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Epidemiology

L I

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Principles of Epidemiology and Epidemiologic Methods or Studies

Epidemiology is derived from the word Epidemic
epi=among,
demos = people,
Logos= study),

many definitions

which is a very old word dating back to the 3rd century B.C

many definitions

There appears to be almost as many definitions of epidemiology as there are authors who have written on the subject, ranging from Hippocrates to those of the present day.

A short list is given below

1. That branch of medical science which treats epidemics (Parkin, 1873).
2. The science of the mass phenomena of infectious diseases (Frost, 1927).
3. The study of disease, any disease, as a mass phenomenon (Greenwood, 1934),
4. The study of the distribution and determinants of disease frequency in man (MacMahon, 1960).

- Epidemiology has been defined by John M. Last in 1988 as:-

"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 problem

Epidemiology:

is the basic science of preventive and social medicine. Although it is an old science , it made only slow progress up to the start of 20th century.

- Epidemiology has evolved rapidly during the past few decades. Modern epidemiology
- Its ramifications cover not only study of disease distribution and causation and thereby prevention , but also **health and health-related events** occurring in human population.

Therefore modern epidemiology

- Modern epidemiology has entered the most exciting phase of its evolution.
- By identifying risk factors of chronic disease,
- evaluating treatment modalities and
- health services

- it has provided new opportunities for
- prevention,
- treatment,
- planning

and

- improving the effectiveness and efficiency of health services

- The current interest of medical sciences in epidemiology has given rise to newer off-shoots(branches) such as

- infectious disease epidemiology
- chronic disease epidemiology
- clinical epidemiology
- serological epidemiology
- cancer epidemiology
- malaria epidemiology
- neuro epidemiology
- genetic epidemiology
- Molecular Epidemiology
- Occupational epidemiology
- psychosocial epidemiology, and so on.

- **This trend is bound to increase in view of the increasing importance given to the pursuit of epidemiological studies**.

- Although there is no single definition to which all epidemiologists subscribe,
- Three components are common to most of them.

First, studies of disease frequency
Second, studies of the distribution and
Third, studies of the determinants.

- Each of these components confers (يمنح)an important message

Epidemiology and clinical medicine

The basic difference between epidemiology and clinical medicine is that :

- in epidemiology, **the unit of study is a** "defined population" or "population at-risk";
- in clinical medicine, the unit of study is a "case" or "cases".

In clinical medicine, the physician is concerned with disease in the individual patient,

- whereas the epidemiologist is concerned with disease patterns in the entire population.
- Epidemiology is thus **concerned with both the sick and healthy**.

- It has been stated that clinicians are interested in cases with the disease, the statistician with the population from which the cases are derived, and
- the epidemiologist is interested in the **relation ship between cases and the population** in the form of a rate
- Jn clinical medicine, the physician seeks a diagnosis from which he derives a prognosis and prescribes specific treatment.
- In epidemiology, an analogous(same)situation exists
- The epidemiologist is confronted(challenge) with relevant data derived from a particular epidemiological study.
- He seeks to identify
- **a particular source of infection,**
- **a mode of spread or**
- **an aetiological factor**
- **in order to determine a future trend and**
- **recommend specific control measures**

- The epidemiologist also **evaluates the outcome of preventive** and therapeutic measures instituted which provides the necessary guidance and feed-back to the health **care administrator** for effective management of public health programmes.
- In clinical medicine, the patient comes to the doctor;
- in epidemiology, **the investigator goes out into the communityto find persons who have the disease or** experience of the **suspected causal factor** in question.
- Clinical medicine is based on **biomedical concepts** with an **ever-increasing concern for refining the technique of diagnosis and treatment at the individual level.**

The subject matter of clinical medicine is easily "perceived" by such techniques as clinical and laboratory examinations including post-mortem reports.

- In contrast, the subject matter of epidemiology is "conceptual" and can only be symbolized in the form of tables and graphs

- Finally, it may be stated that clinical medicine and epidemiology are not antagonistic.
- Both are closely related, co-existent and mutually helpful
- .
- Most epidemiological enquiries(investigations) could never be established without appropriate clinical consideration as to how the disease in question can be identified among individuals comprising the group under scrutiny.

