



Public Health

Title : Epidemiology

Lec no : 7

Done By : Lama khalaf

وَقُلْ رَبِّ زِدْنِي عِلْمًا

Epidemiology (I) L6



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Learning Objectives

1. Understand the history and the role of epidemiology as a basic science of public health.
2. Develop perspective of disease and other health related events.
3. Understand the different types of epidemiology.
4. Understand the achievements of epidemiology.
5. Study the purpose and use of Epidemiology.

Scope of Epidemiology

Originally, Epidemiology was concerned with investigation & management of *epidemics* of communicable diseases also it concerns about how diseases change from acute to chronic

Lately, Epidemiology was extended to endemic communicable diseases and non-communicable infectious *diseases*

Recently, Epidemiology can be applied to *all* diseases and other health related events

↳ how to keep the population healthy
↳ how to promote health



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Epidemiology International

The term epidemiology is derived from the Greek word epidemic.

– **Epi** means-Among, upon, – **Demos** means study population or people and – **Logos** means scientific study.

• So – it is the scientific **study of the disease pattern** in human population.

– In broad sense, it is the **study of effects of multiple factors** on human health. *rather than the disease (we are concerned about the health of the people)*

– It is multidisciplinary subject involving those of the physician, Biologists, Public Health experts, Health educators etc.

Epidemiology

EPI

DEMO

LOGOS

Upon, on, befall

People, population, man

the Study of

The study of anything that happens to
people

“That which befalls man”

What is epidemiology? it is a synonyms to biostatistics we are always dealing with numbers for ex:-

■ Epidemiology is a discipline that uses **quantitative** methods to study **diseases** and **health** in human populations to **inform** prevention and control efforts. (promote health and prevent health problems.)

■ For example, the **relationship between tobacco use and lung cancer studies** started in the 1950s. also ,how many individuals are having the disease ,how many birth every year and how many individuals having chronic diseases...

■ The finding by John Snow that **the risk of cholera in London was related to the drinking of water** supplied by a particular company provides a well-known example. in 1884 they noticed that certain population are having the same pattern of diarrhea and vomiting
→ Same water source.

Definitions of Epidemiology: what do we mean by frequency of health problem? how many people having the disease,(incidence and prevalence) in order to plan for health programs
It is the study of **frequency**, **distribution**, and **determinants** of diseases and other **health-related conditions** in a human population and the application of this study to **the prevention of disease and promotion of health** causes

Distribution: where, time, and of the ill people
↳ ex: Flu is common in winter , asthma more in spring
gastroenteritis in summer , CO poisoning in winter
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Definition of Epidemiology

□ A quantitative basic science, built on a working knowledge of probability, statistics and sound research methods.

causal association: what is the criteria for the risk factor to be causative..cauz not all risk factors are causative some of them are compounding factors (هي ليست السبب و لكن تواجهها مع غيرها يزيد فرصة المرض)

□ A method of causal reasoning, based on developing and testing biologically plausible hypothesis pertaining to occurrence and prevention of morbidity and mortality.

ملخص: لازم نعرف الcausative risk factor عشان نعمل preventive measures
الفقرة:

□ A tool for public health action to promote and protect the public's health based on science, causal reasoning, and a dose of practical common sense.

لازم نعرف الcausative risk factor و كم ال dose الي لازم اتعرضلها منو عشان يصير معي المرض

Components of the definition

1. **Study:** for any disease we need alot of studies for data gothering and analysis

Epidemiology involves Systematic collection, analysis and interpretation of health-related data.

2. **Frequency:** how many individual are having the disease (incidence and prevalence) so we could plan certain health programs for thses people

Epidemiology studies the number of times a disease occurs.

It answers the question ; **How many ?**
Epidemiology is a quantitative science .

3. **Distribution:** people ,time, place

Epidemiology studies distribution of diseases. It answers the question **who, where and when ?** Epidemiology **describes health events.**

Distribution : refers to analysis of, **times, persons, places and classes of people affected.**

حساسيه الزيتون بشهر 1-10
2-falls among elderly people in winter, early in the hypotension and hypoglycemia and at night due

Epidemiology: Definition

Dynamic study of the

Determinants

Occurrence

Distribution

Control

Pattern

Of health and disease in a population

breast cancer is common in women
prostate cancer for anatomical and biological reasons in men

1-Malaria in Africa
2-Tb in low social class areas
3-Schistosoma in Egypt
4-Hypert in mountain areas



→ causes and how to prevent them

4. **Determinants:** include factors that influence health; biological, chemical, physical, social, cultural, economic, genetic and behavioural. **Environmental** ex: high temperatures causes alot of heat strokes

CO poisoning in winter
medical ال أمراض التي تمنع المرأة من ال
consultation

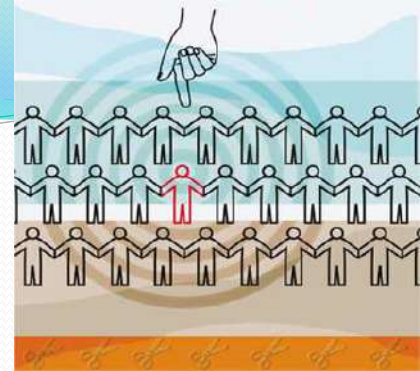
Epidemiology studies what determines health events. It answers the question how and why ? Epidemiology analyzes health events .

