# Epidemiologic Triad

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# OBJECTIVES OF THE LECTURE

**By the end of this lecture students will be able to:**

- Describe four theories postulated for the development of diseases.
- Explain the concept of iceberg phenomenon of diseases.

# DEVELOPMENT OF DISEASES

In community medicine, we have to know WHY do diseases occur in order to develop a way on HOW we can intervene and prevent them from occurring at the first place. If my population is known to have certain diseases, I shouldn't be just waiting for more people to come in with symptoms. My job is not limited to treating people. If I have the tool of knowledge, my job is to minimize the number of patients by increasing awareness, routine screening, vaccinations… etc. That is what prevention means.

# THE CAUSAL MODEL: Why do we study that?

Studying how different factors can lead to ill health → Generate knowledge → Disease prevention and control.

# PRIMITIVE & MID-AGE THEORIES

**Supernatural cause** → Evil spirits.

**Punishments** → Gods.

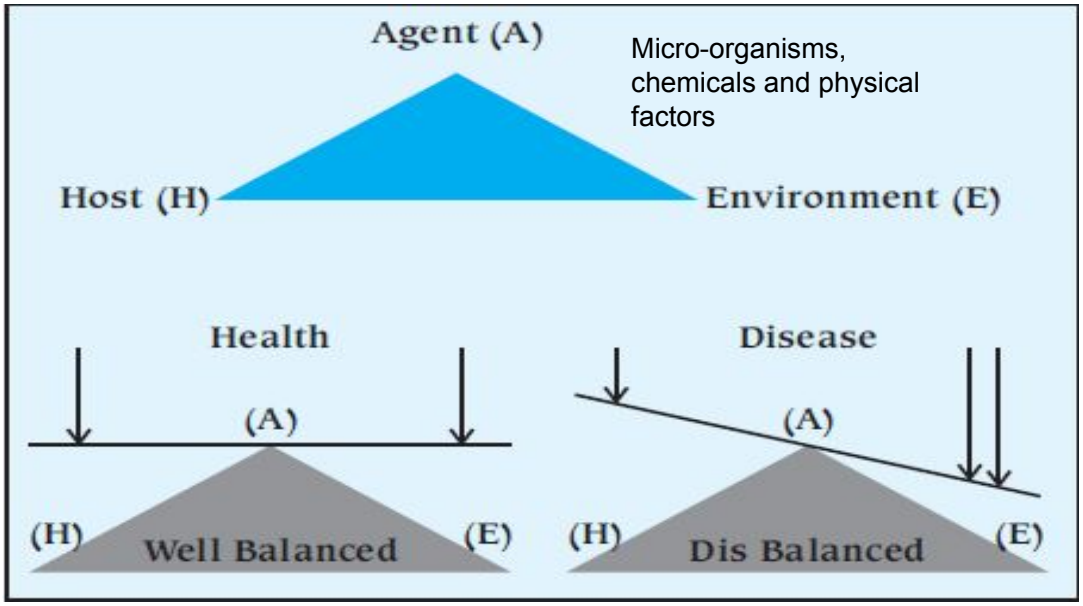
**Contagion theory** → Contact with sick.

**Miasma (stink)** → Bad/Poisonous air.

# GERM THEORY

After discovering the microscope, we realized we aren't alone on this planet; from there, the germ theory developed. They claimed that in order for any disease to occur, a microbe should be introduced to the body. This is not entirely true however, since we live in balance with these microbes at normal conditions.

# EPIDEMIOLOGIC TRIAD




Health is maintained with balance between **1) us as humans, 2) the environment 3) the infectious agents.** Once this balance is disturbed, disease occurs. The disturbance can be due to a problem in the human (Age, lifestyle.. etc.), the environment (climate, overcrowding.. etc.) or the infectious agent (virulence, resistance.. etc.)

