The epidemiology

1.1. Definition

Epidemiology is the study of the frequency, distribution and determinants of diseases and other health related conditions in populations, and the application of this study to the promotion of health, and to the prevention and control of health problems.

Major components of the definition

1. Population. The main focus of epidemiology is on the effect of disease on the population rather than individuals. For example malaria affects many people in Ethiopia but lung cancer is rare. If an individual develops lung cancer, it is more likely that he/she will die. Even though lung cancer is more killer, epidemiology gives more emphasis to malaria since it affects many people.

2. Frequency. This shows that epidemiology is mainly a quantitative science. Epidemiology is concerned with the frequency (occurrence) of diseases and other health related conditions. Frequency of diseases is measured by morbidity and mortality rates.

3. Health related conditions. Epidemiology is concerned not only with disease but also with other health related conditions because every thing around us and what we do also affects our health. Health related conditions are conditions which directly or indirectly affect or influence health. These may be injuries, births, health related behaviors like smoking, unemployment, poverty etc.

4. Distribution. Distribution refers to the geographical distribution of diseases, the distribution in time, and distribution by type of persons affected.

5. Determinants. Determinants are factors which determine whether or not a person will get a disease.

6. Application of the studies to the promotion of health and to the prevention and control of health problems. This means the whole aim in studying the frequency, distribution, and determinants of disease is to identify effective disease prevention and control strategies.

1.3 Uses of Epidemiology *f*

To make a community diagnosis. Epidemiology helps to identify and describe health problems in a community (for example, the prevalence of anaemia, or the nutrition status of children). *f*

To monitor continuously over a period of time the change of health in a community. (for example, the effect of a vaccination programme, health education, nutritional supplementation). *f*

To practice surveillance for a specific disease in order to be able to act quickly and so cut short any outbreak (example cholera). *f*

To investigate an outbreak of a communicable disease, analyse the reasons for it, plan a feasible remedy and carry it out, and monitor the effects of the remedy on the outbreak. *f*

To plan effective health services. Effective services, interventions and remedies all depend on accurate community data.

Mode of Transmission

Modes of transmission include the various mechanisms by which agents are conveyed to other susceptible hosts. Transmission may be direct or indirect.

1. Direct Transmission

1.1 Direct contact: Occurs when there is contact of skin, mucosa, or conjunctiva with infectious agents directly from person or vertebrate animal, via touching, kissing, biting, passage through the birth canal, or during sexual intercourse. Example: HIV/AIDS/STIs, rabies

1.2 Direct Projection: is transmission by projection of saliva droplets during coughing, sneezing, singing, spitting or talking. Example: common cold

1.3 Transplacental: is transmission from mother to fetus through the placenta. Example: syphilis, HIV/AIDS 2. Indirect transmission The following are the different types of indirect transmission.

2.1 Vehicle-borne: Transmission occurs through indirect contact with inanimate objects fomites: bed sheets, towels, toys, or surgical instruments; as well as through contaminated food, water, IV fluids etc.

2.2 Vector-borne: The infectious agent is conveyed by an arthropod to a host. Vectors may be biological or mechanical. Biological vector: A vector is called biological vector if the agent multiplies in the vector before transmission. • Example: anopheles mosquito is a biological vector for malaria. Mechanical vector: A vector is called mechanical vector if the agent is directly infective to other hosts, without having to go through a period of multiplication or development in the vector. The vector simply carries the agent by its body parts(leg, proboscis etc) to convey it to susceptible hosts. Example: Flies are mechanical vectors for the transmission of trachoma.

2.3 Airborne: which may occur by dust or droplet nuclei (dried residue of aerosols) Example: Tuberculosis. When pulmonary tuberculosis patients cough, they emit many aerosols which consists the agents of tuberculosis. When these aerosols dry droplet nuclei will be formed. These droplet nuclei will remain suspended in the air for some time. When another healthy susceptible individual breaths he/she will inhale the droplet nuclei and become infected with tuberculosis.

V. Portal of entry - is the site where an infectious agent enters a susceptible host. Examples: -Nasal mucosa is portal of entry for common cold -Conjunctiva is the portal of entry for trachoma -Injury site is portal of entry for tetanus

VI. Susceptible human host: The susceptible human host is the final link in the infectious process. Host susceptibility or resistance can be seen at the individual and at the community level. Host resistance at the community (population) level is called herd immunity. Herd immunity can be defined as the resistance of a population to the introduction and spread of an infectious agent, based on the immunity of a high proportion of individual members of the population, thereby lessening the likelihood of a person with a disease coming into contact with susceptibles. Example

- If 90 % of the children are vaccinated for measles, the remaining 10 % of the children who are not vaccinated might not become infected with measles because most of the children (90 %) are vaccinated. That means transmission from infected person to other susceptible children will not be easier