

# The key understanding between the epidemiologic triangle and hill's criteria of C...

[Science](#), [Epidemiology](#)



## **Environmental Epidemiology**

The key understanding between the epidemiologic triangle and Hill's criteria of causality is indeed the fact that there is a correlation revealing a cause and effect mechanism of exposures and health outcomes within the environment of a population. Therefore, the epidemiologic triangle consists of three major factors, which are an agent, a host, and the environment. The environment is defined as the domain in which disease-causing agents may exist, survive, or originate; it consists of "all that which is external to the individual human host".

The host is "a person or other living animal, including birds and arthropods, that affords subsistence or lodgment to an infectious agent under natural conditions". An agent (of disease) refers to a factor such as a microorganism, chemical substance, or form of radiation whose presence, excessive presence, or (in deficiency diseases) relative absence is essential for the occurrence of a disease. These concepts provide the background of observing hypothetical interrelationships factors that may cause disease in epidemiologic studies, in which the agent affects the host within an environment. For example, data documented that air pollution and smoking causes lung cancer.

However, Hill's criteria of causality was proposed as a form of action that must be thoroughly examined before concluding on these observations. There are nine areas of causality, but only seven are needed for the environmental epidemiology study. The seven criteria of causality include

strength, consistency, specificity, temporality, biological gradient, plausibility, and coherence. The overall approach of this criteria of causality towards disease factors suggests that there may be more than one cause towards the correlation between exposures and health conditions within the environment, and that the cause has to be established first before the effect as well.

The father of modern epidemiology was John Snow, who was an English anesthesiologist in the mid 1800's linked an epidemiology study called "the natural experiment" that contributed to discovering the cholera outbreak in London that affected many residents negatively by drinking contaminated water. The results lead to a comparison between two companies in which one used water from a less contaminated river and the other company utilizing a more contaminated water system resulting into a higher mortality rate (Friis).

## **Environmental Toxicology**

1. Environmental toxicology is the study of how ecological systems, their structure, dynamics, function, etc. are affected by pollutants. An example of this study may include the efficacy of carbon monoxide detectors within homes.
2. Paracelsus is one of the founders of modern toxicology, who is most known for contributing significantly by introducing the dose-response relationship, which conducts the observation correlation of the adverse effects between the poison and strength of a dosage chemically on living organisms.

3. Teratogen- a drug that causes birth defects. Xenobiotics- foreign chemicals that are introduced into the body. Carcinogen- a chemical substance that can potentially cause cancer.
4. Toxins and toxicants have poisonous effects; however, toxins are derived from living organisms that include insects, reptiles, plants, and microorganisms such as some mushrooms and poison ivy. Toxicants are made by the result of human activity such as methanol detoxifying within the liver converting to formaldehyde. The difference between a toxin and a poison is that a toxin has certain substances that may produce negative effects, but a poison is any agent that is capable of destructing an entire substance.

LD50 is a lethal dose that refers to the dosage mortality rate of a chemical at 50 percent in living organisms. (Friis, page 54) The degree in which something is poisonous is defined as toxicity, which is determined by a substance's physical and chemical properties such as low and high toxicity. Therefore, I believe that anything can be poisonous or toxic if misused or abused because of the chemical make-up of living organisms.

There are many routes of exposure; however, mainly they are through ingestion through food and drink, injections into the bloodstream, skin and eye contact, and inhalation. These routes of exposure can lead to serious physical damage as well such as lung and brain diseases. (Friis). Duration of Exposure: (Friis)

Acute- usually a single exposure for less than 24 hours

Subacute- exposure for one month or less

Subchronic- exposure for one to three months

Chronic- exposure for more than three months.