



uBEATS Teacher's Guide:

Introduction to Epidemiology

This teacher guide is a supplementary text to support the use of the uBEATS “Introduction to Epidemiology” module for grades 6-12.

To help students develop the knowledge necessary for an incredible future in health care, we created UNMC Building Excellence in Academics Through STEM (uBEATS), an online health science resource for Nebraska students.

UNMC uBEATS modules are short (15 minutes or less), interactive online health science modules to supplement curriculum taught in grades 6 – 12. These do not replace curriculum, but they are a supplement for teachers and students incorporating evidence-based information and UNMC expert guided material. Each module is chunked into sections with formative and summative assessments with immediate feedback provided.

Tips on how to utilize uBEATS modules:

- Internet access is required to view uBEATS modules.
- For those who have access to one-to-one technology, modules can be used in or outside of the classroom as a topic introduction, extension, or review. For classrooms without individual student devices, modules can be used in whole group instruction. Formative assessment questions can use the teacher's preferred call and response method and summative assessment questions can be displayed on the board and answered individually by students or printed and distributed to students after viewing the module.

Objectives

1. Identify key (scientific) principles of epidemiology.
2. Explain the terms “distribution” and “determinants” to understand health events/problems in a population.
3. Give examples of ways epidemiology can improve public health.

Introduction

Public health is focused on protecting and improving the health of individuals and communities. Unfortunately, public health is facing more and more challenges. We're all facing an uncertain future with how rapidly the world is changing. Global warming, pollution, infectious diseases, and accumulation of microplastics are all issues that we need to figure out. We need more "hands on deck" to protect the health of our communities.

Prior Knowledge

Before beginning this module, the teacher should understand the Next Generation Science Standards (NGSS) featuring [Three-Dimensional Learning](#).

Dimension 3: Disciplinary Core Ideas—Life Sciences [A Framework for K-12 Science Education](#)

Rapid advances in life sciences are helping to provide biological solutions to societal problems related to food, energy, health, and environment.

Science and Engineering Practices [NGSS](#)

1. Asking questions (for science) and defining problems (for engineering)
6. Constructing explanations (for science) and designing solutions (for engineering)

Crosscutting Concepts [NGSS](#)

1. Patterns
2. Cause and Effect
7. Stability and Change

Key Terms/Vocabulary

Epidemiology, public health, global warming, pollution, infectious disease, microplastics, distribution, determinants, emergency preparedness, natural disasters, environmental health, health services administration, occupational health, occupational safety, population, dispersion, disease-causing agent, communicable disease, chronic disease, genetic markers, epidemiologist, primary physician, exposure risk, antibiotics, morbidity, mortality, incidence, prevalence, descriptive epidemiology, analytic epidemiology, association, causation, observational study, experimental study, clinical trial, community,

trial, demographic, Ebola, Covid-19, bubonic plague, Spanish Flu, smallpox, Hendra virus, measles, Legionnaires' disease, cholera, Parkinson's disease, globalization, urbanization, germ theory, sanitation, pesticides, herbicides, fertilizers.

Science Standards

Nebraska Science Standards

- SC.HSP.17.1.C-Evaluate a solution to a complex real-world human health problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts

Nebraska Health Science Standards

- HS.HS.11.4.c-Describe the basic structural and functional organization of the human body and the systems of the body, including the integumentary, cardiovascular, musculoskeletal, immune, respiratory, digestive, urinary, reproductive, nervous, and endocrine systems

Next Generation Science Standard (NGSS) Core Idea

- ETS2- Links Among Engineering, Technology, Science, and Society

National Consortium for Health Science Education NCHSE

- Foundation Standard 1: Academic Foundation
 - 1.2.1. Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders.
- Foundation Standard 3: Systems
 - 3.1.1 Differentiate healthcare delivery systems and healthcare related agencies

Extensions of the lesson

To help students become more familiar with the Key Terms of this module, the teacher can use the vocabulary list for a classroom Word Wall, or integrate the vocabulary into review sessions.

Encourage students to check current events for the latest news involving epidemics, pandemics, or vaccinations.

Advise students to reflect privately on their own personal history of illness and/or disease.

As student misconceptions become apparent, the teacher may need to reinforce the differences in each of these paired concepts:

- Distribution is the frequency and pattern of health events, while determinants are the causes of health events.
- Morbidity is the rate of incidence, while mortality is the number of deaths.
- Incidence refers to the number of new cases over a period, while prevalence is the proportion of people having that disease.
- Descriptive epidemiology deals with the who, where, and when, while analytic epidemiology is the study of what caused it.
- Association means two things are somehow connected, while causation means that one is the result of the other.

Enrichment

Explore the website of the [Centers for Disease Control and Prevention](https://www.cdc.gov) (CDC) to learn more about their role in promoting public health.

Search for classroom activities on the spread of disease, such as National Geographic's [There's an Outbreak!](#)

Investigate the work of John Snow to understand why he became known as the Father of Epidemiology.