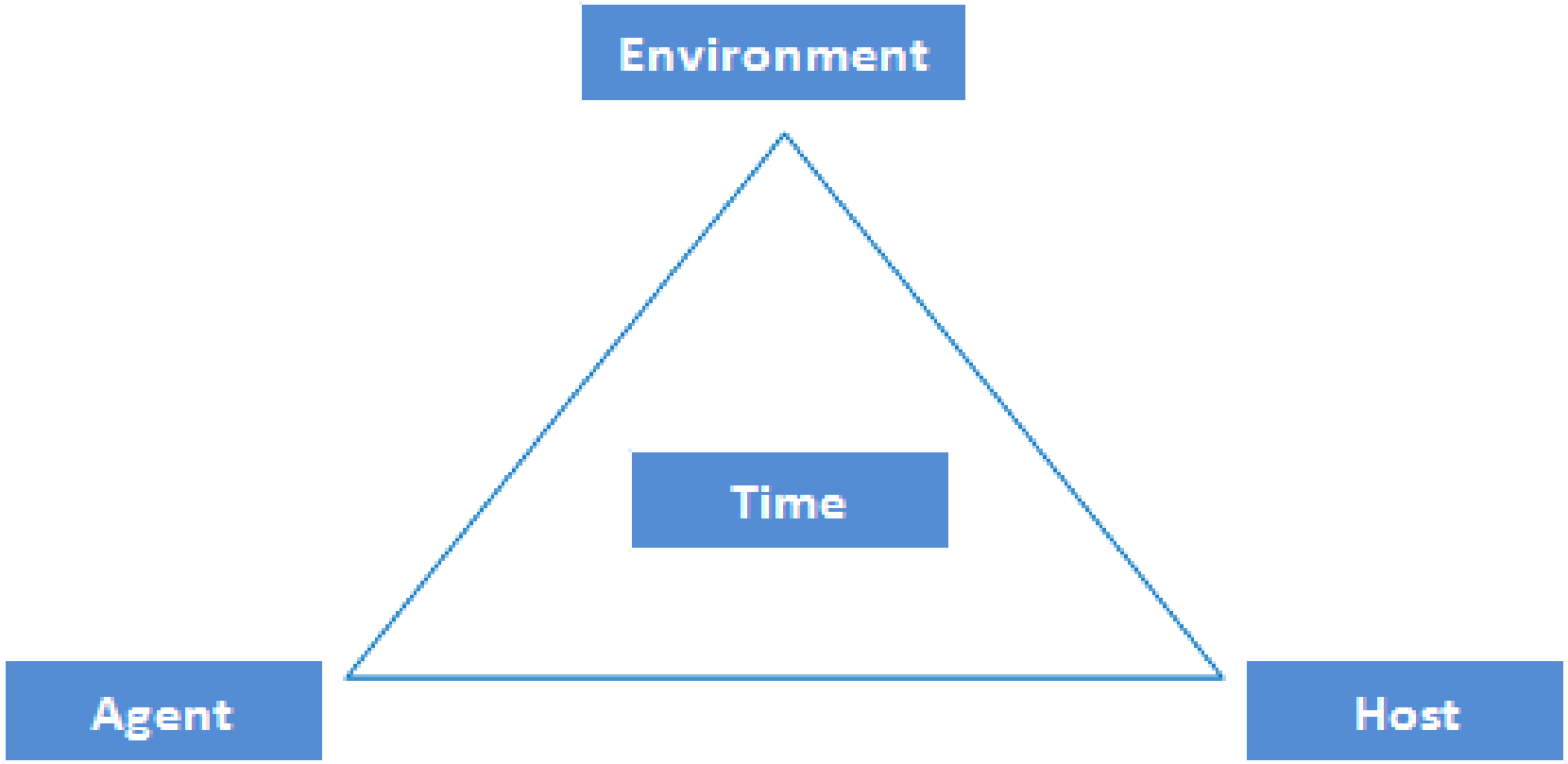