5. **Diseases & other health related events :**
The focus of Epidemiology are not only patients. It studies all health-related conditions. Epidemiology is a broader science.

6. **Human population:**

Epidemiology **diagnoses and treats** communities/populations .

↳ rather than an individual



Clinical medicine diagnoses and treats patients.
Epidemiology is a basic science of public health.

7. **Application:**

Epidemiological studies have **direct and practical** applications for **prevention of diseases & promotion of health.**

Epidemiology

❖ Describes:

- health events *not just diseases.*
- **cause** and **risk factors** of disease
- clinical **pattern** of disease ; Identify **syndromes**
- Identify **control** and/or preventive measures

So ; Epidemiology

- Is the **basic science** public health
- Provides insight regarding the **nature, causes, and extent** of health and disease
- Provides **information needed to plan** and target resources appropriately

History of Epidemiology:

Seven landmarks in the history of Epidemiology not a new science

- Hippocrates (460BC): **Environment & human behaviors affects health**
sailors can't reach fresh fruit so they had scurvy symptoms and when they ate fresh fruits the symptoms disappeared
- John Graunt(1662): **Quantified births, deaths and diseases**
- Lind (1747): **Scurvy could be treated with fresh fruit**
- William Farr (1839): Established **application of vital statistics for the evaluation of health problems**
biostatistics is the most important to study health and diseases
- John Snow (1854): tested a **hypothesis on the origin of epidemic of cholera**
all the population have vomiting, watery diarrhea and they discovered that the cause is polluted water
- Alexander Louis (1872): Systematized application of numerical thinking (**quantitative reasoning**)
- Bradford Hill (1937): Suggested **criteria for establishing causation.**
he determined the criteria for a risk factor to be a causative agent or not

Epidemiological thought emerged in 460 BC. Epidemiology flourished as a discipline in 1940s

Purpose/use of Epidemiology

The ultimate purpose of Epidemiology is prevention of diseases and promotion of health.



How?

1. Explanation of the natural history of diseases.

what are the stages of the development of the disease inside the body → so we could know how to stop the development of it.

2. Description of health status of population

How can we assess

administration to the hospital, life expectancy, fertility, mortality and morbidity

we should know the cause of death

to know if the population is increasing or decreasing.

in developing countries there is decrease in productive age group due to over use of family planning method and the development of health services caused prolongation of life

3. Establishing determinants of diseases.

4. To aid in the planning and development of health services and programs

5. Evaluation of intervention effectiveness



Uses of Epidemiology

- to study the cause (or etiology) of disease(s), or conditions, disorders, disabilities, etc.
- to determine the primary agent responsible or ascertain causative factors.
- to determine the characteristics of the agent or causative factors .
- to determine the mode of transmission .
it's important to know it so we could apply certain policies to prevent transmission of the disease
- to determine contributing factors .
- to identify and determine geographic patterns .

3. TO CONTROL THE DISEASE TRANSMISSION.



Types of Epidemiology:

Two major categories of Epidemiology:



1. **Descriptive Epidemiology**: Defines frequency and distribution of diseases and other health related events.

Answers the **four** major questions:

- how many
- who
- where, and
- when

(persons, classes of people affected ,places and times,..)

2. **Analytic Epidemiology** : Analyses determinants of health problems.

Answers **two** other major questions: **how?** and **why?**

Epidemiology includes the following areas:

1. Etiological Epidemiology, includes:

A. communicable diseases etiology,

B. chronic disease etiology,

C. social and organizational factors as mediators of adverse health states,

D. impact of **environmental factors** such as air pollution);

1. IDENTIFY THE CAUSES OF DISEASES.



ندرس الخدمات الصحيه الموجوده عنا,المستشفيات,المراكز الصحيه.