## 1)Host

**Intrinsic factors**

Age
Sex
Ethnicity
SES
Life style
Nutrition status
Hygiene

## 2)Environment

**Extrinsic factors (physical/social environment)**

Urbanization
Climate/rainfall
Altitude
Overcrowding
Bad ventilation
Indoor air pollution
access to Health services

## 3)Agent

**Necessary/not enough**

Number
Virulence
Resistance

Some intrinsic factors (related to the human) make them more susceptible to develop DISEASE. If a microbe is in the air, we are ALL susceptible to INFECTION, but we are not ALL susceptible to DISEASE; because certain characteristics make some individuals more vulnerable than others (e.g. old age, very young age, male/female physiological differences, immunodeficiency… etc.)

# EXAMPLES

- **Chemical contaminants:** l-tryptophan contaminant causing eosinophilia-myalgia syndrome.

- **Physical forces:** Repetitive mechanical forces associated with carpal tunnel syndrome.
- factors that contribute to TB:
  intrinsic: low immunity
  extrinsic: overcrowding
  necessary: agent's infectivity

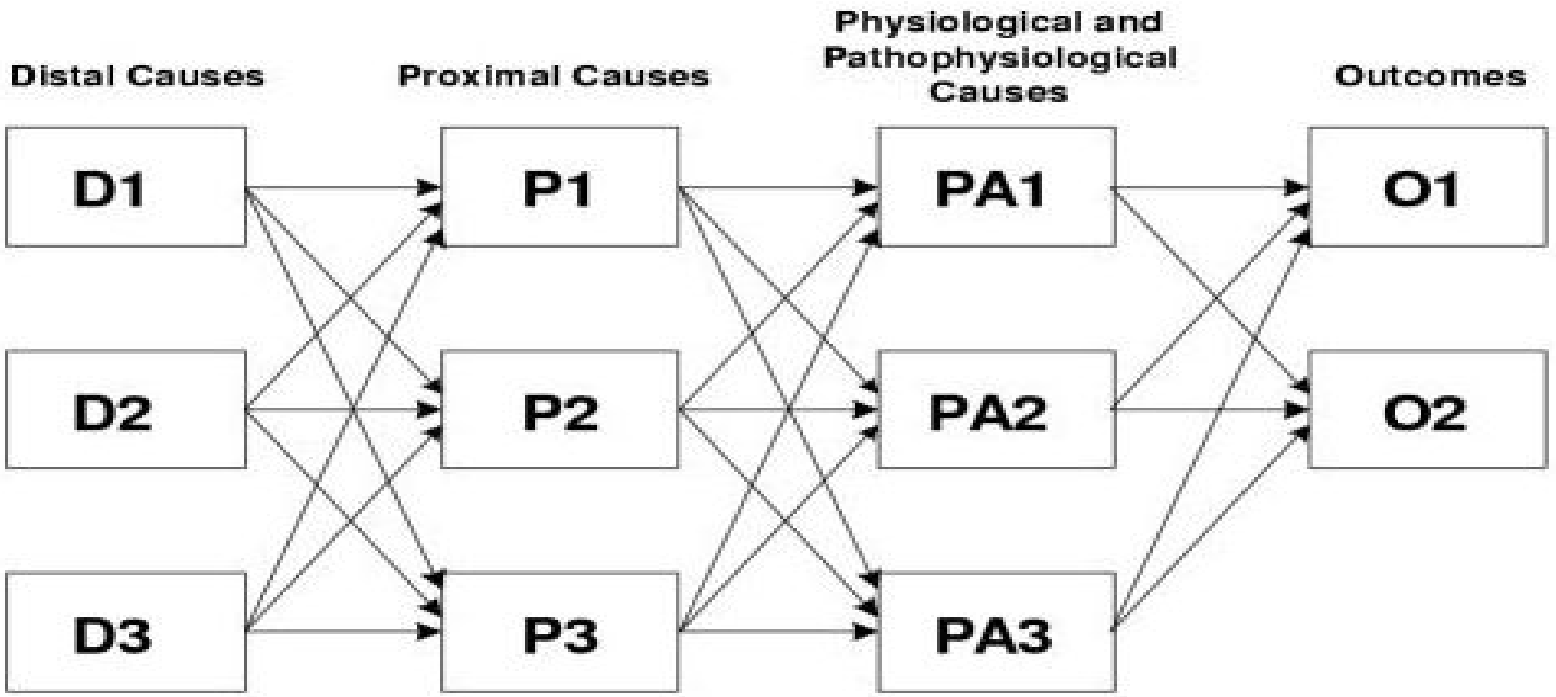
# THE CONCEPT OF AGENT

**Broadening to the category of agents included:**

- Microorganisms.
- Chemicals (tobacco, drugs, poisons… etc.)
- Physical (radiation, temperature… etc.)
- Allergens (food, air… etc.)

