

The investigations in Module 1 of the *Detectives in the Classroom* curriculum prepare students to answer the first Essential Question:

- Why are some people getting sick while others remain healthy?

When students understand how to answer this question, they will be developing the first of five Enduring Understandings that provide the structural framework for the curriculum. The first Enduring Understanding is:

- Clues for formulating causal hypotheses can be found by describing the way a disease or other health-related condition is distributed in a group of people in terms of person, place, and time.

Various types of scientists use different methods to try and determine what is causing people to get sick. Pathologists work at the cellular level and study microscopic tissue samples and organisms. Physicians work at the individual level and study the signs, symptoms, and medical histories of specific patients. Epidemiologists take a more distant view and study groups of people at the population level. The community is the epidemiologist's laboratory.

One of the ways epidemiologists study diseases or other health-related outcomes is to describe how the disease is distributed in terms of person, place, and time (PPT). If we step back and observe how a disease is distributed, we realize that the disease does not affect everyone, everywhere, all the time. Only certain people get sick, in certain places, at certain times. The description of who these sick people are, where they are sick, and when they became sick is the descriptive epidemiology of the disease.

Each disease has its own unique descriptive epidemiology. Breast cancer is more likely to occur among women than men. Skin cancer is more likely to occur among people who live closer to the equator. The flu is more likely to occur during the winter.

The table below, *Describing the Distribution of a Disease*, identifies a few of the person, place, and time characteristics that can be used to describe the distribution of a disease.

<b><i>Describing the Distribution of a Disease</i></b>		
<b>Person</b> (Who)	<b>Place</b> (Where)	<b>Time</b> (When)
Sex	Residence	Year
Occupation	Occupation	Season
Age	At specific events	Day
Economic group	Geographic site	Date of onset
Ethnicity	Anatomical site	Duration

Once we know how a disease is distributed, we can begin to speculate as to why it is distributed that way. Why did these people get sick, in this place, at this time? As we study these descriptive epidemiological clues, we can begin to identify some suspected causes and formulate hypotheses, or educated guesses, to try to explain why some people got sick and others did not.

For example, because breast cancer is more likely to occur among women than men, we might speculate that something about female sex hormones causes the disease. Because skin cancer is more likely to occur among people who live closer to the equator, we might formulate a hypothesis about exposure to the sun causing skin cancer. And because the flu is more likely to occur during the winter, we might speculate that exposure to cold weather causes the flu.

In **Investigation 1-1: Why Are These Students Getting Sick?**, selected students are given "DZ" (disease) signs for a fictitious disease. For example, the teacher may give DZ signs to all students wearing sneakers. The students observe how the DZ is distributed and develop hypotheses about possible "causes" of DZ. For example, students may hypothesize that fumes from the school's newly refinished gymnasium floor caused the DZ. In Investigation 1-1, students begin to become familiar with the terminology of epidemiology (called "Epi Talk") by using terms such as disease distribution, hypothesis, and disease detectives. (Note: Epi Talk is used throughout the Investigations in all five of the modules.)

In **Investigation 1-2: In The News**, students read news articles about different health-related outcomes, identify the parts of the articles that describe the distribution of those outcomes, and categorize the descriptions in terms of PPT. Students also identify the parts of the articles where the authors describe hypotheses that attempt to explain the distributions.

In **Investigation 1-3: What's My Hypothesis?**, each student is assigned an exposure, for example, using a cell phone, and writes a description of how a disease would be distributed, in terms of PPT, if that exposure caused a disease. Then, thinking like an epidemiologist, students review other students' PPT descriptions and formulate one or more hypotheses for each. Students compare their hypotheses and realize that a given PPT distribution of a health-related outcome can lead to the formulation of several different educated guesses.

In **Investigation 1-4: Amy**, students are given a letter to a principal from the mother of a sick child, Amy. Amy's mother believes that her daughter is sick because of a school-based exposure and demands that action be taken immediately. Students are asked to predict the descriptive epidemiology of the disease if it were caused or were not caused by different school-based exposures. Assuming the roles of various stakeholders (manufacturer, principal, epidemiologist, and newspaper reporter), students critique the evidence and conclusions from different perspectives. Students realize the limits of descriptive epidemiological evidence and that formulating hypotheses is not the same as proving a hypothesis. Role-playing helps students appreciate that various stakeholders may interpret descriptive epidemiology clues differently.

In **Investigation 1-5: A Mysterious Ailment**, students read a 1981 newspaper column about AIDS (before it was called AIDS and before the virus had been identified) and identify the descriptive epidemiological clues that led to the formulation of early causal hypotheses. To further understand the value of descriptive epidemiology, students predict what the descriptive epidemiology of AIDS would have been if the disease was caused by mosquito bites, sitting on toilet seats, donating blood, or shaking hands. Students realize that descriptive epidemiology is sometimes useful in determining that certain causal hypotheses do not make sense.

In **Investigation 1-6: Concept Connections**, students identify the important concepts that need to be understood in order to answer the first Essential Question, “Why are some people getting sick while others remain healthy?” Students then draw a concept map that depicts and explains how the concepts connect to each other. In conclusion, students realize that they have developed the first Enduring Understanding of Detectives in the Classroom, “Clues for formulating causal hypotheses can be found by describing the way a disease or other health-related condition is distributed in a group of people, in terms of person, place, and time.”