- **Likewise, a knowledge of prevalence, aetiology and prognosis derived from epidemiological research is important to the clinician for the diagnosis and management of individual patients and their families**

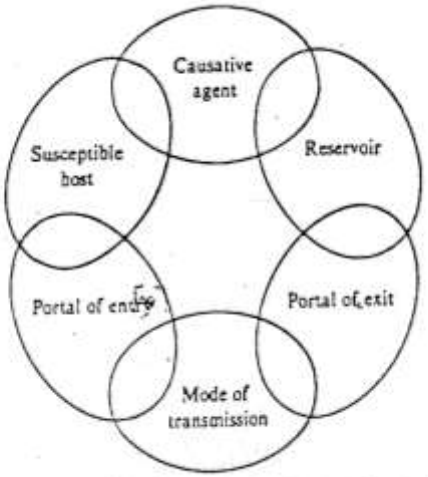
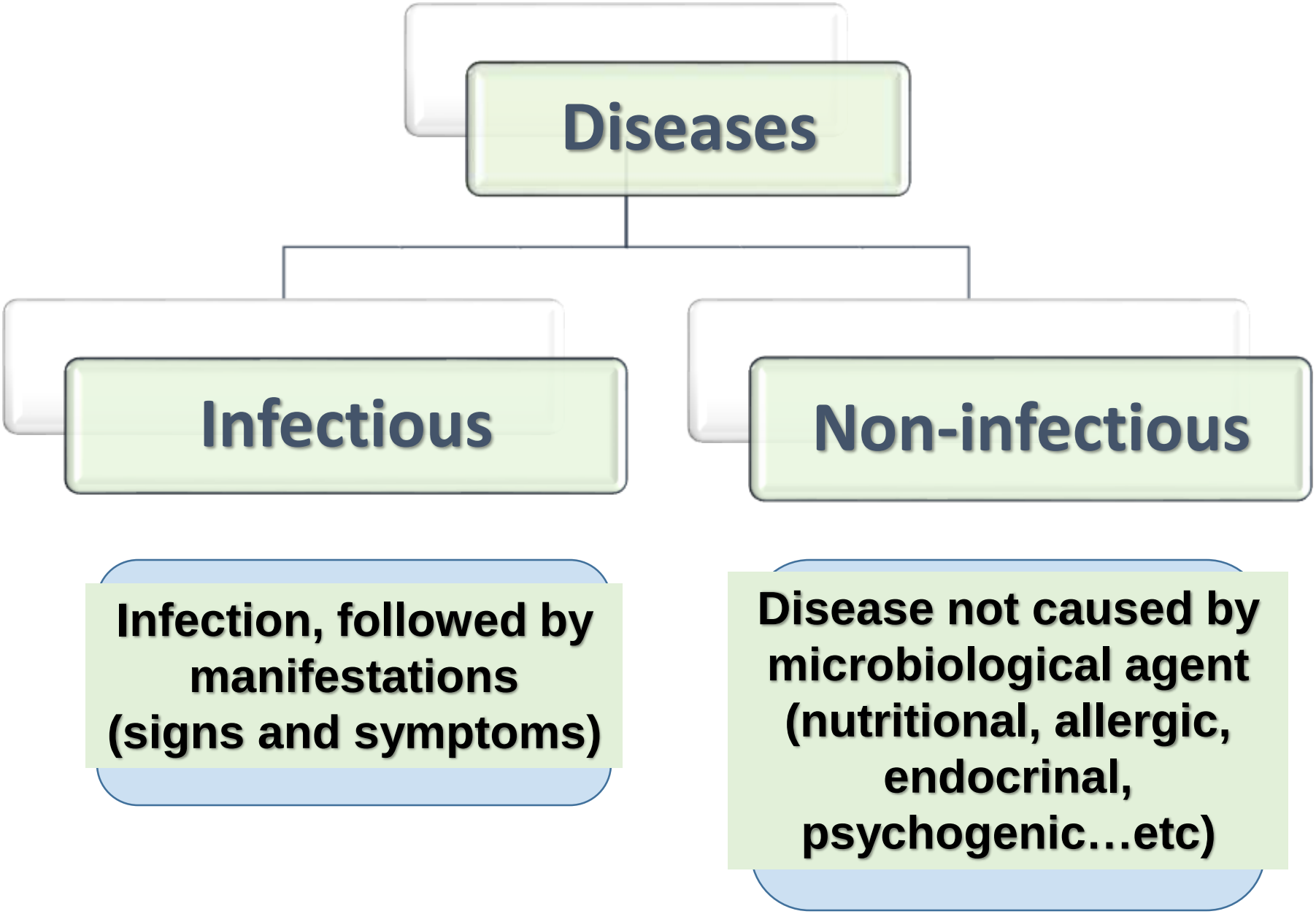


