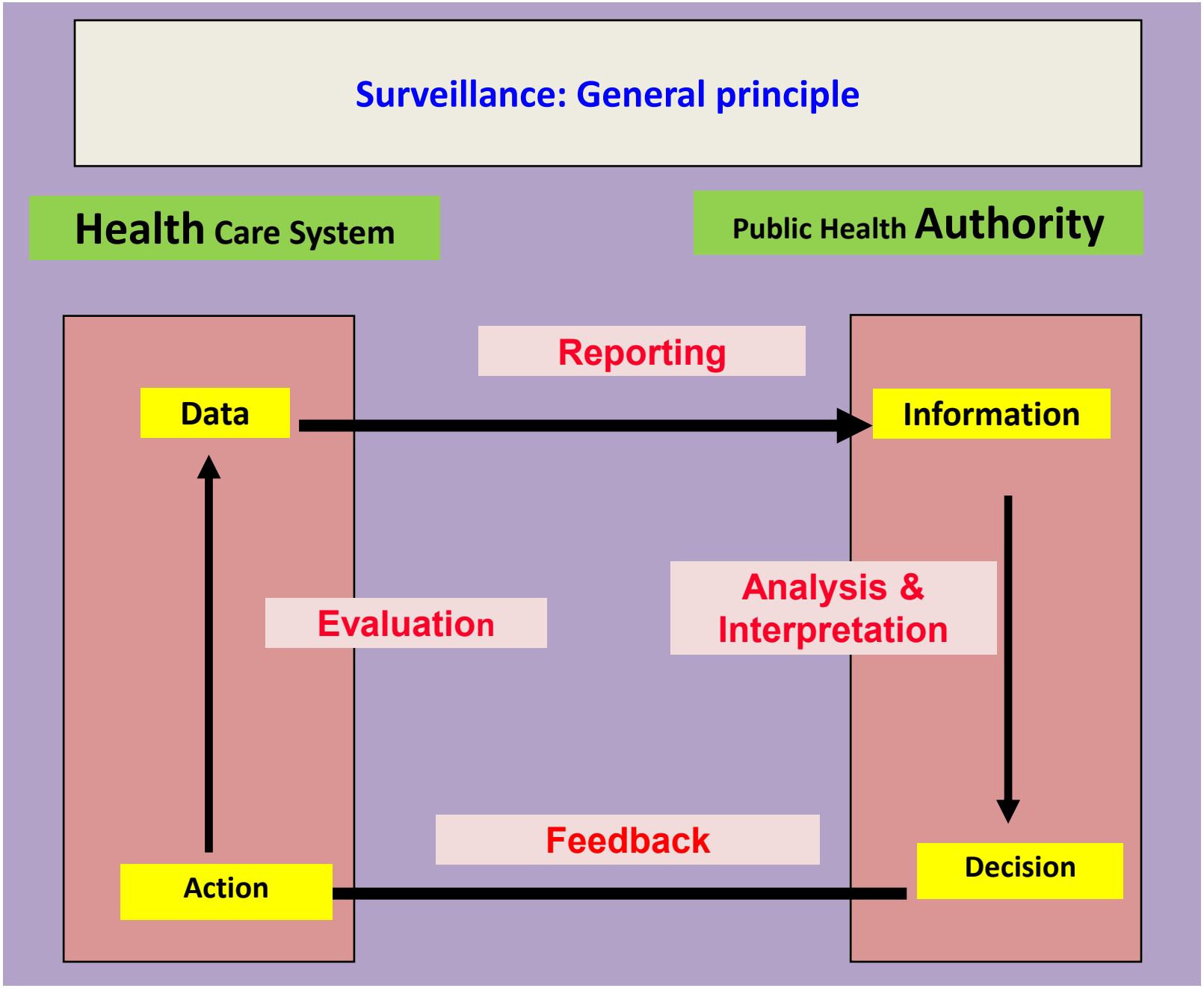


SOURCE: CDC/NCHS, National Vital Statistics System.

Dissemination of data

- To policy makers & administrators for action
- To media to avoid misinformation & misunderstanding

Surveillance: General principle



Types of Surveillance

Types Of Surveillance

- **Routine Surveillance**
- **Sentinel Surveillance**
- **Special studies**

Routine Surveillance

- Routine surveillance is national population-based surveillance.
- Data are collected on all identified cases by all possible sources.
- Data collection forms are completed by reporting sources and sent to higher levels according to a predetermined time and method of communication

Sentinel Surveillance

- In many developing countries, where it is not feasible for health authorities to use national population-based surveillance, sentinel surveillance provides a practical alternative.
- Under this strategy, health officials define homogeneous population subgroups and regions to be sampled.
- They then identify institutions that serve the population subgroups of interest to report the specific disease.
- Data from these institutions are used to provide estimates of the disease under surveillance or to conduct additional investigation.

