

Nutritional epidemiology

What is Nutritional Epidemiology?

Nutritional epidemiology is an area of epidemiology that involves research to:

1. Examine the role of nutrition in the etiology of disease
2. Monitor the nutritional status of populations.
3. Develop and evaluate interventions to achieve and maintain healthful eating patterns among populations.

Nutritional epidemiology has contributed to understanding the etiology of many diseases.

- Low intake of fruits and vegetables has been shown to be related to increased risk of cardiovascular disease.
- Replacing saturated and trans fats with unsaturated fats can play an important role in the prevention of coronary heart disease and type 2 diabetes.
- Many diseases—as cataracts, neural-tube defects, and macular degeneration—that were not thought to be nutritionally related have been found to have important dietary determinants.
- In the early 1990s, epidemiological studies established that women could substantially reduce their risk of bearing a child with a neural tube birth defect by increasing their intake of the B vitamin folic acid.
- Medical organizations in many nations have recommended increased intakes of folic acid for women of childbearing potential
- Government agencies in several countries are planning to fortify staple foods with folic acid.

Goals of nutritional epidemiology

1. Monitoring food consumption, nutrient intake and nutritional status of a population.
2. Generating new hypotheses about diet and disease, to:
 - „ produce evidence that supports or refutes existing hypotheses
 - „ assess the strength of diet-disease associations.
3. Contributing to prevention of disease and improvement of public health.

Nutrition problems in the past

Typical deficiency syndromes

- . **Protein energy malnutrition**
- . **Iron deficiency anemia**
- . **Goiter**

High frequency among those with very low intake

Short latent periods

Can be reversed within days or weeks

Contemporary nutritional epidemiology

Major diseases throughout the world

- . **Heart disease**
- . **Cancer**
- . **Osteoporosis**
- . **Cataracts**
- . **Stroke**
- . **Diabetes**
- . **Neural tube defects**

Why is it hard to study contemporary nutrition-related disease?

Due to the Characteristics of modern nutrition-related diseases:

- 1. Multiple determinants (factors) (multicausation)**
diet, genetic, psychosocial, levels of physical activity; behavioral characteristics
- 2. Long latent periods**
cumulative exposure over many years, or relatively short exposure occurring many years before diagnosis
- 3. Not readily reversible**
- 4. May result from excessive and/or insufficient intake of dietary factors**

Nutritional assessment of community

The nutritional assessment is an integral part of making a 'community diagnosis'

Objectives

1. Assess the magnitude of nutritional problems of a community
2. Find geographical distribution of such problems
3. Identify 'population at risk' of a certain disease.

Study method

Nutritional surveys can be cross sectional or longitudinal. Random samples are picked from the community as representatives.

Techniques

1. Clinical examination
2. Anthropometry
3. Diet survey
4. Biochemistry
5. Vital statistics (birth, death)
6. Functional assessment
7. Assessment of environment

Clinical examination

Clinical examination is a simple, direct and inexpensive method, but

- **Diagnoses only clinically manifest cases**
- **Most clinical findings are very nonspecific**
- **A doctor is required to conduct the examination.**

Biochemistry

These tests are costly, time consuming and can't be applied on a large scale.

Anthropometry

It is a direct, widely used technique for assessment of under five children. The usefulness of anthropometry depends on accurate assessment of age, standard measurement

procedures and reference values.

(doctors need not be involved in anthropometry).

Indices

1. *Weight for age.*
2. *Height for age.*
3. *Weight for height.*
4. *Body mass index.*

Diet survey

It is the direct method to see for yourself what people are actually eating, and to find any inadequacies, and to suggest remedies.

1. To weight food, both before and after cooking—Accurate, time consuming

2. Interviews on what they have eaten—

Most common method with reasonably good results.

- 24 hr diet history
- Diet cycle: Most families have a system of rotation in their menu, i.e. the same items are rotated over an interval

3. Inventory method—

Estimate what the family stores in stock for a week

Food hygiene

All the conditions that must be met during production, processing, storage, distribution of food so that it remains safe, wholesome and fit for human consumption [WHO].

Household hygiene of cooked food

The UK Food Standards Agency publishes recommendations as part of its Hazard Analysis and Critical Control Points (HACCP) program.

Cooking food until the CORE TEMPERATURE is 75 °C or above will ensure that harmful bacteria are destroyed. However, lower cooking temperatures are acceptable provided that the core temperature is maintained for a specified period of time as follows,

- 60°C for a minimum of 45 minutes
- 65°C for a minimum of 10 minutes
- 70°C for a minimum of 2 minutes.

