EPIDEMIOLOGY

KSU

College of Applied Medical Sciences

CHS 334

Epidemiology

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EPIDEMIOLOGY

Objectives

At the end of the course, the students will able to:

- **Describe the basic principles and concepts of epidemiology.**
- **Identify the uses and applications of epidemiology.**
- **Explain the natural history of disease and principles of disease prevention.**
- **Describe epidemiological approach to define and measure the occurrence of health-related states in populations.**

EPIDEMIOLOGY

Objectives

At the end of the course, the students will able to:

- **Identify the modifiable environmental factors and encourages the application of epidemiology to the prevention of disease and the promotion of health.**
- **Describe the common causes of disease, disability and death in the community.**
- **Describe the difference type of epidemiologic studies.**

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Epidemiology is the study of the distribution and determinants of health related states and events in populations and the application of this study to the control of health problems.

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- **Epidemiology is considered a cornerstone methodology of public health research, and is highly regarded in evidence-based medicine for identifying risk factors for disease and determining optimal treatment approaches to clinical practice.**

EPIDEMIOLOGY

- **Epidemiology Serves as the foundation and logic of interventions made in the interest of public health and preventive medicine**
- **Epidemiology studies are applied to the control of heath problems in populations.**

What Is The Unique Skill Of Epidemiologists?

MEASURING DISEASE FREQUENCY IN POPULATIONS

Two Broad Types of Epidemiology

DESCRIPTIVE EPIDEMIOLOGY

Examining the distribution of a disease in a population, and observing the basic features of its distribution in terms of time, place, and person.

Typical study design:

community health survey

(approximate synonyms - cross-sectional study, descriptive study)

ANALYTIC EPIDEMIOLOGY

Testing a specific hypothesis about the relationship of a disease to a putative cause, by conducting an epidemiologic study that relates the exposure of interest to the disease of interest.

Typical study designs: cohort, case-control

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Public Health is an organized community efforts aimed at the prevention of disease and promotion of health. It links many disciplines and rests upon the scientific core of epidemiology.

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Purposes of Epidemiology :

1. **To explain the etiology (cause) of a single disease or group of diseases using information management. Etiology the factors contributing to the source of or causation of a disease.**

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Purposes of Epidemiology:

2. **To discover the agent, host, and environmental factors which affect health, in order to provide the scientific basis for the prevention of disease and injury and the promotion of health.**

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Purposes of Epidemiology :

3. **To determine the relative importance of causes of illness, disability, and death, in order to establish priorities for research and action.**

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Purposes of Epidemiology:

4. **To identify those sections of the population which have the greatest risk from specific causes of ill health, in order that the indicated action may be directed appropriately.**

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Purposes of Epidemiology:

5. **To evaluate the effectiveness of health programs and services in improving the health of the population.**

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Epidemiology includes four different types of studies:

Descriptive Studies address questions like,

- **"Who is most likely to develop AIDs?" or**
- **What do the outbreaks of Legionnaires ' disease have in common?**
- **Is there any association between kids who live near high-tension wires and the development of anemia?**

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Epidemiology includes four different types of studies:

Descriptive Studies this type of research:

1. **Looks at the world as it is without trying to change it,**
2. **Relies on existing data such as census, or**
3. **Uses surveys of large groups of people to collect the information.**

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Epidemiology includes four different types of studies:

Once we have (or at least think we have) a good description of what's related to what, we can ask more specific questions and move into the

Hypothesis Testing phase

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Epidemiology includes four different types of studies:

Hypothesis Testing phase For example, if we suspect that the chances of developing breast cancer may be related to the intake of fatty foods, we can see if countries that have low-fat diet also have a law prevalence of cancer and if this prevalence is related to fatty intake.

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Epidemiology includes four different types of studies:

Hypothesis Testing phase Similarly if we think that Legionnaires ' disease is caused by stagnant water in cooling systems, we can immediately test for water purity as soon as we hear about an outbreak.

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Epidemiology includes four different types of studies:

Hypothesis Testing phase Again we are pretty much leaving the world alone and "simply" gathering more focused information – information that can support or refute a specific hypothesis.

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Epidemiology includes four different types of studies:

If after this stage our hypotheses are still viable, we may want to move to the third stage which is

Intervention Studies

EPIDEMIOLOGY

Epidemiology includes four different types of studies:

Intervention Studies now finally we are getting a chance to change things. Rather than simply observing the relationship between low density lipoprotein (LDL) cholesterol and coronary heart disease, we can do a study to see if lowering cholesterol in one group of people leads to a lower death rate than in people belonging to the group we leave alone.

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Epidemiology includes four different types of studies:

Intervention Studies Notice that we are still using hypothesis testing as with the second stage but with an added wrinkle – we now have more control over more of the variables.

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Epidemiology includes four different types of studies:

Each of these types of epidemiologic research may require us to develop methods to gather the necessary data or carry out the intervention.