1. **Passive (Routine reporting system)**

Hospitals, health centers, health facilities.

Reporting is governed by existing local rules.

Advantages:

- Inexpensive.
- Standardized.
- Good for monitoring large numbers of typical health events

Disadvantages:

- Under-reporting is a problem
- Incomplete data
- Busy doctors & nurses

2-Active (Sentinel reporting system):

Collection of data on a specific disease for a relatively limited period of time.

By selected health units, certain physicians,…

Advantages:

- More consistent pictures.
- Motivated.

Disadvantages:

- Not representative
- Active surveillance is relatively expensive practice.

- It is usually limited to disease elimination programs and to short-term intensive investigation and control activities, or to seasonal problems, (e.g. Influenza, arboviruses).

Special studies

- Cross-sectional Serveys or cohort Studies are often used to define prevalence or incidence of selected diseases in a population.
- These studies are particularly useful for diseases that may have asymptomatic clinical presentation such as acute hepatitis C virus infection.

Communicable Diseases under Surveillance in Egypt

Prioritization is done according:

- Public health importance of the disease including morbidity, mortality, and the potential to cause public health concern;
- The existence of effective and feasible preventive measures;
- The epidemic potential of the disease.
- The existence of international or regional targets of eradication, elimination or control.

Recommended Frequency of Notifiable Diseases Reporting

They are grouped according to the timing of reporting and the need for public health action.

- **Group A** diseases are conditions which require prompt public health action and should be **immediately reported** by phone or fax.
- **Group B** are diseases with epidemic potential that require more in-depth investigation and monitoring, **require weekly notification**
- **Group C** diseases are reported on a **monthly basis.**

	Group A	**ICD-10**
	Immediate Reporting Required	**Classification**
1	Meningitis	G00-A39-A87
2	Acute Flaccid Paralysis/Poliomyelitis	A80
3	HIV/AIDS	B20-B24
4	Rabies/Animal Bite	A82
5	Diphtheria	A36
6	Malaria	B50-B54
7	Plague	A20
8	Tetanus (Neonatal)	A33
9	Acute Food Poisoning	A05
	Unusual Severe Health Events:	
10	• Viral Hemorrhagic Fever	A91
11	□	*A92.4*
12	• Botulism	*A0-05.1*
13	• Cholera	A00
14	• Others	

	Group B	ICD-10
	Weekly Reporting Required	**Classification**
1	Typhoid	A01
2	Brucellosis	A23
3	TB	A15-A19
4	Measles	B05
5	Pertussis	A37.0-A37.1
6	Bloody diarrhea (dysentery)	A03

	Group C	ICD-10
	Monthly Reporting Required	**Classification**
1	Viral Hepatitis	B15-B19
2	Mumps	B26
3	Rubella	B06
4	Shistosomiasis	B65
5	Leprosy	A30
6	Fasciola	B66.3
7	Falaria	B74.0-B74.1-B74.2

Creating case definitions

There are two components that should be included in case definitions:

1. Clinical and/or laboratory criteria to assess if an individual has the illness of interest

- The clinical features should **be significant** or **signs of the illness** that are simple to measure and objective.
- **If the pathogen causing illness is known**, then the appropriate laboratory criteria (e.g., pathogen type, subtype) should be included.

2. Restrictions by person, place, and time

Definition of Terms Used in Case Classification Of Communicable Diseases under Surveillance

Case definitions should be

- Simple / Clear
- Adapted to
  - ✓ Staff qualification
  - ✓ Available diagnostic
- Stable
- Standardized
- Available at all reporting levels
  - ✓ Health posts / health centres
  - ✓ Hospitals
  - ✓ Laboratories

- **Case:** A person who meets the case definition.
- **Case definition:** A set of diagnostic criteria that must be fulfilled to be regarded as a case of a particular disease. Case definitions can be based on clinical criteria, laboratory criteria, or a combination of the two.
- **Suspect Case:** A case that is classified as suspected, usually on clinical basis for reporting purposes.