The model does not work well for some noninfectious diseases as it is not always clear whether a particular factor should be classified as an agent or as an environmental factor. Therefore, this theory is not enough, and other models are needed to be introduced to overcome the role of the agent.

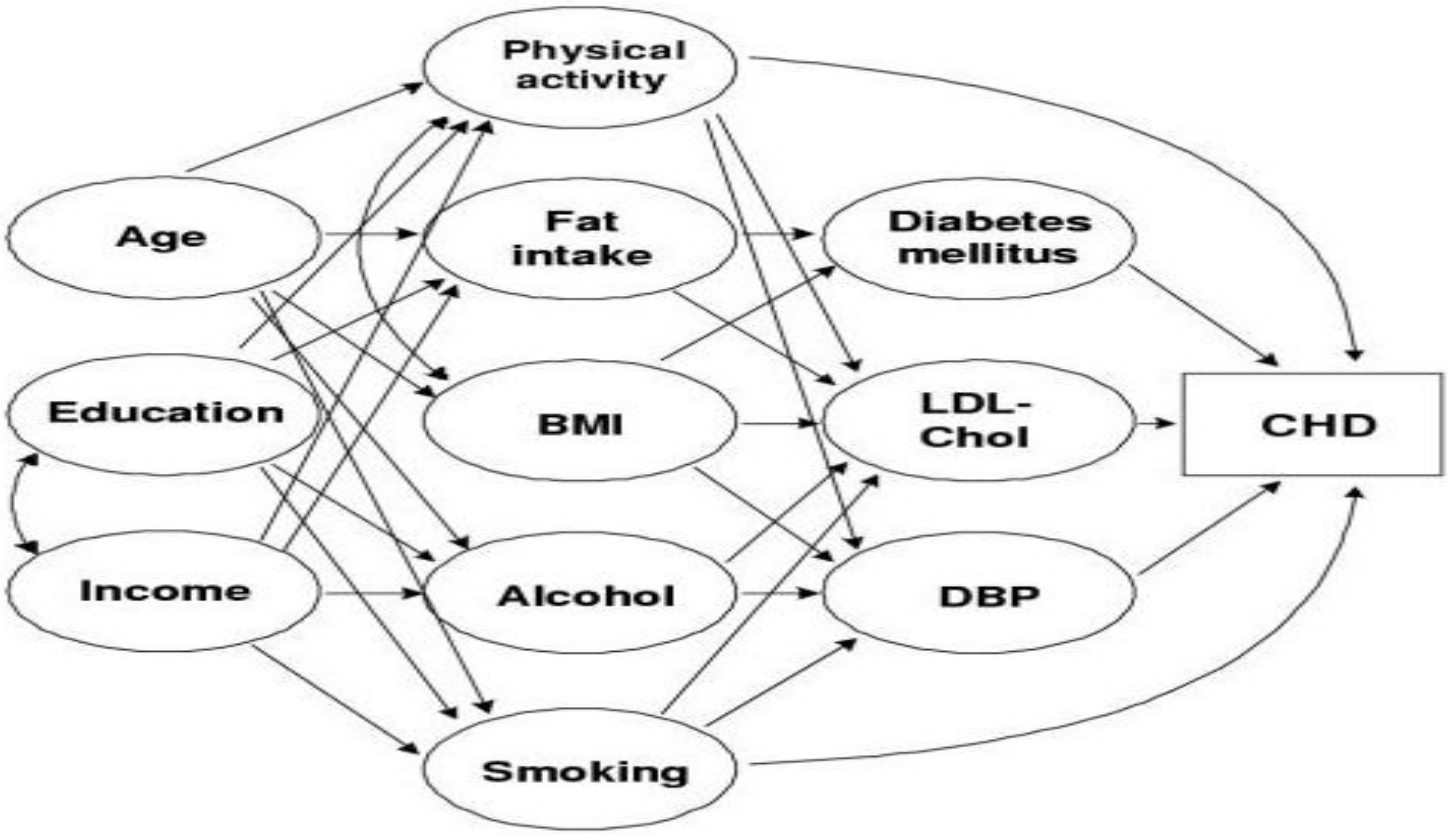
# WEB CAUSATION




For a disease to occur, it requires some pathophysiological changes in the body. These changes are caused by multiple proximal and distal factors (not one thing) that interact with one another, producing the outcome, which is the disease.

