

2nd lecture:

TERMINOLOGY IN PUBLIC HEALTH

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OBJECTIVES OF THE LECTURE

By the end of this lecture students will be able to:

- Explain common definitions and terminology used in public health
- Apply these definitions in different situations.



Epidemiology

- Epidemiology is often described as the *basic science* of public health.
- The word epidemiology is of latin origin:
 - *Epi*: on or upon
 - *Demos*: people or population
 - *Logos*: study of
- *Epidemiology is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems. (not necessarily diseases).*

(Last JM, editor. Dictionary of epidemiology. 4th ed. New York: Oxford University Press; 2001. p. 61.)

Epidemiology is the study of:

- **Distribution**: pattern, rates: high or low, age groups
- And **Determinants**: contributors (both the risk factors and direct causes) that help cause the problem but not exclusively the direct causes. Example: low socioeconomic class, smoking, being exposed to certain chemicals.
- Of disease/health-related events and application of this study
- To **prevent** and **control** health problems. The main goal is prevention and control.

In a specific population we study the distribution and the determinants of any health related event/state/condition to be able to control it and limit it.

Health:

A state of complete physical, mental, and social well-being and not merely (not only) the absence of disease or infirmity (weakness). (WHO1948)

Example: A person who is physically and mentally well but is not social and doesn't have good relationships is not a completely healthy person.

Morbidity:

Any departure (deviation), subjective or objective, from a state of physiological or psychological well-being.

(Any change whether sensible or not).

Health # morbidity

Infection:

It is the **entry**, development and multiplication of an infectious agent in the body of man or animal.

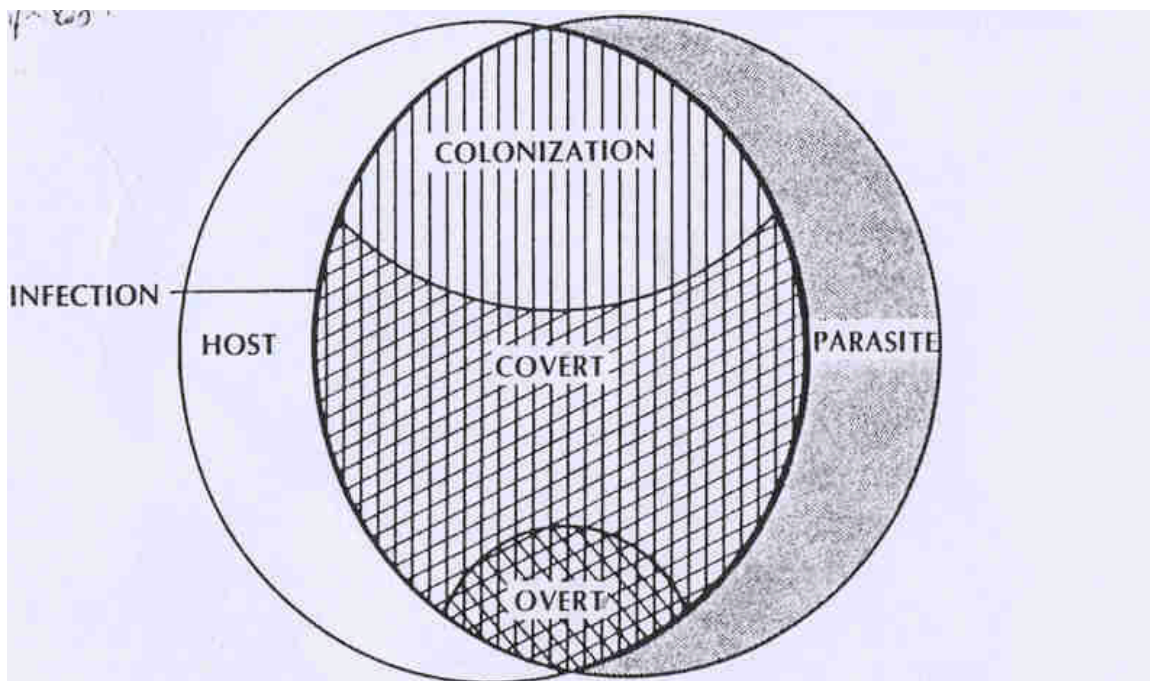
The result of infection may be inapparent or manifested. (if manifested it is called infectious disease).

