GENERAL CONCEPTS OF EPIDEMIOLOGY.

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Discussion topics

1. **Epidemiology as a science and subject of study.**
2. **The task and the objectives of epidemiology.**
3. **Measures of population health.**
4. **Clinical epidemiology, the aim and concerns .**
5. **Determinants of health and their impact on chronic diseases.**
6. **The factors that play a role in the causation of disease.**
7. **The ethics of biomedical research.**

1. Definition of epidemiology

- **The word "epidemiology" is derived from the Greek words: epi "upon", demos "people" and logos "study".**

- **Epidemiology is defined 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 prevention and control of health problems"**

Epidemiologists are concerned not only with death, illness and disability, but also with more positive health states and, most importantly, with the means to improve health.

Epidemiology - definition

- 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 prevention and control of health problems

Epidemiology description

Study	**includes: surveillance, observation, hypothesis testing, analytic research and experiments.**
Distribution	**refers to analysis of: times, persons, places and classes of people affected.**
Determinants	**include factors that influence health: biological, chemical, physical, social, cultural, economic, genetic and behavioral.**
Health-related states and events	**refer to: diseases, causes of death, behaviors such as use of tobacco, positive health states, reactions to preventive regimes and provision and use of health services.**
Specified populations	**include those with identifiable characteristics, such as occupational groups.**
Application to prevention and control	**the aims of public health—to promote, protect and restore health.**

2. The aim of epidemiology

Public health refers to collective actions to improve population health.

Epidemiology, one of the tools for improving public health, is used in several ways:

- ✓ **etiology of communicable diseases can lead to the identification of preventive methods.**
- ✓ **epidemiology is a basic medical science with the goal of improving the health of populations, and especially the health of the disadvantaged.**

2. The objectives of epidemiology

1. To identify the etiology or the cause of a disease and the risk factors – factors that increase a person's risk for a disease.
2. To determine the extent of disease found in the community
3. To study the natural history and prognosis of disease.
4. To evaluate both existing and new preventive and therapeutic measures and models of health care delivery
5. To provide the foundation for developing public policy and making regulatory decisions relating to environmental problems

3. MEASURES OF POPULATION HEALTH

- **Health determinants**
- **Health indicators**
- **Risk factors**
- **Other measures**

3. Health determinants

- ***Health determinants*** **are generally defined as the underlying social, economic, cultural and environmental factors that are responsible for health and disease.**

3. Health indicators

- **A health indicator is a variable – that can be measured directly to reflect the state of health of people within a community.**
- **It can be used as components in the calculation of a broader social development index to a combination of the level of economic development, literacy, education, and life expectancy.**

3. Risk factors

- **A risk factor refers to an aspect of personal habits or an environmental exposure, that is associated with an increased probability of occurrence of a disease. The impact of these interventions can be determined by repeated measures using the same methods and definitions.**
- **Risk factors can include tobacco and alcohol use, diet, physical inactivity, blood pressure and obesity.**

3. *Other measures of population health*

- **years of potential life lost (PLL) based on the years of life lost through premature death (before an arbitrarily determined age);**
- **healthy life expectancy (HALE);**
- **disability-free life expectancy (DFLE);**
- **quality-adjusted life years (QALYs);**
- **disability-adjusted life years (DALYs).**

4. Clinical epidemiology

is the application of epidemiological principles and methods to the practice of clinical medicine.

- **The aim of clinical epidemiology is to aid decision-making about identified causes of disease.**

The central concerns of clinical epidemiology are:

- **definitions of normality and abnormality**
- **accuracy of diagnostic tests**
- **natural history and prognosis of disease**
- **effectiveness of treatment**
- **prevention in clinical practice.**

- **The decline in death rates that occurred during the nineteenth century in high-income countries was principally due to a decrease in deaths from infectious disease.**
- **Most of the decline in mortality took place before these interventions and has been attributed to improvements in nutrition, housing, sanitation and other environmental health measures.**

5. DETERMINANTS OF HEALTH AND THEIR IMPACT ON CHRONIC DISEASES

Socioeconomic, cultural, political & environmental factors	Common modifiable risk factors	Intermediate risk factors	Main chronic diseases
Including: - Globalization - Urbanization - Population ageing	Tobacco use Alcohol abuse - Unhealthy diet - Physical inactivity	- Raised blood pressure - Raised blood glucose - Abnormal blood lipids -overweight/obesity	- Heart disease - Stroke - Cancer - Diabetes - Chronic respiratory diseases
	Non-modifiable risk factors		
	- Age - Sex - Heredity		

5. RISK FACTORS COMMON TO MAJOR NONCOMMUNICABLE DISEASES

Social structure (social position)	**Social class Age Sex Ethnicity**	**Healthy public policy**
Environmental influences (places)	**Geographic location Housing conditions Occupational risks Access to services**	**Organizational and community intervention**
Lifestyle influences (individual behaviours)	**Smoking Nutrition Physical activity Psychosocial factors**	**Primary and secondary prevention**
Physiological influences (the body)	**Blood pressure Cholesterol Obesity Blood glucose**	**Primary and secondary prevention**
	Non-communicable diseases	

6. Four types of factors play a part in the causation of disease

- **Predisposing factors, such as age, sex or specific genetic traits**
- **Enabling (or disabling) factors such as low income, poor nutrition, bad housing and inadequate medical care**
- **Precipitating factors such as exposure to a specific disease agent**
- **Reinforcing factors such as repeated exposure, environmental conditions and unduly hard work**

7. The ethics of biomedical research

- Research ethics involves the application of fundamental ethical principles to a variety of topics involving research, including scientific research.
- These include the design and implementation of research involving human experimentation, animal experimentation and various aspects of scientific misconduct

7. Animal Research

- **It includes the three r's (3Rs) described by W. M. S. Russell and R.L. Burch as:**

1. **Replacement** – prefer to use of non-animal methods (ex. Computer modelling)
2. **Reduction** – methods that enables researches to obtain the same information from fewer animals
3. **Refinement** – methods that alleviate or minimize potential pain, suffering or distress of animals.

7. Human Experiments

- In 2010, the National Institute of Justice in the USA publish recommended rights of human subjects that include obtaining voluntary/informed consent from the subjects.
- Participants should have full access to information regarding research.
- Participants should be treated as autonomous agents and they should be given the privilege to end participation at any time.
- Protection from physical, mental and emotional harm and safeguarding the integrity is a mandatory requirement in human experiments, thus the benefits should outweigh the cost

7. Scientific misconduct

- Represent the violation of the standard codes of scholarly conduct and ethical behavior in professional research.

Forms of scientific misconducts includes:

- Plagiarism, including citation plagiarism.
- Fabrication – inventing data by inflating respondent numbers.
- Falsification – changing or wrongly reporting data.
- Ghost – writing when someone other than the named author makes the major contribution.
- Suppression – suppressing of publish because of some interest.
- Salami slicing– reporting of the result of one research in several papers.
- Fraudulent designs – when research is deliberately designed to provide misleading results (data manipulation, data concoction, deliberate selection of subjects etc.