

## Epidemiology of Communicable Diseases

### Definitions and introduction

**Incubation period:** The time interval between invasion by an infectious agent and the appearance of first sign or symptom of the disease. It is very useful in:

- Retrospective tracing of source of infection
- Following up contacts to determine whether they are infected or not.

**Latent period:** The period between exposure and the onset of infectiousness (this may be shorter or longer than the incubation period)

**Period of communicability (infectivity period):** It is the period of time during which an infected host is capable of transmitting the infective agent.

**Reservoir:** Any person, animals, plant, arthropod, soil or inanimate matter in which an infectious agent normally lives and multiplies and serves as a source of infection to others. It is the natural habitat of the infectious agent.

**Contact:** a person or animal that has been in such association with an infected person or contaminated environment and thus has had an opportunity to acquire the infection.

**Communicable disease:** An illness due to specific infectious agent or its toxic products which develops through transmission of that agent or its

toxic products from a reservoir infected person to a susceptible host either directly or indirectly through plant, animal, vector.

Report of a disease: an official report notifying an appropriate authority of occurrence of a specified communicable or other disease in human.

Contagious disease: Is a communicable disease that is transmitted through direct contact. Examples include scabies, trachoma sexually transmitted diseases and leprosy.

Surveillance of disease: in communicable diseases it's the process of systemic collection, analysis, and evaluation of data (morbidity and mortality, isolation, immunity).

Infection: Infection is the entry and development or multiplication of an infectious agent in the body of man or animal.

Infectious disease: A disease of man or animal resulting from an infection. A disease caused by invasion of the body by an infectious agent such as bacteria, fungi or viruses.

Contamination: The presence of an infectious agent on a body surface, on or in cloths, beddings, toys, surgical instruments or dressings, or other articles or substances including water and food.

Infestation: It is the development and reproduction of arthropods on the surface of the body or in the clothing. (lice) This term could be also used to describe the invasion of the gut by parasitic worms.

Nosocomial infection: Nosocomial (hospital – acquired) infection is an infection originating in a patient while in a hospital.

**Opportunistic infection:** This is infection by organisms that make the opportunity provided by a defect in host immunity. For example opportunistic infections are common in AIDS.

**Zoonosis:** Is an infection that is transmitted from vertebrate animals to man.

**Endemic:** It refers to the constant presence of a disease or infectious agent within a given geographical area or population group. It is the usual or expected frequency of disease within a population.

**Epidemic:** The occurrence in a community of disease, specific health related behavior, or other health related events clearly in excess of expected occurrence.

**Sporadic:** The cases occur irregularly, haphazardly from time to time, and generally infrequently. The cases are few and separated widely in time and place that they show no or little connection with each other, nor a reasonable common source of infection e.g: polio, meningitis, tetanus.

**Susceptible:** A person or animal having no resistance against pathogenic agents to prevent disease.

**Carrier:** A person or animal that harbors a specific infectious agent without clinical features and serves as potential source of infection. Carriers may be incubatory, convalescent or chronic.

**Isolation:** Is separation, for the period of communicability, of infected persons or animals from others so as to prevent the direct or indirect transmission of the communicable agent to a susceptible person (host).

**Quarantine:** Restriction of activities for healthy people who has been exposed to a case of communicable diseases during its period of communicability (contacts). Its aim to prevent disease transmission during the incubation period. Two types: absolute quarantine and modified quarantine (partial limitation).

**Mode of transmission:**

The way disease agents are transmitted from the source of infection to new hosts.

The common modes of transmission are:

a. Direct transmission:

- Direct contact (hand shaking, kissing, biting)
- droplet infection ( coughing, sneezing),
- Inoculation into skin as in sexual contact.
- Contact with soil (ascariasis)
- Transplacental or vertical transmission.

b. Indirect transmission:

- *Vehicle-borne transmission:* infectious agent is transmitted within contaminated inanimate materials or objects. Fomite: toys, soiled cloths, food service utensils and surgical instruments. Also

considered vehicles are water, milk, food, and biological products such as blood, serum, plasma, organs and tissues.

- *Vector - borne transmission*: disease transmission by a living organism, such as a mosquito, fly, or tick. The transmission may be:

1- Mechanical: via the contaminated mouth parts or feet of the vector (on insect bodies) e.g: transmission of trachoma by flies, transmission of organisms that cause dysentery, and typhoid fever by flies.

2- Biological: involving multiplication or developmental changes of the agent in the vector before transmission occurs, e.g: transmission of malaria by mosquitoes.

- *Air -borne transmission*: transmission of microbial aerosols to a suitable port of entry, usually the respiratory tract. Microbial aerosols are suspensions of dust or droplet nuclei made up wholly or in part by organisms may be suspended and infective for long period of time. Examples of air -borne diseases include tuberculosis, influenza ....

The general strategies to prevent and control communicable diseases:

1. The elimination of source of infection by effective detection and treatment of cases and carriers or dealing with any other source.

2. Interruption of transmission pathways by, for example, the destruction of intermediate hosts, destruction of breeding sites and purification of water.
3. Improvement of host resistance or immunity against infection as for example by immunization.
4. Combination of all methods.

- Communicable, or infectious diseases, are caused by microorganisms such as bacteria, viruses, parasites and fungi that can be spread, directly or indirectly, from one person to another. Some are transmitted through bites from insects while others are caused by ingesting contaminated food or water. (WHO)
- Mode of transmission:
- Physical contact with an infected person, such as through touch (staphylococcus), sexual intercourse (gonorrhoea, HIV), fecal/oral transmission (hepatitis A), or droplets (influenza, TB)
- Contact with a contaminated surface or object (virus), food (salmonella, E. coli), blood (HIV, hepatitis B), or water (cholera);
- Bites from insects or animals capable of transmitting the disease (mosquito: malaria and yellow fever; flea: plague); and
- Travel through the air, such as tuberculosis or measles.
- Reporting cases:
- Planning and evaluation of disease prevention and control programs.
- Assurance of appropriate medical therapy
- Common-source outbreaks
- Health Risk??
- Communicable diseases are a major cause of mortality and morbidity in disaster situations:

- • Population displacement
- • collapsing health services
- • lack of disease control programmes
- • poor access to health care in urban and/or rural areas
- • malnutrition
- • interrupted supplies and logistics
- • poor coordination among agencies.
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- Communicable diseases classification or grouping:
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- Water-borne diseases
- Vector-borne diseases
- Diseases associated with overcrowding
- Vaccine-preventable diseases
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- Risk management considerations
- Safe water, sanitation, site planning:
- Primary care: at community level is critical for prevention, early diagnosis, and treatment .
- Surveillance/early warning system: to detect outbreaks and monitor priority endemic diseases.

- Immunization: • Mass measles immunization and vitamin A supplementation
- Prevention of malaria and dengue.