- **Infectious disease**

A clinically manifested disease of man or animal resulting from infection.

- **Inapparent infection**

It is the presence of an infection in a host without the occurrence of recognizable clinical signs or symptoms. (subclinical which means that the infection is there, if the blood is tested for the infectious organism it will be present but without causing any signs or symptoms).



3 Venn Diagram illustrating several types of host-parasite interaction. (Adapted

This diagram shows the 3 possible outcomes of the interaction of any type of parasite with a host.

- 1- **Colonization:** the organism only colonized in the host body not causing an infection
- 2- **Covert:** subclinical infection (covered infection).
- 3- **Overt:** overt means apparent, here the infection is manifested; there are obvious signs and symptoms.

Diseases can be divided into 2 main types, **communicable** and **non-communicable** diseases.

Communicable Disease

Is an illness due to a **specific** infectious agent or its **toxic products** that arises through transmission of that agent from reservoir to susceptible host. (each infection has a transmission mode, can be through human or animal(zoonotic)).

Examples on Communicable Disease: respiratory tract infections, measles, hepatitis, HIV (through blood, sexual or parental transmission)... Here a specific organism can be found in the blood of the infected person

Non- Communicable Disease

There is no specific infectious agent that is found in the blood, and there is no mode of transmission from one person to another, the patient can't infect anyone else with the same disease.

Examples on Non- Communicable Disease: cancer, diabetes...

We have different patterns/distributions of disease: endemic, epidemic, pandemic, outbreak, sporadic

1- Endemic Disease

The **constant** presence of a disease or infectious agent within a given geographic area or population group; may also refer to the **usual** prevalence of a given disease within such area or group.

e.g. Bilharziasis in Egypt since pharaohs. Malaria in KSA in Jazan and Jeddah; yellow fever...

2- Epidemic Disease

Epidemic disease is the occurrence of **more** cases of a disease than **expected** in a given area or among a specific group of people over a particular period of time.

- It is an endemic with increase in number of cases over a specific period of time which is usually annual; example: the increase in Seasonal variation is not considered an epidemic; seasonal problems such as diarrheal diseases which usually increase in summer. You cannot compare summer with winter. Respiratory infections increase in winter, thus to check if there is an epidemic (increase) we compare the same time of every year such as the number of cases from January 2011 to January 2012. Example, instead of 10 cases we have 100 cases.
- Another type of epidemic is the occurrence of new cases in an area which was free from that specific disease.

3- Pandemic Disease

A pandemic is an epidemic which occurs over a very wide area (several countries or **continents**) at the same time and usually affects a large proportion of the population.

e.g. Influenza A H1N1 in 2009 (in 2009 it was a pandemic as it suddenly spread to several countries and reached different continents in a short period of time, but any other cases that occur randomly at other times are not considered a pandemic).

4- Outbreak

An outbreak is a more or less **localized** epidemic affecting a **large** number in a specific group in the community. (Such as epidemics except in localized areas)

Example: outbreak of food poisoning in an institution.

5- Sporadic: عشوائي

Cases occur irregularly, haphazardly from time to time and generally **infrequently**.

Cases are few and ***separated widely in space and time*** showing no connection to each other.

Ex: a case of measles in Riyadh, and then after a couple of months another case was diagnosed in Jeddah, both are the same disease but they are not possibly related as the virus cannot be incubated for that long; they are separated both in time and space thus those are called sporadic cases..

We can differentiate the type of infection based on the place of infection (hospital or community).

Nosocomial infection

(Hospital-acquired infection)

An infection originating in a medical facility; e.g., occurring when a patient is in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. (inpatient or outpatient)

Example: a patient gets admitted, goes into surgery and after surgery sepsis occurs, and the wound gets infected.

Example: if a person gets an infection after visiting a medical facility in a couple of days it is not hospital acquired, it is community acquired.

Agent

A factor, such as a microorganism, chemical substance, or form of radiation, whose presence, excessive presence (example: hypervitaminosis) or (in deficiency diseases) relative absence is essential for the occurrence of a disease or health problem.