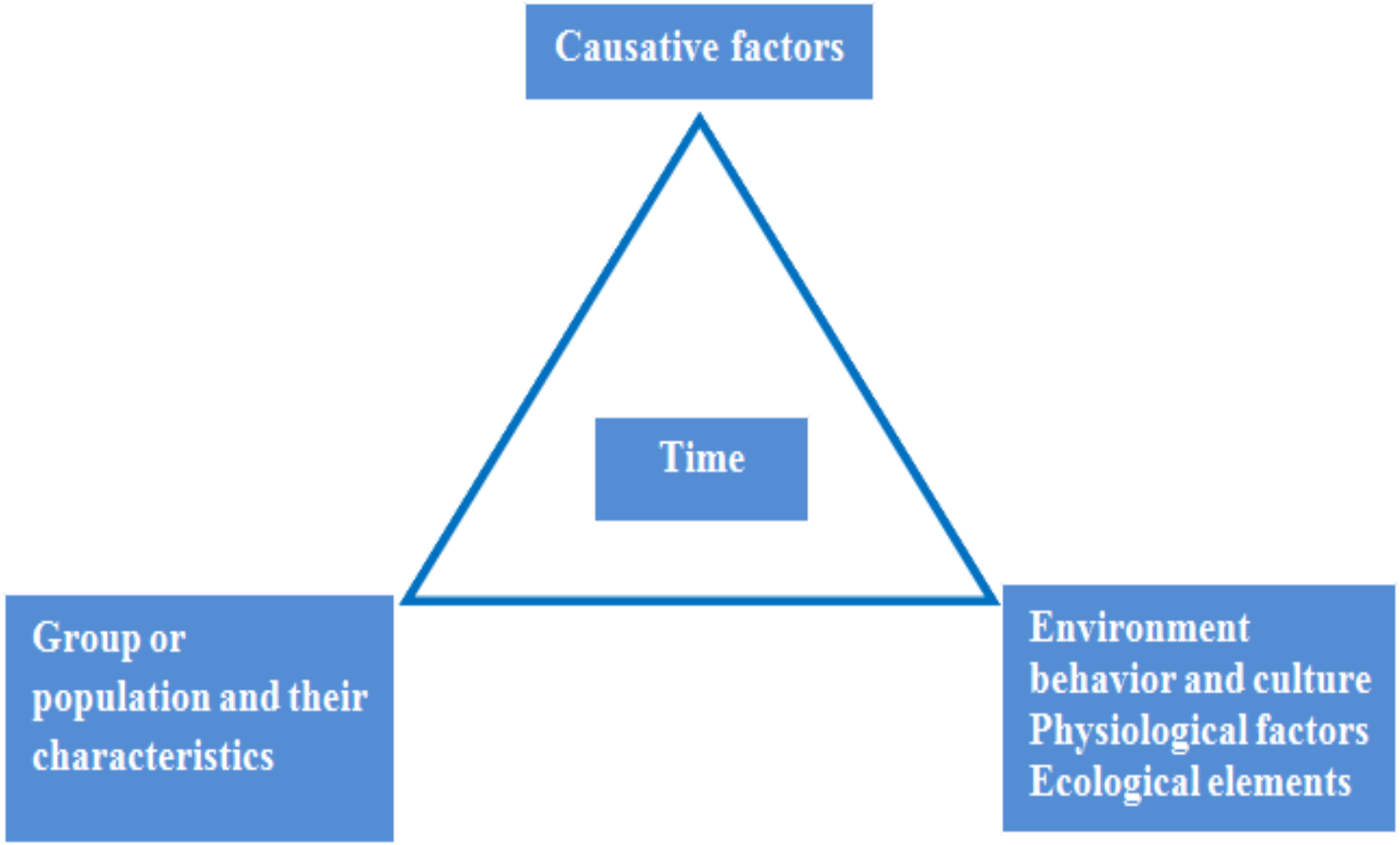
Determinants of Health