- **Probable Case:** A case that is classified as probable on clinical plus either epidemiological or laboratory basis for reporting purposes
- **Confirmed Case:** A case that is classified usually on laboratory basis as confirmed for reporting purposes. Exception under individual diseases

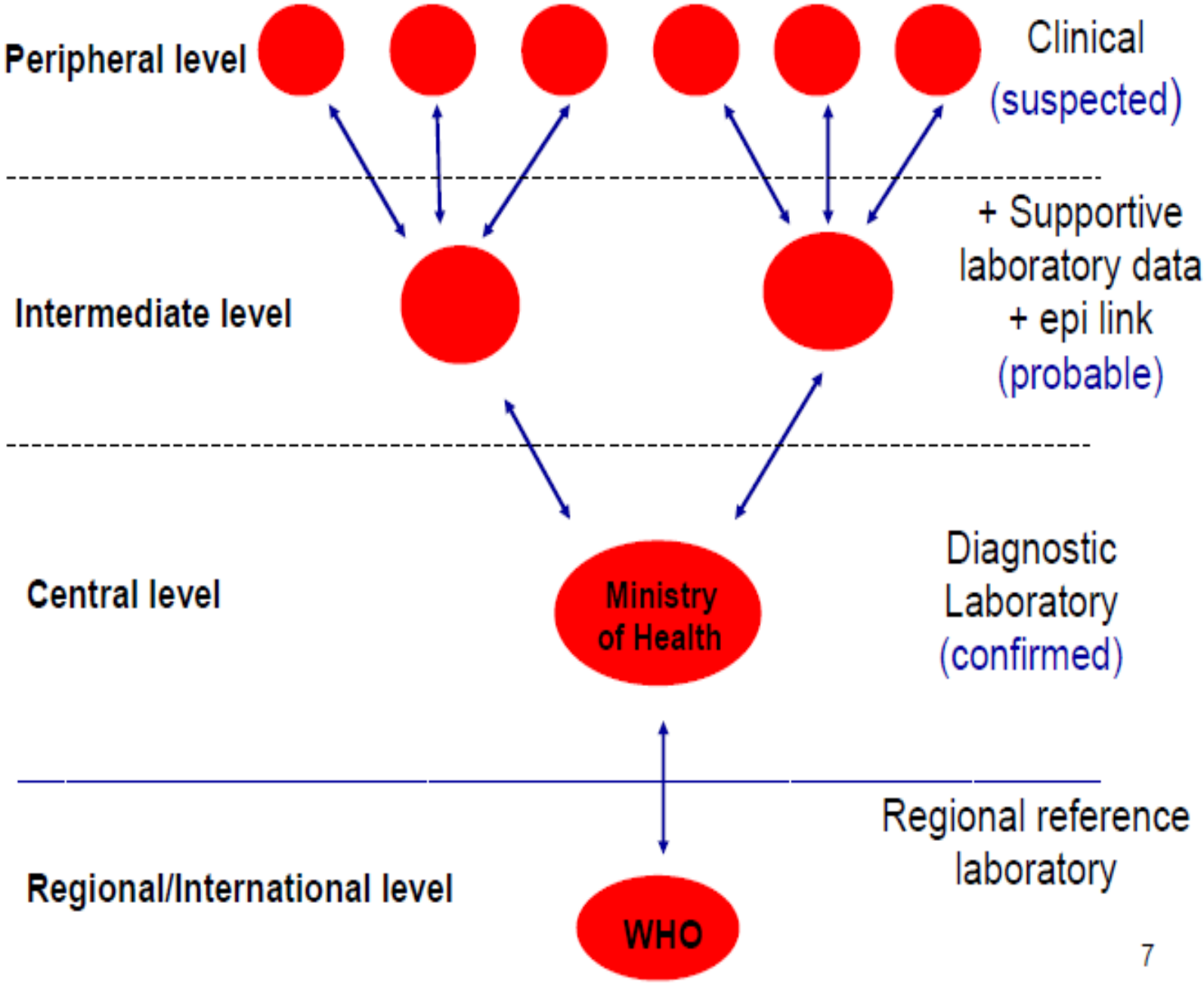
Levels

- **Suspected case**
  - ✓ Clinical signs and symptoms
  - ✓ No laboratory evidence
- **Probable case**
  - ✓ Suspect case + supportive lab (eg: single high titre)
  - ✓ Suspect case + epi link (eg: contact with confirmed case)
- **Confirmed case**
  - ✓ Laboratory evidence
- **Cholera**
  - ✓ Suspected: Acute watery diarrhoea
  - ✓ Confirmed: Isolation of *Vibrio cholerae*

Case definition categories

Case category	General features
Confirmed	Laboratory confirmation of agent
Probable	**Typical clinical features of illness AND Partial laboratory results (confirmation pending) OR Epidemiologic link to a laboratory-confirmed case**
Suspect	Typical clinical features of illness AND Missing laboratory and epi information

- **Primary cases** are directly exposed to the outbreak source, while **secondary cases** are defined as individuals who contracted the illness through exposure to a primary case, rather than the outbreak source itself


