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Week 8: Public Environment & Health

Module 2: Introduction to Epidemiology

Lesson: How Do Scientists Track an Outbreak?

Lesson Overview	
Students learn how epidemiologists study disease patterns and causes within populations. They use evidence to identify patterns, test explanations, and revise their thinking when new information appears. This matters because epidemiologists help communities understand health problems, identify likely causes, and make informed decisions that protect public health.	
Learning Targets	Vocabulary
Explain how scientists study disease in a population. Distinguish between patterns (what is happening) and causes (why it is happening). Analyze outbreak data to determine and revise the most likely cause.	Epidemiology studying disease in groups of people Population a group of people in the same place Distribution patterns of disease (who, where, when) Determinants causes of disease
Materials	Instructional Notes
Module Student response sheets Whiteboard or chart paper	This lesson builds on students' understanding of public health from the previous module. Students move from thinking about community health systems to examining how epidemiologists investigate health events within populations. The lesson develops students' understanding that epidemiology focuses on groups rather than individual patients. The primary conceptual shift is helping students understand the difference between distribution and determinants. Students often jump directly to a cause without first examining patterns. Through the lesson, students gather evidence showing that epidemiologists first study who is affected, where events occur, and when they occur before testing explanations for why the problem is happening. The application activity was selected because it mirrors authentic epidemiological work. Students identify patterns, evaluate competing determinants, and revise explanations when new evidence emerges. The focus is not on finding the correct answer immediately but on using evidence to support and improve explanations. This prepares students for future learning about outbreaks, public health investigations, and evidence-based decision making.



Learning Experience

8 min	Opening	The teacher displays the scenario: "A school may have to shut down. Many students suddenly have severe stomach pain." Students are asked: "What is causing the illness?" The teacher reveals the initial evidence: • Most sick students are in 7th grade • Many ate school lunch • Illness started on Monday Students are given time to consider whether the evidence supports their original idea. The teacher then reveals additional evidence: • Students who brought lunch also got sick • Students who did not eat lunch also got sick Students are asked to revise their thinking and discuss what evidence influenced their decision. The teacher facilitates a brief share-out. Students write an initial explanation, review the evidence, decide whether the evidence supports their original idea, revise their explanation using the new information, and discuss what evidence changed their thinking.
15 min	Module	Focus: What epidemiologists study, the difference between patterns and causes, and how epidemiologists use evidence to determine causes in populations. Guiding Questions: • What is a population? • What patterns do scientists look for? • How do scientists determine causes?
15 min	Application	The teacher displays the scenario: "A city health department is investigating a rise in respiratory illnesses. Officials are trying to determine the most likely determinant before making recommendations to the community." The teacher displays the investigation data: • Most cases are occurring in neighborhoods located near major highways. • Cases increased during the same month that air quality measurements worsened. • The highest number of cases occurred in people who spend most of their day outdoors in the affected neighborhoods. • Cases are occurring across different age groups. The teacher tells students: "You are epidemiologists. Use the evidence to identify patterns and determine which possible determinant best explains the data." The teacher displays the possible determinants: • Air pollution • A contagious virus • Seasonal allergies Students are reminded to use evidence from the module:



		• Distribution focuses on who, where, and when. • Determinants explain why a health event occurs. • Epidemiologists use patterns to test possible causes. As students work, the teacher circulates and asks: “Which information describes a pattern?” “Which determinant best matches the patterns?” and “What evidence supports your explanation?” In Step 1: Identify the Patterns, students determine the who, where, and when patterns in the investigation data and record at least two patterns supported by evidence. In Step 2: Evaluate Possible Determinants, students review the three possible determinants, eliminate one determinant that does not fit the evidence, and select the determinant that currently best matches the patterns. In Step 3: Construct an Explanation, students write a claim identifying the most likely determinant and support the claim with evidence from the investigation data. In Step 4: Revise with New Evidence, the teacher reveals: “Investigators find that neighborhoods with the highest illness rates also had the highest air pollution measurements during the outbreak period.” Students decide whether the explanation still fits, revise the explanation if needed, and explain how the new evidence affected the claim. Sentence Frames: “One pattern we noticed is _____. ” “This determinant matches the evidence because _____. ” “Our claim is supported by _____. ” “We revised our thinking because _____. ”
2 min	Reflection	Why do scientists need patterns before identifying causes?
2 min	Career Connections	Epidemiologists study diseases, injuries, environmental exposures, and other health events that affect populations. They analyze patterns, investigate determinants, and use evidence to help communities make informed public health decisions. Their work has helped identify sources of disease outbreaks, improve public health systems, and investigate environmental factors that affect community health.