**Community medicine**

**Agent Host Environment**

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**OBJECTIVES**

BY the end of the lecture you will be able to:

1. define the epidemiological triangle

2. enumerate:

1. agent types
2. host factors
3. environmental factors

**Epidemiologic Triangle**

Is the Basic triad of analytical epidemiology

The epidemiologic triangle, depicts the relationship among ***three key factors*** in the occurrence of disease or injury: ***agent,* *host and*** ***environment.***

**Epidemiologic Triangle**

Used to explain the etiology of infectious diseases.

Relationship of the agent, host &his environment also exists among non-infectious diseases.

**For example:**

CANCER

Maybe depend upon the extent of EXPOSURE to the CARCINOGENIC AGENT , the dose of the agent, the genetic and the environment.

***Agent***

An ***agent***is a factor whose presence or absence, excess or deficit is necessary for a particular disease or injury to occur.

It is classified into:

**1.Biological agents**

**2.Physical agents**

**3.Chemical agent**

**4.Nutritive agents**

**Biological agent**

* virus
* bacteria
* protozoa
* fungus
* helmenth
* ectoparasite

***physical agent***

1. **Temperatures; Heat, Cold**
2. **Radiation; Solar, UVR, Ionizing**
3. **High altitude**

4.VIBRATION

***CHEMICAL AGENTS***

***NUTRITIONAL AGENT***

1. **Excessive Nutrition**
2. **Under Nutrition**

**4.Malnutrition**

**Characteristics of Infectious Disease Agents**

1. **Infectivity**
2. **Pathogenicity**
3. **Virulence**
4. **Immunogenicity**
5. **Toxigenicity**
6. **Survival**

**Virulence**

* Refers to the severity of the disease.
* Measured by the proportion of severe or fatal cases.
* If fatal, use ***case fatality rate.***
* Toxigenicity
* The capacity of the agent to produce a toxin or poison.

**Infectivity**

* The capacity of an agent to produce infection or disease.
* Measured by the ***secondary attack rate.***

**Pathogenicity**

* The capacity of the agent to cause disease in the infected host.
* Measured by the proportion of individuals with clinically apparent disease.

**Survival**

* The ability of the agent to survive adverse environmental conditions.

**I*mmunogenicity***

The ability of the agent to induce antibody production in the host.

**Host:**

**Definition**

A person (or animal) that permits lodgment of an infectious disease agent under natural conditions

* The host can be the organism that gets sick, as well as any animal carrier (including insects and worms) that may or may not get sick.
* Although the host may or may not know it has the disease or have any outward signs of illness, the disease does take lodging from the host. The “host” heading also includes symptoms of the disease.
* Different people may have different reactions to the same agent. For example, adults infected with the virus *varicella (chickenpox) are more likely than children to develop* serious complications.
* Hosts in which a parasite attains maturity or passes its sexual stage are ***primary*** or ***definitive*** hosts
* Those in which a parasite is in a larval or asexual state are ***secondary*** or ***intermediate*** hosts.
* A ***transport host*** is a carrier in which the organism remains alive but does not undergo development
* **HOSTS FACTOR** (INTRINSIC FACTORS) – INFLUENCE EXPOSURE , SUSCEPTABILITY OR RESPONSE TO AGENTS ,INCLUDES:
* Physiological e.g. pregnancy
* Anatomical
* Genetic e.g. sickle cell anemia
* Behavioral e.g. smoking
* Occupational
* Constitutional
* Cultural
* Once an agent infects the host, the degree and severity of the infection will depend on ***the host’s ability*** to fight off the infectious agent.
* Two types of defense mechanisms are present in the host: nonspecific and disease-specific.

**Environment**

* The domain external to the host in which the agent may exist, survive, or originate.
* The environment consists of physical, climatologic, biologic, social, and economic components that affect the survival of the agents and serve to bring the agent and host into contact.

**Reservoirs of Infectious Diseases**

* The environment can act as a reservoir that fosters the survival of infectious agents.
* Examples: contaminated water supplies or food; soils; vertebrate animals.

**Types of Environmental Factors**

* Physical, chemical, biological
* Social, political, economic
* Population density
* Cultural
* Environmental factors that affect presence and levels of agents
* Homeostatic Balance

**Epidemics arise when host, agent, and environmental factors are not in balance**

* + Due to new agent
  + Due to change in existing agent (infectivity, pathogenicity, virulence)
  + Due to change in number of susceptibles in the population
  + Due to environmental changes that affect transmission of the agent or growth of the agent .