Objectives

- Determinants of health in terms of the epidemiologic triad
- What are causative agents?
- Who is the host?
- Environment determinants in epidemiology



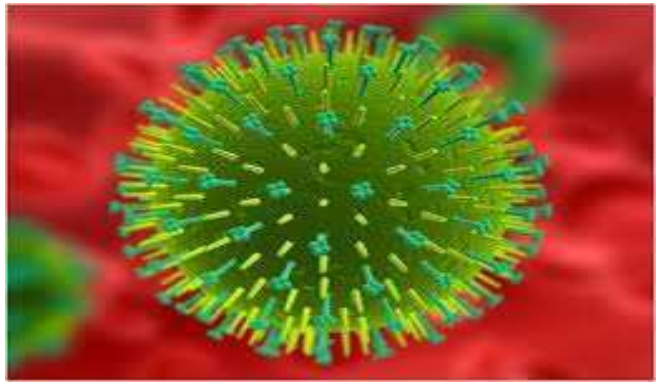
The Epidemiological Triangle



Advanced model of the triangle of epidemiology

Causative Agent

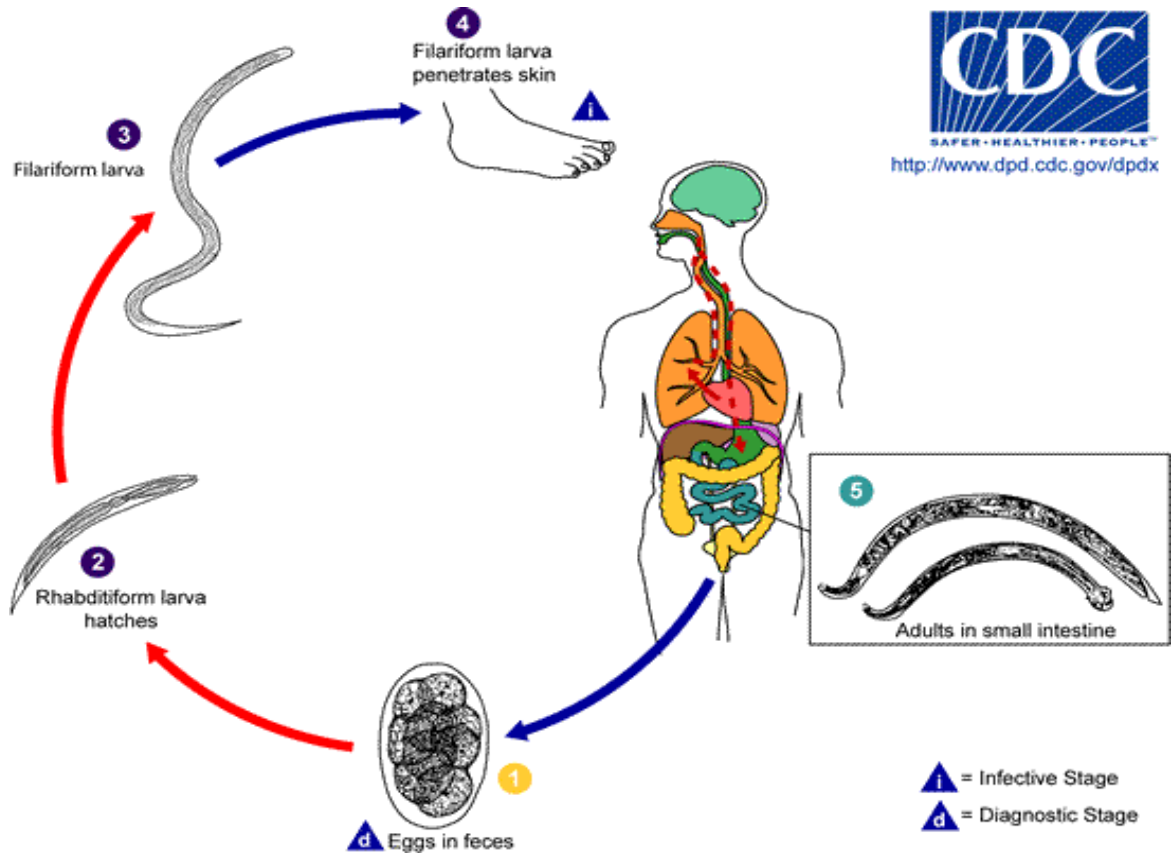
Bacteria



Virus

Fungus

Rikettsia


4
Filariform larva
penetrates skin
i
3
Filariform larva
2
Rhabditiform larva
hatches
1
d
Eggs in feces
5
Adults in small intestine
CDC
SAFER·HEALTHIER·PEOPLE™
http://www.dpd.cdc.gov/dpdx
i = Infective Stage
d = Diagnostic Stage