- The agent does not have to be a microorganism.
- Example in anemia there is deficiency in hemoglobin (iron). Other examples such as excess in vitamins or radiation can be harmful.

Pathogenicity

The ability of an agent to cause disease after infection, measured as the proportion of persons infected by an agent who then experience **clinical** disease.

There must be an agent that causes the clinical condition (signs and symptoms). Each agent has a different ability of manifesting the disease after infecting the host, thus the pathogenicity measures that ability as a percentage or a ratio of the number of people who manifested the disease and those who didn't. "Clinical: Subclinical ratio"

Examples: - If 100 kids were infected by the measles virus, almost all of them will manifest the disease, thus Measles pathogenicity is almost 100%. Chicken pox also has almost 100% pathogenicity.

While in TB almost only 30% would have symptoms therefore the TB pathogenicity is approximately 30%.

Hepatitis B not all patients have jaundice..

Virulence

Virulence is the ability of an infectious agent to cause **severe** disease; it is measured as the proportion of persons with the disease who become severely ill or die.

High virulence means high severity, low virulence means low severity.

Case fatality rate: number of cases and how many died. Example in plague almost 80% die, while persons affected with common cold rarely ever die thus plague is of virulence while common cold is of low virulence. Rabies which is an animal virus kills every human being it enters, as there is not yet any sort of cure for it, so it has very high virulence.

Reservoir of infection

The reservoir of an agent is the habitat in which an infectious agent normally lives, grows, and multiplies .

Reservoirs include:

Humans, animals, or the environment. (any human or animal or environment that can harbor the agent where it can normally live and multiply without hurting the reservoir; the reservoir can be a carrier of the infection but does not manifest the disease.

A disease that has an animal reservoir is called a **Zoonotic disease**. (under natural conditions).

The normal flora of the gastrointestinal tract of a horse is the clostridium tetani which does not cause tetanus in animals but causes tetanus in humans when wounded.

Some animals can only be reservoirs or carriers of specific diseases such as bats (rabies).

Zoonosis:

An infection or infectious disease that is transmissible under natural conditions from **vertebrate** animals to humans. (vertebrate animals such as cats, rats, bats, camels, cows, sheep, pigs.. not insects, insects are usually just vectors(وسيط))

Zoonotic diseases include:

brucellosis (cows and pigs), (through blood or unpasteurized milk)

anthrax (sheep), (causes skin diseases or GIT problem)

plague (rodents),

rabies (dogs, bats and other mammals).

Carrier

A person or animal that harbors the infectious agent for a disease and can transmit it to others, but does not demonstrate signs of the disease. (a reservoir, or a person that has the pathogen but has no signs and symptoms; he has the agent and can transmitted it. Example a typhoid carrier would show no symptoms but if you check for the microb in his body it will be positive.

Communicable

It is the time during which an infectious agent may be transmitted directly or indirectly from an infected person to another person or animal.

Example : measles is very communicable(can be transmitted) in the first 4 or 5 days and then it stops being communicable.

Incubation period

The time interval from **exposure** to an infectious agent to the **onset** of symptoms of an infectious disease.

Pre-patent period

It is the period in people between **time of exposure** to a **parasite** and the time when the parasite can be **detected** in blood or stool. It is equivalent to the incubation period of microbial infections

Pre-patent period is in relation with parasites.

Host

A person or other living organism that are susceptible to (can be infected by) an infectious agent under natural conditions.

Risk Factor:

An aspect of personal behavior or lifestyle, an environmental exposure, or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, injury, or other health condition.

Chemoprophylaxis:

It is the administration of a chemical, including antibiotics, **to prevent** the development of an infection or **to slow progression** of the disease to a clinically manifest form.

Chemotherapy:

It is the use of a chemical **to treat** a clinically recognizable disease or to limit its further progress. (Example: chemotherapy is given to someone that has meningitis).

Reference book & page number for the lecture resource

1. Last JM, editor. Dictionary of epidemiology. 4th ed. New York: Oxford University Press; 2001
2. Principles of EPIDEMIOLOGY in Public Health Practice *Third Edition* An Introduction to Applied Epidemiology and Biostatistics. Centers for Disease Control and Prevention (CDC) Glossary pages;1-23