**Web causation model de-emphasize the role of the agent**

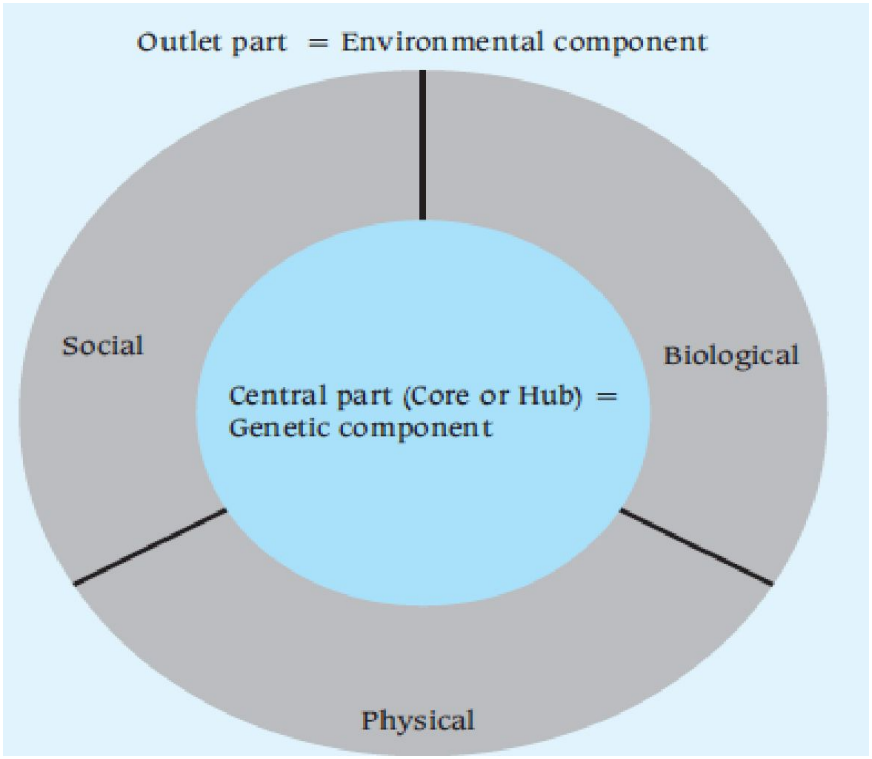
# EXAMPLE




In order for Coronary Heart Disease (CHD) to occur, it needs pathophysiological changes within the human body, e.g. increase in blood pressure, cholesterol, and sugar levels; and each of these risk factors is influenced by another set of factors like age, education and income.