Causative Agent

- In the late 1800s, Koch espoused the concept that diseases are caused by living organisms
- Agent : Bacteria, virus, fungus, microbiologic agents
- Identification of specific agents of disease depends upon:
  1. The microorganism must be observed in every case of the disease

2. The microorganism must be isolated and grown in pure culture.

3. The pure culture must when inoculated into a susceptible animal reproduce the disease

Host

Descriptive Epidemiological Characteristics

- **Personal Characteristics**
  - Age
  - Gender
  - Race and ethnicity
  - Marital status
  - Socio-economic status
  - Education

Personal Characteristics

Age

- Considered the single most important personal characteristic (in most diseases, age differences are usually more observed than any other variable)
- Knowledge of age may help understand the factors responsible for disease development
- May give explanation for differences in disease occurrence in different population-groups

Personal Characteristics (Age)

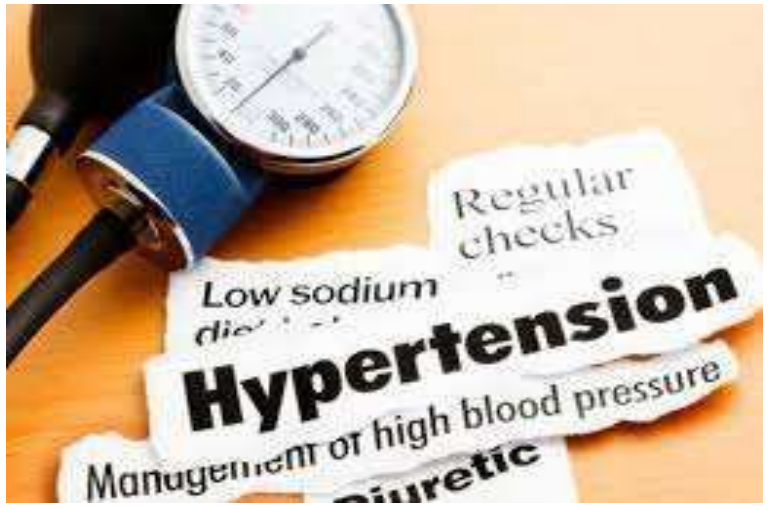
- Age is affected by …. Agent ….. Host ….and Environmental factors

Personal Characteristics (Age)

- Agent factors
  - The degree of communicability and post-infection immunity of causative biological agents tend to determine the age distribution of diseases
  - E.g; disease of higher communicability and strong post-infection immunity (e.g; measles) tend to occur at an earlier age compared to (e.g;mumps)

Personal Characteristics (Age)

- Host factors (e.g; biologic characters)
  - Changes in blood pressure with age predisposes to cardiovascular accidents
  - Acne tends to occur around puberty
  - Rheumatoid arthritis may affect women at menopause


Regular checks
Low sodium
Hypertension
Management of high blood pressure

Personal Characteristics (Age)

- Age-determined patterns
  - Morbidity and mortality tend to be high at extremes of age
    - Children ….congenital anomalies and infectious diseases
    - Elderly …. Cardiovascular problems, cancer
    - Disease vary in severity by age e.g; pneumonia is very severe under 5 years and among elderly

Personal Characteristics (Gender)

- Epidemiological studies report differences of disease patterns between males and females
- A rough estimate is obtained by dividing the No. of male cases / No. of female cases given an equal population distribution of both sexes
- A ratio of ONE indicates NO sex difference

Personal Characteristics (Gender)

- Host factors
- Anatomical or physiological differences may explain the distribution of disease by gender

- Sex-restricted diseases (e.g; cancer-cervix, prostatic cancer)

Personal Characteristics (Gender)

- Environmental factors:
- Male …..occupational exposures, dust ….more vulnerable to (T.B) compared to females

- Mothers tend to be in more contact with sick children and develop infectious diseases easier than men

Personal Characteristics (Race)

- Race :

  Some disease tend to occur among certain races; sickle cell anaemia and T.B. among dark-coloured individuals

Personal Characteristics (Marital status)

