

Environmental and occupational epidemiology

Environmental epidemiology provides a scientific basis for studying and interpreting the relationships between the environment and population health. Occupational epidemiology deals specifically with environmental factors in the workplace.

Environmental factors that may affect health include:

Factors	Examples
Psychological	Stress, unemployment, shiftwork, human relationships
Biological	Bacteria, viruses, parasites
Physical	Climate, noise, radiation, ergonomics
Accidental	Hazardous situations, speed, influence of alcohol, drugs
Chemical	Tobacco, chemicals, dust, skin irritants, food additives

Exposure and dose

The concepts of exposure and dose are particularly important in environmental and occupational epidemiology. Exposure has two dimensions: level and duration. For environmental factors that cause acute effects more or less immediately after exposure starts, the current exposure level determines whether effects occur. In epidemiological studies, all kinds of estimates of exposure and dose have been used to quantify the relationship between an environmental factor and the health status of a population.

Dose-effect relationships

For many environmental factors, effects range from subtle physiological or biochemical changes to severe illness or death. Usually, the higher the dose, the more severe or intense the effect. This relationship between dose and severity of effect in the individual is called the dose-effect relationship.

Dose–response relationships

Response is defined in epidemiology as the proportion of an exposed group that develops a specific effect. At low doses almost nobody suffers the effect, and at a high level almost everybody does. This reflects the variation in individual sensitivity to the factor studied.

Risk assessment

Risk assessment is some form of assessment of the health risk of a defined policy, action or intervention. WHO has produced numerous guidelines and methods for doing risk assessments, particularly in relation to chemical safety.

Health impact assessment

Health impact assessment can be considered as a risk assessment focused on a specific population or exposure situation, while risk assessment has a more general application, answering such questions as: “What type of health risk can this chemical potentially cause in certain exposure situations?” Health impact assessment is now widely recommended as a method to assess the potential value of different preventive policies and actions.

There are several steps to assist in an overall environmental risk assessment

- 1- Identify which environmental health hazard may be created by the factor under study.
- 2- Analyze the type of health effect that each hazard may cause (hazard assessment).
- 3- Measure or estimate the actual exposure levels for the people potentially affected, including the general population and the workforce. The human exposure assessment should take into account environmental monitoring, biological monitoring and relevant information about history of exposure and changes over time.

- 4- Combine the exposure data for subgroups of the exposed population with the dose–effect and dose–response relationships for each hazard to calculate the likely health risk in this population.

Risk management

The term risk management is applied to the planning and implementation of actions to reduce or eliminate health risks.

Special features of environmental and occupational epidemiology

Epidemiology is used in environmental and occupational fields to establish:

- Etiology
- Natural history
- The health status of a population
- The value of interventions and health services.