2. Social Epidemiology ,includes:

A. women's health,

- in some countries she is still in sub-class group,so unfortunately she is at risk of so many health problems
- in productive age group also she is at risk of so many diseases,ex:contraceptive pills put her in a risk of breast cancer

B. gender roles and risk of HIV infection,

gender plays a role in sexually transmitted diseases

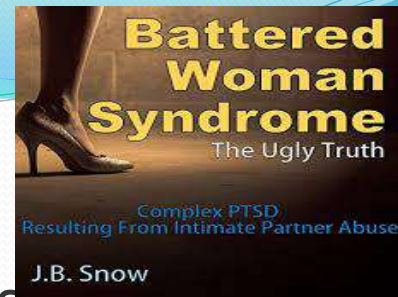
C. harm reduction strategies ;i.e. women abuse or child abuse (battered syndrome)

like physical abuse: beating them, burning them with cigarettes

D. health of older persons (Geriatric Medicine),like Falls.

E. impact of poverty,education, malnutritions low socio-economical status

F. international/global health equity



3. Clinical Epidemiology & Health Services Research:

A. evaluation of clinical and health service interventions to improve public health,

we should monitor health services so we could evaluate them

pharmaco-epidemiology: concerns about the quality and the safety of the drug to and increase the awareness of the doctors about new drugs

B. analysis of treatment patterns, adverse drug reactions and other aspects of **quality of care**,

every year to see the quality

C. evaluation of **community health programs**,

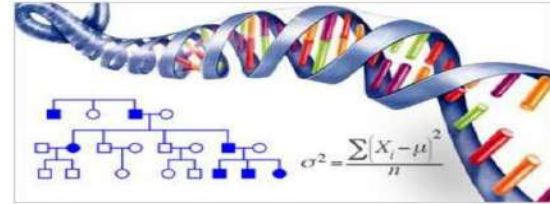
D. applied health economics,

it's important to know the resources in order for appropriate use of them and arrange the health services according to priority

E. diffusion of treatment innovations *same as point B*

CLINICAL EPIDEMIOLOGY





→ study the relationship between genetics and disease occurrence

4. Genetic epidemiology deals with the etiology, distribution, and control of disease in groups of relatives, and with inherited causes of disease in populations. like premarital test.

– we can't prevent the occurrence of the disease but we can prevent it's complications like cystic fibrosis, phenyl ketone urea, G-4 PD disease (جلوكوما)

Genetic epidemiological research in family or population studies aims to establish:

- A. a genetic component to the disorder,
- B. the relative size of that genetic effect in relation to other sources of variation in disease risk, and the responsible gene(s),

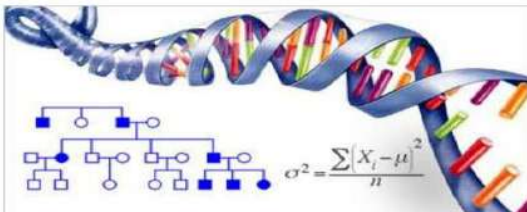
→ it's not hereditary but having one baby with down syndrome increases the risk of other babies

i.e. Down syndrome is caused by having three copies of the genes on chromosome 21, rather than the usual

Public health genetics include:

- i. population screening programs , i.e. premarital screening for **haemoglobinopathies, Down syndrome.**
في عنا مراكز خاصة لفحص ال we-hemoglobin pathies
have centers for blood transfusion for thalassemia cases
- ii. organizing and evaluating services for patients with genetic disorders, and
- iii. the **impact of genetics on medical practice.**

GENETIC EPIDEMIOLOGY



PUBLIC HEALTH GENOMICS



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Health status of populations



■ Epidemiology is often used to describe the health status of population groups.

it's important to know the fertility, mortality, morbidity and if the **حکینا** population is increasing or not to because it's important to know different types of diseases in order to provide health care services

■ Knowledge of the disease burden in populations is essential for health authorities, who seek to use limited resources to the best possible effect by identifying priority health programmes for prevention and care.

■ In some specialist areas, such as environmental and occupational epidemiology, the emphasis is on studies of populations with particular types of environmental exposure.

Evaluating interventions provide then evaluate



The epidemiologists evaluate the effectiveness and efficiency of health services.

This means determining things such as:

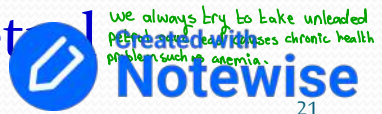
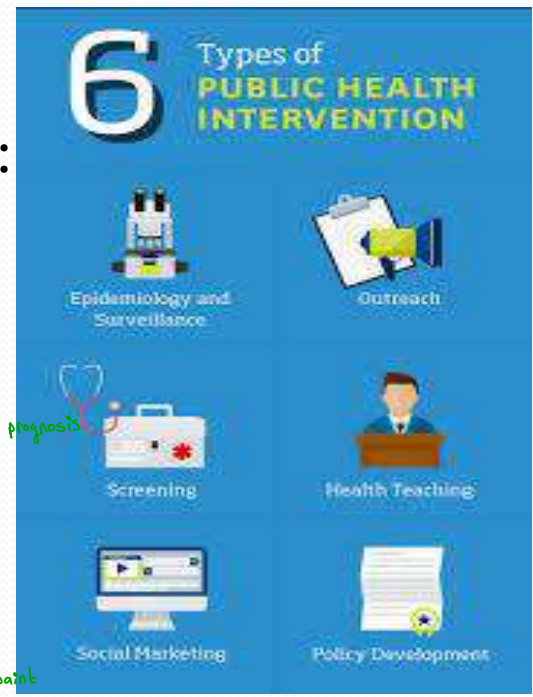
✓ the value of treating high blood pressure, it's a silent disease so it's important to do screening tests after 40 → the earlier the intervention the better the prognosis