- Married people tend to be less vulnerable to develop disease, in general

- Accidents, chronic disease, and poor health tend to be more encountered among the single

Personal Characteristics (Socio-economic status)

- Occupation: diseases related to occupational exposures (e.g; pneumoconiosis) , hearing disorders (noise in factories)

- Education: lesser educated are at a health disadvantage and with lesser access to health care facilities

- Income: may determine the occurrence and type of care for diseases

Environment

- Environmental factors

  – Children living at overcrowded areas have greater risk of exposure to infectious diseases at an early age

- **Place characters**
  - Geography
  - Chemical and physical environment

– Sanitation

– Health services







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- Risk Factors
  - Presence or absence of risk related factors with the disease
  - Advances in epidemiologic research have aided in the identification of risk factors for cancer, heart disease, infectious disease, and many other conditions

Risk factors are microbiologic agents, chemical agents, behaviour, environmental or occupational accumulated hazards which augment or potentiate the occurrence of the disease

E.g; role of exercise, diet, smoking and alcohol consumption in the health outcomes such as …… coronary heart disease, arthritis, diabetes, and cancer.

Place Characteristics

- Disease patterns may differ by locality of their occurrence (country, city, village, district)

Geography: the climatic factors in a certain region (e.g; temperature, humidity, wind etc;) play major role in determining the biologic environment which is necessary for perpetuation of the diseases in the community

Place Characteristics

- **Chemical and physical environment (geology, soil, water)**
  - Iodine deficiency in underground water …. Goitre (enlarged thyroid)
  - Exposure to ionizing radiation and reactors leakage …..higher rates of leukaemia and congenital malformations

Place Characteristics

- **Environmental sanitation**
  - Poor sanitation is associated with higher levels of infectious gastrointestinal (diarrhoeal) diseases
  - Evident in poor urban, squatter, and rural areas
  - E.g; cholera, typhoid, amoebic dysentery

Availability

Health Services

– Availability, accessibility and utilization of health services play major roles in prevention and control of diseases

Equity

When everyone has what they need to succeed

Affordability

Accessibility

Time

Time Patterns

- Four patterns are usually observed as far as time variation is concerned

1. **Secular trends:**
   - Refers to variation of disease occurrence over long periods of time
   - Cardiovascular and cancer diseases are currently showing increasing trends
   - Measles and poliomyelitis are showing decreasing trends

Time Patterns

- Cardiovascular and cancer diseases are currently showing increasing trends
- Measles and poliomyelitis are showing decreasing trends

Explain why ??

In terms of agent, host, environment

Time Patterns

2. **Periodic trends**

   - Some diseases show a periodic cycle of recurrences of epidemics at intervals of few years (e.g; influenza)

   such trends may be attributed to

   . Change in virulence of the causative agent

   . Changes in the immunity of the population

Time Patterns

3. Seasonal trends:
   - Most infectious diseases show seasonal variations due to the change in weather conditions which have;
   - Direct effects: affecting the individual resistance (dry winter mouths …dry mucous membranes …decrease resistance to infection
   - Indirect effects: through helping crowding and moving of people to new place favouring the spread of infection

Time Patterns

4. **Rapid fluctuations**

   - In the form of either rapid increases (disease outbreaks following consumption of a contaminated food item), or decreases (following mass immunization campaigns)

Conclusion

“The Five Objectives of Epidemiology”

From *Epidemiology, by Leon Gordis*

1) Etiology & Risk Assessment

Identify the etiology or the cause of a disease and the factors that increase the person’s risk of the disease

2) Assess & Monitor Disease Burden

- Measure the extent of disease found in the community.

–Planning health services and resources

–Training healthcare providers

–Surveillance (of the impact of risk factor reduction and treatment)

3) Natural History & Prognosis

- Fundamental concepts for studying and controlling disease
- Define, quantitatively, the natural history of a disease from development to signs and symptoms to death. (Tells us what to expect)
- Develop interventions to cure or slow progression of the disease.

4) Evaluation

Evaluate new and existing preventive and therapeutic measures and healthcare delivery (health services) on health outcomes

5) (Help) Shape Policy

Provide the evidence-based foundation for developing public policy and making regulatory decisions to protect the health of populations, the health of the public.