

Public Health and Epidemiology

Epidemiological Principles

Disease Surveillance

Public health surveillance is the ongoing systematic collection, analysis, and interpretation of health data essential to planning, implementation, and evaluation of public health practice.

Surveillance Systems

- **Passive Surveillance**: Routine reporting by healthcare providers
- **Active Surveillance**: Proactive case finding by public health officials
- **Sentinel Surveillance**: Monitoring specific populations or conditions

Outbreak Investigation

- **Case Definition**: Establishing criteria for identifying cases
- **Descriptive Epidemiology**: Person, place, and time analysis
- **Analytical Studies**: Case-control and cohort studies to identify risk factors

Preventive Medicine

Primary Prevention

- **Vaccination Programs**: Immunization schedules and coverage targets
- **Health Promotion**: Lifestyle interventions and behavior change
- **Environmental Health**: Reducing exposure to health hazards

Secondary Prevention

- **Screening Programs**: Early detection of disease in asymptomatic populations
- **Risk Assessment**: Identifying individuals at high risk for disease
- **Diagnostic Testing**: Appropriate use of screening tests

Tertiary Prevention

- **Disease Management**: Preventing complications in those with established disease
- **Rehabilitation**: Restoring function and preventing disability
- **Palliative Care**: Improving quality of life for those with serious illness

Global Health Challenges

Infectious Diseases

- **Emerging Pathogens**: Surveillance and response to new infectious threats
- **Antimicrobial Resistance**: Strategies to combat drug-resistant organisms
- **Vector-Borne Diseases**: Control of mosquito-borne and tick-borne illnesses

Non-Communicable Diseases

- **Cardiovascular Disease**: Leading cause of death globally
- **Cancer Prevention**: Screening and risk reduction strategies
- **Diabetes Epidemic**: Prevention and management of type 2 diabetes

Health Equity

- **Social Determinants**: Addressing root causes of health disparities
- **Access to Care**: Ensuring equitable access to healthcare services
- **Cultural Competency**: Providing culturally appropriate care

Environmental Health

Air Quality

- **Pollution Monitoring**: Tracking air quality indicators
- **Health Impact Assessment**: Evaluating effects of air pollution on health
- **Policy Interventions**: Regulations to reduce emissions

Water Safety

- **Drinking Water Standards**: Ensuring safe water supply
- **Waterborne Disease Prevention**: Monitoring and preventing contamination
- **Sanitation Systems**: Proper waste management and treatment

Climate Change and Health

- **Heat-Related Illness**: Preparing for extreme temperature events
- **Vector Ecology**: Changes in disease vector distribution
- **Food Security**: Impact of climate change on nutrition and food safety

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