✓ the efficiency of sanitation measures to control diarrheal diseases and

في حالة اسمها pica: تاكل أشياء غير الاكل زي الدهان، اسفنج، تراب و تكون مستمتع و انتا بتاكلو فالناس الي بتاكل الدهان بصير عندها accumulation of lead (causing anemia, affecting their mental state)

uplp → it's not just in petrol also it's in paint

✓ the impact of reducing lead additives in petrol



We always try to take unrelated petrol and lead causes chronic health problems such as anemia.

Achievements in epidemiology

Smallpox completely eradicated wit was the common cause of morbidity and mortality.
ازالما موت الانسان بعملو عمى

- ❖ The **elimination of smallpox** contributed greatly to the health and well-being of millions of people, particularly in many of the poorest populations.
- ❖ Smallpox illustrates the **achievements of modern public health**.

❖ In the 1790s it was shown that **cowpox infection** conferred **protection against the smallpox virus**, yet it took almost 200 years for the benefits of this discovery to be accepted and applied throughout the world.

❖ An intensive campaign to eliminate smallpox was coordinated over many years by the World Health Organization (WHO).

❖ An **understanding of the epidemiology of smallpox was central to its eradication**, in particular, by:

- **providing information about the distribution of cases and the model, mechanisms and levels of transmission;**

- **mapping outbreaks of the disease;**

حددو المناطق الي بصير فيها ال disease. و سيظرو عليها

- **evaluating control measures**

خطو vaccine و عملو globally, و كانت آخر حالة ب 1978



Methyl mercury poisoning (Minamata disease) صنظفة مصسة باليابان
Mercury was known to be a hazardous substance in the Middle Ages but has recently become a symbol of the dangers of environmental pollution.

In the 1950s, mercury compounds were released with the water discharged from a factory in Minamata, Japan, into a small river.

This led to the accumulation of methyl mercury in fish, causing severe poisoning in people who ate them.

This was the first known outbreak of methyl mercury poisoning involving fish, and it took several years of research before the exact cause was identified. صنظفة ال minamata كانوا ياكلو بس سمون من نهر ميناماتا
it caused neurological defect

Minamata disease has become one of the best-documented environmental diseases.

Epidemiology played a crucial role in identifying the cause and in the control of what was one of the first reported epidemics of disease caused by environmental pollution. كان في مصنع بتخلص من ال waste تبعو بالنهر هاد

Rheumatic fever and rheumatic heart disease

✚ Rheumatic fever and rheumatic heart disease are associated with poverty, and in particular, with poor housing and overcrowding, both of which favor the spread of streptococcal upper respiratory tract infections.

kids with tonsillitis caused by type a strep cocuss developed rheumatic fever after weeks or developed acute glomerulonephritis

✚ In many wealthy countries, the decline in rheumatic fever started at the beginning of the twentieth century, long before the introduction of effective drugs such as sulfonamides and penicillin.

follicular tonsillitis covered with pus



rapid test \rightarrow for tonsillitis

✚ Today the disease has almost disappeared from most high-income countries although pockets of relatively high incidence still exist among socially and economically disadvantaged populations within these countries.

✚ Epidemiological studies have highlighted the role of social and economic factors that contribute to outbreaks of rheumatic fever and to the spread of streptococcal throat infection.

Iodine deficiency diseases

■ Iodine deficiency, which occurs commonly in certain mountainous regions, causes loss of physical and mental energy associated with inadequate production of the iodine-containing thyroid hormone.

Iodine Deficiency Disorders



Goiter



Cretinism

■ Goiter and cretinism were first described in detail some 400 years ago, but it was not until the twentieth century that sufficient knowledge was acquired to permit effective prevention and control.

■ In 1915, endemic goiter was named as the easiest known disease to prevent and use of iodized salt for goiter control was proposed in many countries in

Tobacco use, asbestos and lung cancer

↳ Causes lung cancer

- Lung cancer used to be rare, but since the 1930s, there has been a dramatic increase in the occurrence of the disease, initially in men.
- It is now clear that the **main cause of increasing lung cancer death rates is tobacco use.**
- The first epidemiological studies linking lung cancer and smoking were published in 1950 .
- However, other **exposures**, such as to **asbestos dust** and **urban air pollution** also contribute to the increased lung cancer burden.



THANK YOU