# EPIDEMIOLOGIC WHEEL

**Lifestyle & living conditions**

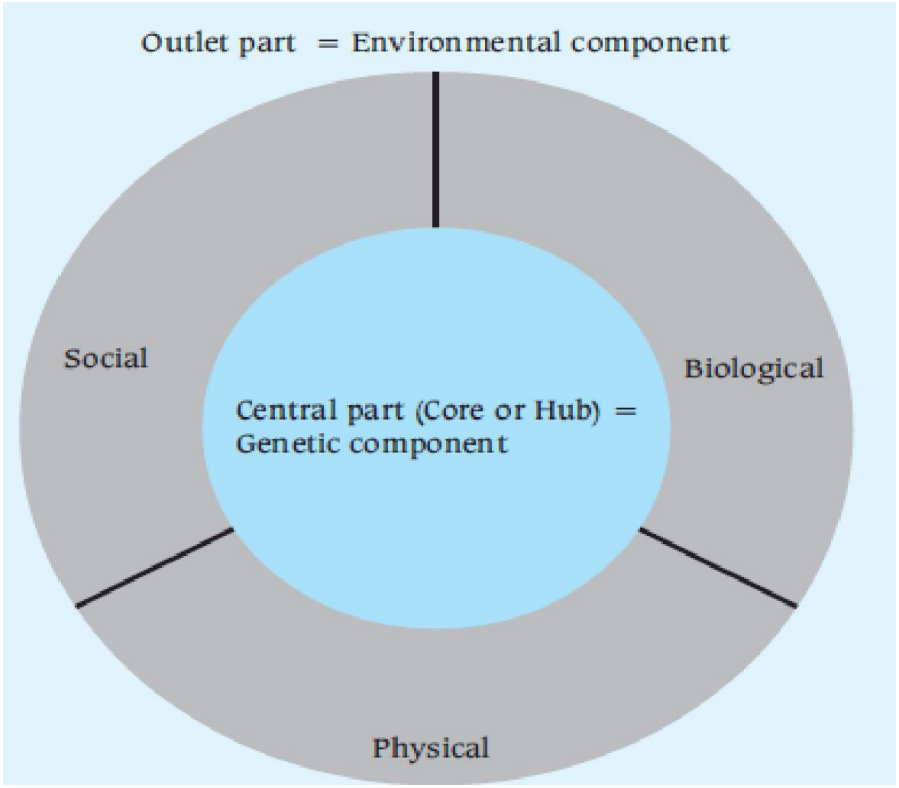



**Organisms & Disease vector**

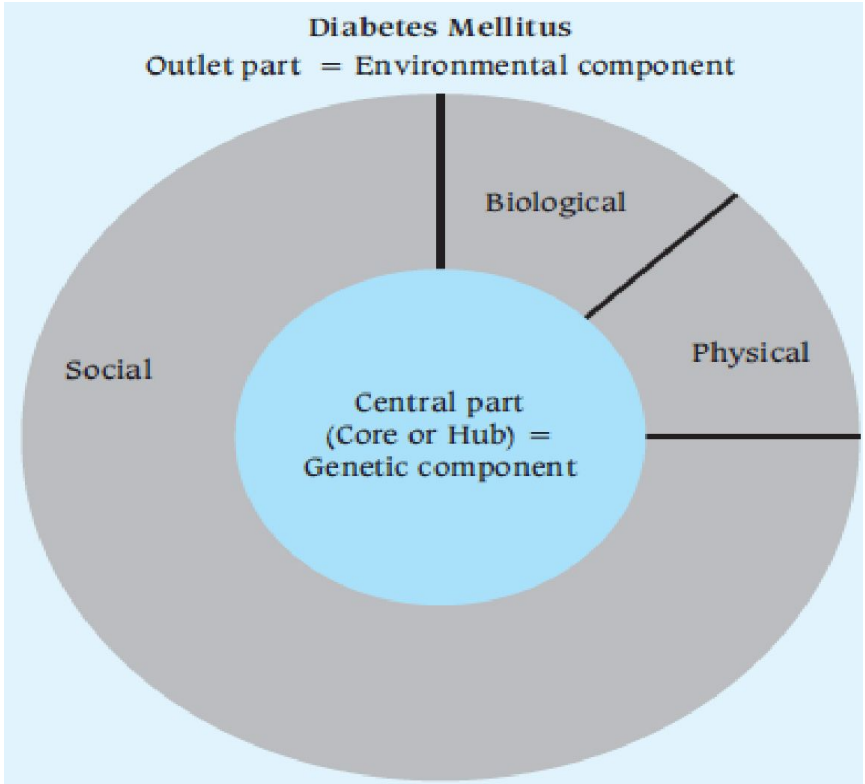
**Climate, seasonality & climate**

A wheel that's composed of two parts, a central part (blue) which is the genetic component of a disease, and an outer part (grey) which is the environmental component of a disease. The environmental component is further **divided into three categories:**