FIGURE 1.2 The chain of infection. Components of the infectious disease process.

Infectious process

Contents

- Definitions related to infectious disease epidemiology
- Requisites for Perpetuation of Communicable Diseases


Diseases
Infectious
Non-infectious
Infection, followed by manifestations (signs and symptoms)
Disease not caused by microbiological agent (nutritional, allergic, endocrinal, psychogenic…etc)

- Infectious disease epidemiology is a fundamental part of the whole of epidemiology.

Studying of communicable diseases??

(a) **by the discovery of "new" infections, and**
(b) changes in the pattern of communicable diseases,
(c) some chronic diseases may have an infective origin.??

- **The development of vaccines and /or antibiotics was not followed, by the virtual (**practical, functional), **disappearance of infectious disease.**

- **Therefore it's prevention and control needs epidemiological knowledge and experience .**

Definitions related to infectious disease epidemiology

- ✓ Health
- ✓ *Infection*
- ✓ Pathogenesis:
- ✓ *Contamination*
- ✓ Infestation
- ✓ Communicable Disease: (CD)
- ✓ Non- Communicable Disease (NCD)
- ✓ Contagious Disease
- ✓ *Host*
- ✓ *Epidemic*
- ✓ "Outbreak *Sporadic*
- ✓ *Endemic*
- ✓ *Pandemic*
- ✓ *Nosocomial Infection*
- ✓ *Opportunistic Infection*
- ✓ *Iatrogenic (Physician-induced) Disease*
- ✓ *Eradication*

Health

Health
Infection
Pathogenesis:
Contamination
Infestation
CD
NCD
Contagious Disease
Host

(WHO definition)

It is the state of complete physical, mental and social well being, and not merely the absence of disease or infirmity. Any deviation from normal health is called Disease

Infection

- **The entry and development and/or multiplication of an infectious agent in the body of man or animals. Also**
- It is the **body responds** to
- **defend itself against the invader, either in the form of an**
  - **immune response** or
  - **disease.**
- **An infection does not always cause illness.**

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The outcome of infection depends on:

1. **Host resistance (immunity)**
2. **Microbiological agent characters (invasiveness, toxicity & Virulence)**

❑ There are several levels of infection :

- **Colonization** (e.g., *S. aureus* in skin and normal nasopharynx)
- **Subclinical** or clinically **inapparent *infection*** (e.g. polio)
- **Latent infection** (e.g. TB)
- **Clinical infection** or manifest

❑ Pathogenesis is:

❖ **End result of agent host interaction:**

- Agent **fails to lodge(**inhabit **)** resulting in ⟹ **No Infection**
- Agent lodges **without causing illness** resulting in ⟹ **subclinical infection** (silent or latent)
- Agent lodges with **frank illness** resulting in ⟹ **Disease**

Thank You

Contamination

- The presence, multiplication and development
- of an infectious agent on a body surface; or an
- inanimate article. clothes, beddings, toys, surgical instruments or water, milk and food.

Infestation

- Lodgement, development and reproduction of arthropods on the surface of the body of persons or animals or in the clothing, e.g., lice, itch mite.
- Also to describe invasion of the gut by parasitic worms, e.g., ascariasis.