Nutritional problems in public health

Malnutrition is a pathological state resulting from a relative or absolute deficiency or excess of one or more nutrients.

Solutions for nutritional problems

Indirect interventions

1. Nutritional education
2. ↑ Family diet
3. Sanitation
4. Effective food production and distribution system
5. Family planning
6. Health services
7. Education.

Direct interventions

1. Short and medium term measures (supplementation, fortification, etc.).
2. Nutritional programs.

Quiz

1. Why is it hard to study contemporary nutrition-related disease?
2. What are the characteristics of modern nutrition-related diseases.
3. What are the goals of nutritional epidemiology
4. Enumerate the objectives of nutritional assessment of community
5. Enumerate the methods used in diet survey.
6. What are the main solutions for nutritional problems.

Epidemiology of Accidents and Injuries

ACCIDENTS

“Unpremeditated event resulting in recognizable damage”. Accidents are a manmade epidemic and no longer considered ‘accidental’.

Problem

All the benefits industrialization, increase in transport facilities, overcrowding, urbanization and rural electrification have also brought a number of 'new' accidents.

Agent

Accidents and injuries are commonly classified based on “intentionality”.

Most road traffic injuries, poisoning, falls, fire and burn injuries, and drowning *are unintentional*.

Intentional injuries include interpersonal violence (homicide, sexual assault, neglect and abandonment, and other maltreatment), suicide, and collective violence (war).

Host

- Poisoning, drowning, burns, and maltreatment by caregivers affect primarily *small children*.

- Road traffic accidents, interpersonal violence and sports injuries tend to affect *older children and adolescents*.

In addition, injuries tend to be more *prevalent in boys*.

Environment

- In the *rural* areas injuries mainly to farming activities, pesticide poisoning, and drowning.

- In the urban areas, most injuries are traffic related, or linked to gadgets and electrical appliances, falls or poisonings resulting from household chemicals and drugs ingested by small children.

The environmental factors leading to injury may also be associated with social factors, such as family stress and critical life events (e.g. hospitalization or chronic disease of a parent, or change of residence).

Injury epidemiology

One special type of epidemiological analysis that plays an important role in environmental and occupational health is accident and injury epidemiology.

Traffic accidents are on the increase in many countries and, being a major cause of death and disability among young people and children, they have a great impact on public health.

Traffic crash injuries

A classic example of practical injury epidemiology for traffic crashes is the demonstrated dose–response relationship between driving speed (dose) and frequency of injury (response) for drivers with and without seat belts. This has served as valuable information for decisions regarding two different preventive approaches:

- speed reduction and
- the use of seat-belts

Workplace injury

Similarly, injuries are among the most important types of ill health caused by factors in the workplace. The environmental factors associated with these injuries are often

more difficult to identify and quantify than those causing, for instance, chemical poisoning. *However, technological and management improvements over the years have resulted in great reductions in occupational injury rates in most high-income countries.*

Violence

Violence is another public health problem that has been highlighted through epidemiological analysis during recent years. In certain high-income countries, homicides are a major cause of death among young males, and the situation is even worse in some low- and middle-income countries.

For example, the WHO mortality database shows that in Brazil, homicide accounts for 40% of all deaths among 15–24 year old males. Firearms are frequently used to commit homicide, and this is an increasing trend in several countries.

Suicides

Another important cause of death is suicide. The environmental factors causing suicidal intent are primarily social or economic, but completed suicides are also dependent on access to a suicidal method, which can be seen as an environmental factor.

Preventing accidents

Primary prevention

1. **Data collection of all accidents**, and possible reconstruction of how the accident happened.
2. **Safety education** that must begin with children, and end with drivers; the education must be delivered through schools and include traffic rules, common hazardous substances in the households, safe use of electrical devices, etc.
3. Use of **personal protective equipment**—
Seat belts, helmet, leather clothing and boots, steering balloons.
4. **Improve environment**,
i.e. *Roads, lighting, marking of danger points, provision of fire guards, to store toxic substances safely and out of reach of children, etc.*
5. **Laws** *to ensure that only good quality drivers (who are medically fit) and vehicles get on the street, speed limits are not crossed and alcohol limit in blood/ breath stays below threshold.*

Secondary prevention

Emergency care after accidents, with rehabilitation services must be integrated into primary health care.