**1) Social:** lifestyle. **2) Physical:** climate. **3) Biological:** organism.




**POSTULATED MODEL**

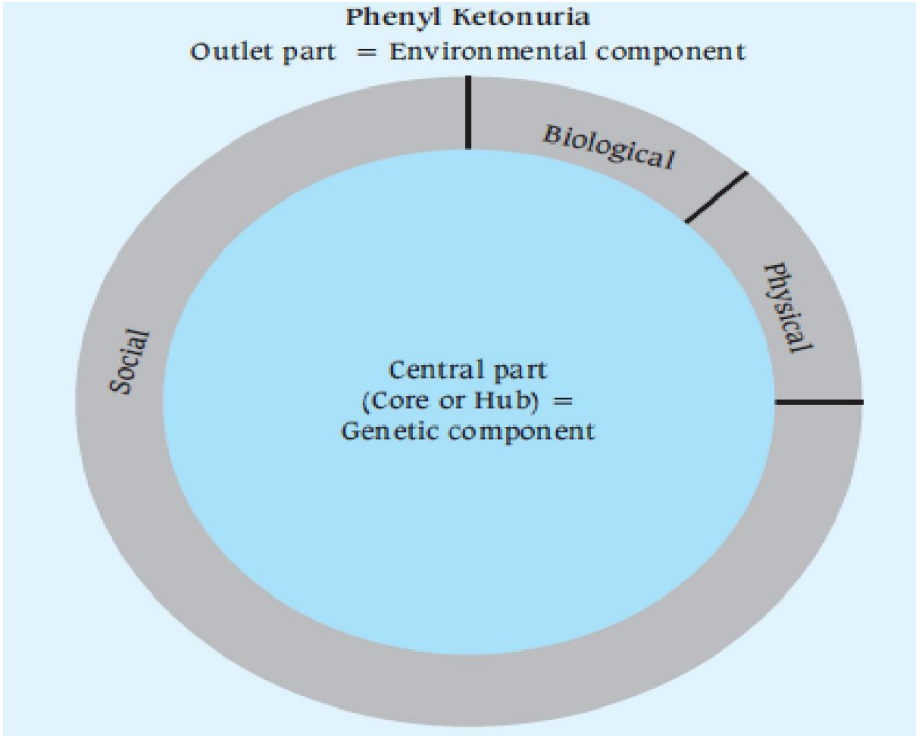



**DIABETES MELLITUS**

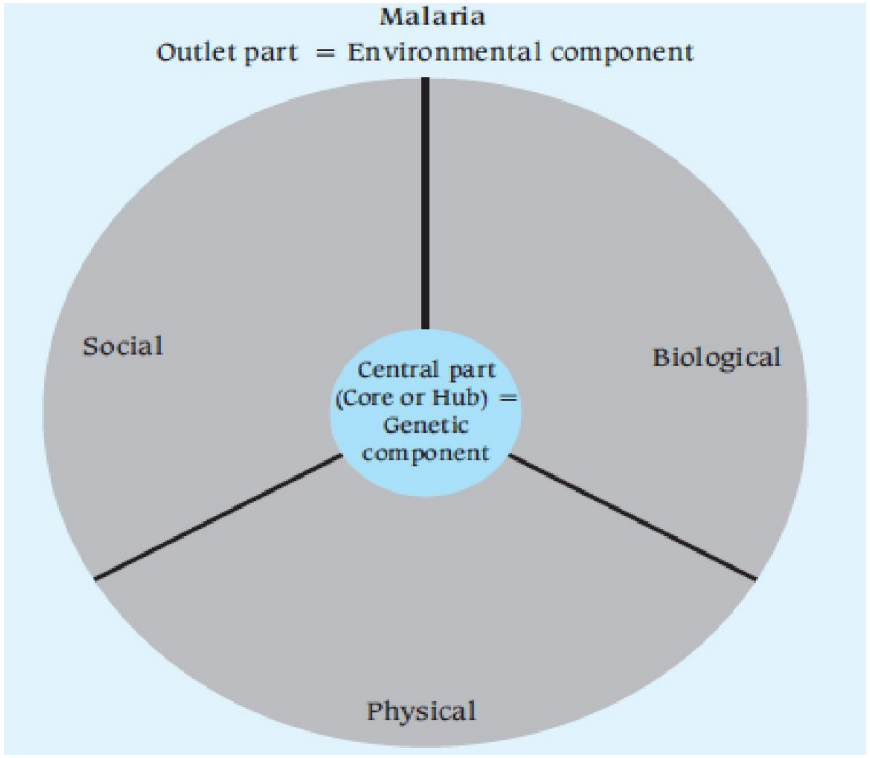
**For each disease, the wheel's component differ.**

Some diseases rely mainly on the genetic part, while others rely on the environmental part… Some diseases rely on the social part of the environment, and others rely on the biological part of the environment, and so on. DM is a good example for diseases that the patient's lifestyle has a great impact on its pathophysiology.