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Epidemiology includes four different types of studies:

Methods Studies or research methods which is a systematic and principled way of obtaining evidence (data, information) for solving health care problems.

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Epidemiology includes four different types of studies: Methods Studies

- **Research is *systematic* in that researchers tend to follow a sequential process**
- **Research is *principled* in that research is carried out according to explicit rules. These rules or principles constitute the *scientific method*.**

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Trends in Epidemiology

Epidemiology started with observation and hypothesis generation, about the time when the major health threats were infectious diseases: tuberculosis (TB), cholera, influenza and the like.

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Trends in Epidemiology

Sometime in the second half of the 20th century we entered into the first epidemiology transition, which could be called the Age of Receding Pandemics, most infectious diseases were either completely wiped out (e.g., small pox) or contained (e.g., polio, TB).

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Trends in Epidemiology

This was followed by a second transition into the Age of Degenerative and Man-made Diseases (e.g., cancer, cardiovascular problems) because a significant portion of the population is now surviving beyond the reproductive years.

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Trends in Epidemiology

We could also call it the Age of Useful Intervention as we learn which medications, surgical treatments, and lifestyle interventions actually produce more success stories than failure.

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CURRENT APPLICATIONS OF EPIDEMIOLOGY

Identifying the cause of a new syndrome

When faced with a new syndrome tow questions require an urgent response:

1. **Is this a new syndrome?**
2. **What is causing it?**

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Identifying the cause of a new syndrome

The first step is *passive surveillance*, the local public health agencies relies on reports submitted voluntarily by local physicians and other agencies.

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Identifying the cause of a new syndrome *passive surveillance*, The major advantage of passive surveillance is that no single agency is always on the lookout for an outbreak of something, especially if they do not know what that something is or indeed anything is breaking out at all.

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Identifying the cause of a new syndrome

***passive surveillance*, There is the hope that any new and especially any potentially dangerous syndrome will be noticed by the front line people, (example, family physicians, laboratory workers, and community nurses) and reported to the health office.**

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Identifying the cause of a new syndrome

***passive surveillance*, The downside of remaining passive is that reporting is extremely sporadic. Passive surveillance can alert people that something is happening, but it cannot really say how big the problem is or where the hot spots are.**

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Identifying the cause of a new syndrome

***Active surveillance*, Once an agency suspects that a problem may exist, it usually relies on active surveillance. The agency becomes more active and tries to solicit complete reporting of the new syndrome by contacting family physicians, medical officers of health, or laboratories.**

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Identifying the cause of a new syndrome

***Active surveillance*, Depending on the degree of cooperation received, it is now possible to get a better handle on the magnitude of the problem and perhaps to develop some hypotheses about what may be causing the outbreak.**

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Identifying the cause of a new syndrome

***Active surveillance*, To sharpen their hypotheses, the agencies usually begin a series of studies in which people who had the disease are compared with those who didn't (these are called case control studies, and we will discuss them in more depth in chapter 3).**

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Assessing the Risk Associated with a Harmful Exposure

Epidemiologic methods can be used to assess the risk to health that result from exposure to noxious agents.

CURRENT APPLICATIONS OF EPIDEMIOLOGY

Assessing the Risk Associated with a Harmful Exposure

Epidemiologic studies have played a fundamental role in demonstrating the risk to health from such domestic exposures as smoking, nitrates in food, high dietary cholesterol, and occupational exposure to factors like asbestos, lead, and rubber.

CURRENT APPLICATIONS OF EPIDEMIOLOGY

How to Determine if a Treatment is Effective

The methods of epidemiology have contributed much to the assessment treatment of the effectiveness of particular treatments.

CURRENT APPLICATIONS OF EPIDEMIOLOGY

How to Determine if a Treatment is Effective

In the case of breast cancer the primary issue is whether there is any greater chance of survival with total mastectomy versus lumpectomy.

CURRENT APPLICATIONS OF EPIDEMIOLOGY

How to Determine if a Treatment is Effective

The best data on whether a treatment does more good than harm come from an experimental study design called the randomized controlled trial (RCT). Here, patients with the disorder are randomly allocated to receive either the experimental treatment or conventional therapy (or a placebo).

CURRENT APPLICATIONS OF EPIDEMIOLOGY

How to Determine if a Treatment is Effective

Then the two groups are followed up so that the clinically relevant outcomes of the disease and treatment can be described and compared.

CURRENT APPLICATIONS OF EPIDEMIOLOGY

How to Identify Health Service Use Needs and Trends

Modern epidemiology plays an important role in the development of methods that can be used to describe health services and to test alternative ways to "deliver the goods.”

CURRENT APPLICATIONS OF EPIDEMIOLOGY

How to Identify Health Service Use Needs and Trends

Some variation of this theme are health economics, which combines epidemiologic and economic methods to examine the cost-effectiveness of alternative models of delivery, and policy analysis, which seeks to link research findings to change in health policy.

THANK YOU