Lecture 2 for the 3rd class

Community Dentistry (2017 -2018)

# Epidemiology

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**Epidemiology** is the science that deals with what falls upon people, and it is the bridge between biomedical, social and behavioral sciences

## Definition

Study of the occurrence and distribution of health-related diseases or events in specified populations, including the study of the determinants (causes) influencing such states, and the application of this knowledge to control the health problems.

Purposes of Epidemiology

1. To investigate nature / extent of health-related phenomena in the community / identify priorities
2. To study natural history and prognosis of health-related problems
3. To identify causes and risk factors
4. To recommend / assist in application of / evaluate best interventions

(Preventive and therapeutic measures)

1. To provide foundation for public policy

### Epidemiological measurement

There are several means by which the occurrence of disease may be measured. The commonly used measures of incidence and prevalence can be distinguished by differences in the time of disease onset.

**Incidence** is a count of *new cases* of the disease (or outcome).

**Prevalence**, on the other hand, counts *both new and existing cases* of the disease.

### Uses of Incidence

1. To control disease

2. For research in to etiology, pathogenesis, distribution of disease, efficacy of prevention and therapeutic measure.

## Uses of Prevalence

1. To estimate the magnitude and health /disease problems in community and identify potential high-risk group.

2. for administrative and planning purposes

## Tools of measurement the epidemiology of diseases

• **Rate** measure some specific occurrence (development of disease) in population during a given time period as an example is

**Death rate**: Number of death people in a specific period X 1000

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population

In rate numerator is a part of denominator (numerator includes only individuals who meet the case definition i-e people who have developed the diseases of interest, and the denominator includes total no. of people in the population at risk

### Proportion

A/ (A+B); a fraction in which the numerator.

(A) Includes only individuals who meet the case definition and the denominator (A+B) totals the numbers of individuals who meet the case definition plus those in the study population who do not meet the case definition and are at risk.

A proportion is not dependent upon time. It may be expressed as a fraction or a percentage. A proportion indicates the fraction of the population that is affected by the disease or condition. It is linked to estimating risk.

Ex: 30% of persons over 50 years of age have been screened for colon cancer

• Example

No of children with caries in the first molar

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Total number of children at the same time

## Basic Triad of Descriptive Epidemiology

* **Person.**
* **Place.**
* **Time.**

## Personal Characteristics (whom?)

• Age: Age of the population at risk

### • Gender: Men, women and children were all exposed and at risk

* Socio-economic status (education, occupation, income)
* Marital status :
* Ethnicity/race/genetic profile
* Behavior / habits

## Place (where?)

* Geographically restricted or widespread (outbreak, epidemic, pandemic)? Off-shore (tsunami…)
* Climate effects (temperature, humidity, and combined effects.)
* Urban / sub-urban-squatter / rural

Relation to environmental exposure

(Water, food supply, etc.)

* Multiple clusters or one.

## Time (when?)

* Changing or stable?
* Clustered (epidemic) or evenly distributed (endemic)?

* Time-trends: Point source, propagated, seasonal, secular, combinations

## Basic triad of analytical epidemiology

The Three Phenomena Assessed in Analytic Epidemiology are**:**

Host, agent, and environment

**Host Factors**

* May be a person, an animal or a plant.
* Host factors relate primarily to susceptibility and resistance to disease through biological immunologic status.
* Personal characteristics, personal behavior

**Agents**

* Biological (micro-organisms)
* Physical (temperature, radiation, trauma, others)
* Chemical (acids, alkalis, poisons, tobacco, others)
* Environmental (nutrients in diet, allergens, others)
* Psychological (experiences.)

### Environment

There are many things that could affect the environment like

Living conditions (housing, crowding, water supply, garbage, sewage, etc.)

• Atmosphere / climate

Modes of communication:

Phenomena in the environment that *bring host and agent together*, such as: vector, vehicle, reservoir, etc.)

### Concerning the three factors are that would lead to dental caries are

#### Host Factors

* Tooth enamel
* Saliva (flow and composition)
* Immunity (response to pathogen
* Host (individual beliefs, values, behaviors, habits, and customs **Environmental Factors**
* Plaque (quantity and quality)
* Enzymes
* Minerals.
* Bacterial substrate (fermentable carbohydrate in diet)
* Protective factors (fluoride in toothpaste, water, etc.)
* Socioeconomic factors
* Community standards and cultural factors.
* Family and social support networks
* **Agent Factors**
* Bacterial biofilm
* Specific bacteria streptococcus mutans, lactobacillus)  Other bacteria

#### Completing the clinical picture

• Epidemiologists also contribute to physicians of the clinical picture and natural history of disease **for example:**

Epidemiologists, clinicians, and researchers around the world have collaborated to characterize

Zika virus (ZIKV) name comes from the Zika forest of Uganda

As of 2016, the illness cannot be prevented by medications or vaccines. Zika can also spread from a pregnant woman to her fetus. This can result in microcephaly, severe brain malformations, and other birth defects. Zika infections in adults may result rarely in Guillain Barr's syndrome.