# EXAMPLES

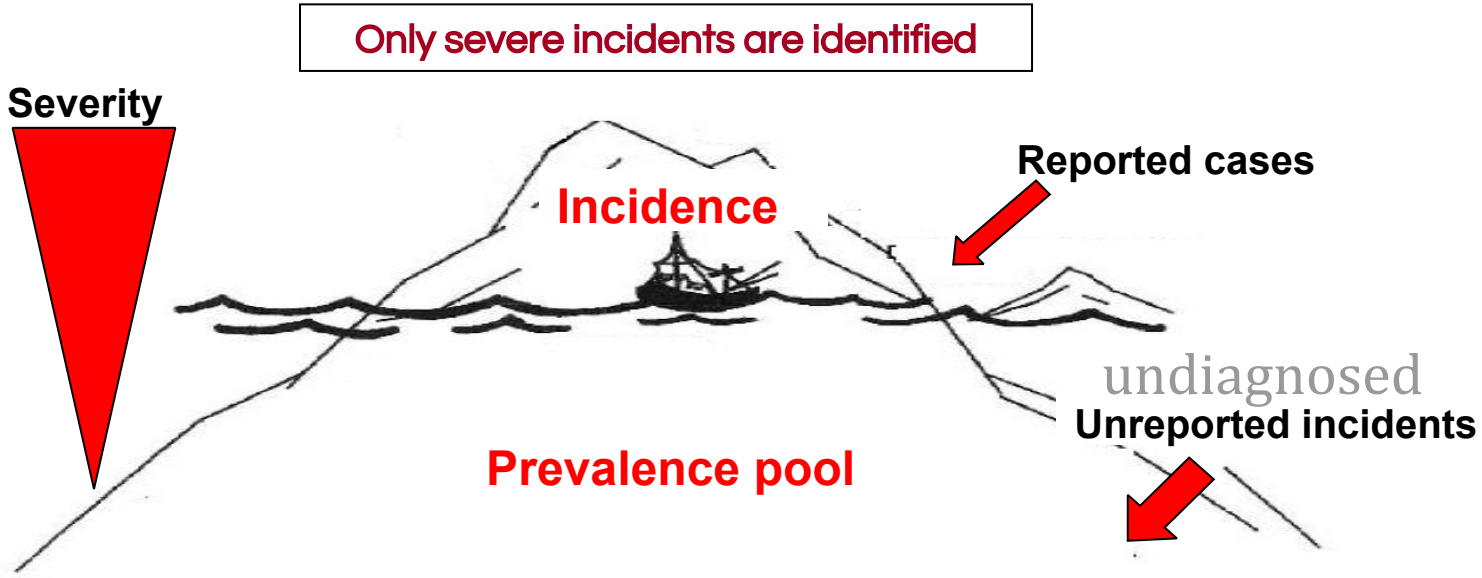



**PHENYLKETONURIA**




**MALARIA**

# ICEBERG PHENOMENON




In order to report a case, it needs to come and seek medical care, and in order for it to come, it needs to be severe; that's why a lot of cases are left unreported (undiagnosed) and missed out. The fact that the presentation and manifestation isn't severe doesn't mean that the disease doesn't exist. The tip of the iceberg represents the incidence (number of newly reported cases), and the rest that's hidden underwater represents the prevalence pool (all individuals of the population who developed the diseases). diseases that begin their courses silently are the best representatives of the phenomenon.

# REFRANESES


- Principles of Epidemiology in Public Health Practice. *Third Edition.* An Introduction to Applied Epidemiology and Biostatistics. Centers for Disease Control and Prevention (CDC).

- Gordis L. Epidemiology 2009