Peripheral level
Clinical
(suspected)
+ Supportive
laboratory data
+ epi link
(probable)
Intermediate level
Central level
Ministry
of Health
Diagnostic
Laboratory
(confirmed)
Regional reference
laboratory
Regional/International level
WHO

Limitation of Surveillance system

1-Underreporting

- Unaware of responsibility
- Lack of knowledge
- Lack of incentive
- Lack of feedback

2- Lack of representativeness

- Severe illness more commonly:
- Seek medical care
- Hospitalized
- Reported
- Influence of media

3- Lack of timeliness

- Disease dependent
- Reporting procedure

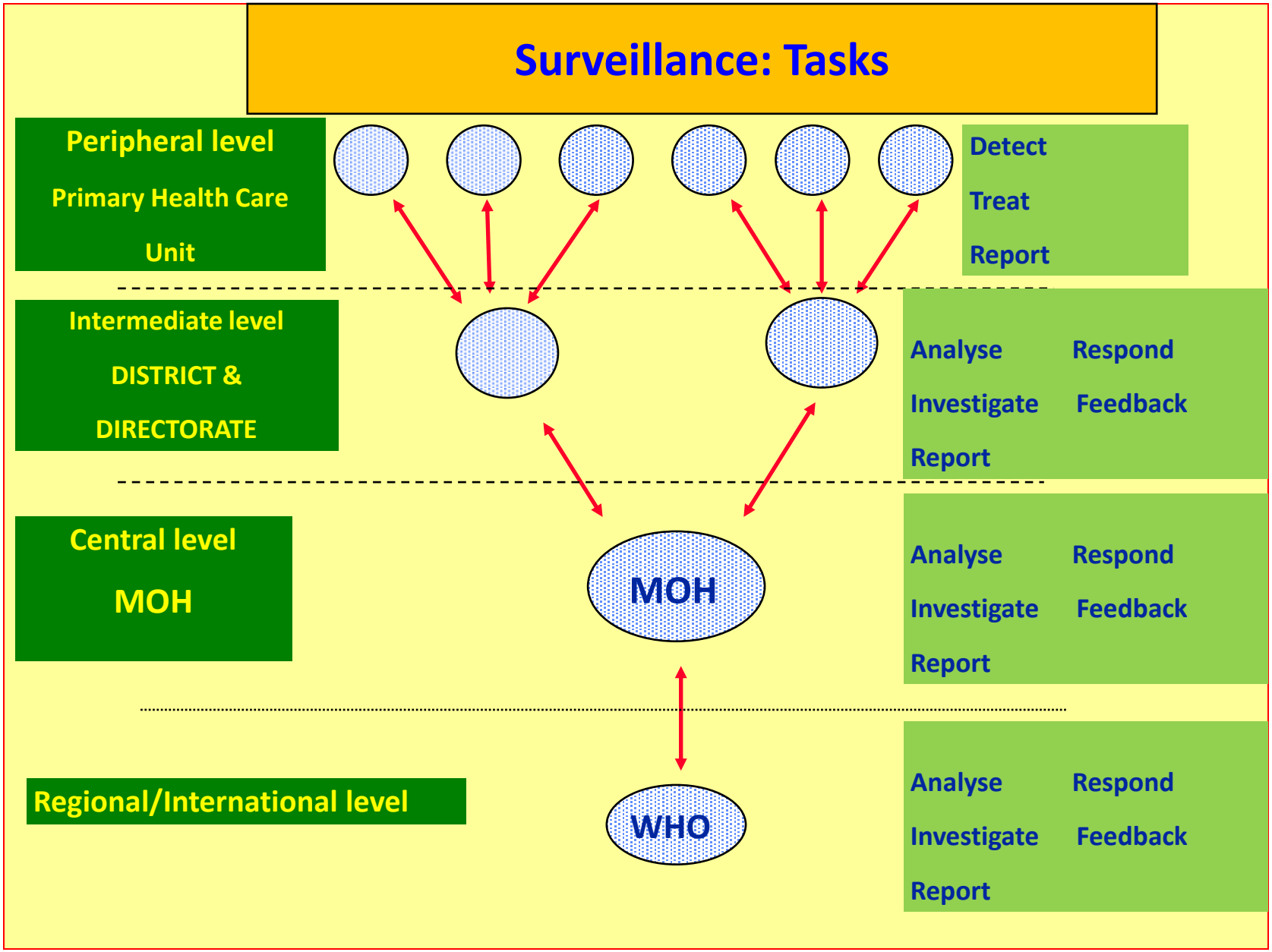
4- Inconsistency of case definition

- Vary by time & place
- Standard case definition

How to Improve a Surveillance System?

- Improve awareness of practitioners
- Simplify reporting
- Frequent feedback
- Active surveillance

Surveillance: Tasks



Thank you