

RESOURCE LIBRARY
LESSON

Controlling the Contagion: Proactive and Reactive Responses to an Outbreak

Students evaluate different proactive and reactive measures that can be implemented in response to an outbreak of infectious diseases. They then explore how different contextual factors can present unique challenges for an outbreak response and disease prevention. This lesson is part of the *Menacing Microbes* unit.

GRADES

6 - 8

SUBJECTS

Biology, Health, Geography, Human Geography, Social Studies, Civics

CONTENTS

3 Activities

In collaboration with



ACTIVITY 1: REACTIVE POLICIES AND
PRACTICES FOR DISEASE CONTROL | 50
MINS

DIRECTIONS

Menacing Microbes Unit Driving Question: How does a community get ready for an outbreak?

Controlling the Contagion Lesson Driving Question: How can we prevent the spread of disease?

1. Watch a video from the CDC to learn about the different people and actions involved in an outbreak response.

Have students watch this video from the CDC, Behind the Headline. As students watch the video, have them answer the following questions:

- *Who is involved?* (Suggested response: federal, state, and local partners; doctors, epidemiologists, statisticians, nurses, communicators, biologists, virologists, mosquito experts, and administrative staff)
- *What do they do?* (Suggested response: watch and analyze data, inform the community, look for patterns, safety training, respond to emergency calls, go to the outbreak site, lab testing)
- *What skills do they need?* (Suggested response: mapping, communication, analysis, reporting)
- *What else do you notice?*

As a class, discuss student responses to these questions.

2. Read to learn about different reactive policies and practices in response to an outbreak.

- Set the purpose of the reading by connecting the reading with their action plan. An example introduction to the reading could be: *In the action plan you will create for your selected disease, you will need to include certain policies and procedures to stop the spread of disease once an outbreak has been identified. Today, you are going to read about some common policies and procedures that communities use to do this.*
- Have students begin to read the article, Preventing and Containing Outbreaks.
 - With a partner from their project group, have students read through the section of the article, "Non-Pharmaceutical Interventions."
 - After reading this section, ask your students: *Will this work for your disease? Is this a realistic plan? Who is involved?*
 - Allow students to discuss in their project groups and orally respond to each question.
- Once students have had a chance to discuss and share their ideas, distribute the Action Plan Research worksheet for students to begin filling in the row for NPIs.
- With their same reading partners, students read the next section of the article, "Quarantine."

- Introduce the term reactive, and add to the word wall started at the beginning of the unit. Tell students that reactive measures occur after the outbreak has started, and are intended to minimize the existing illness.
- With their same reading partners, students read the remainder of the article, continuing to stop, discuss, and add to their Action Plan Research worksheet after each section.

By the end of this activity, students will have reactive measures listed on their Action Plan Research worksheet. They will add additional proactive measures in subsequent activities.

Tip

Step 2: Build a word wall with key vocabulary from the activity.

Modification

Step 2: If you would like to disaggregate the NPIs, you can separate them into Personal NPIs, Community NPIs, and Environmental NPIs.

Tip

Step 2: Model filling in the table with polio or another disease that students are not using as their focal disease.

Modification

Step 2: There are blank rows in the table for you or your students to add additional policies and practices that might work for their focal diseases. If students have extra time, they can do this as independent research.

Informal Assessment

Have students complete and submit an exit ticket that identifies one reactive policy or practice that will work for their disease. Have students submit the following details on the reactive policy or practice they have chosen:

1. *What is the name of the response?*
2. *Who oversees this response?*
3. *What happens during the response?*
4. *When is this response used?*

An example of a completed exit ticket:

1. Isolation in hospital.
2. Doctors, nurses, clinicians, health care providers.
3. Isolation of infected person per case. Appropriate use of Personal Protective Equipment by those who come into contact with the infected person.
4. As soon as the person is diagnosed.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Social Studies

- Civics

Learning Objectives

Students will:

- Explain the different roles that individuals, organizations, and the government have in enacting reactive policies for a response to disease outbreaks.
- Evaluate which reactive measures are appropriate to implement for a disease outbreak.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Modeling
- Reading
- Visual instruction

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- Reading Standards for Literacy in History/Social Studies 6-12:

Key Ideas and Details, RH.6-8.2

THE COLLEGE, CAREER & CIVIC LIFE (C3) FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS

- D2.Civ.12.6-8:

Assess specific rules and laws (both actual and proposed) as means of addressing public problems.

- D2.Civ.13.6-8:

Analyze the purposes, implementation, and consequences of public policies in multiple settings.

- D2.Civ.2.6-8:

Explain specific roles played by citizens (such as voters, jurors, taxpayers, members of the armed forces, petitioners, protesters, and office-holders).

- D2.Civ.6.6-8:

Describe the roles of political, civil, and economic organization in shaping people's lives.

Preparation

BACKGROUND & VOCABULARY

Background Information

Outbreaks of infectious microbial disease can and do happen in communities across the globe. When this happens, teams of people mobilize in response to the notification of the outbreak. Efforts to contain the outbreak are considered reactive measures. When something is reactive, it is acting in response to a situation, rather than creating or preventing it. Many emergency responses are reactive in contexts outside of disease control. Examples include when police respond to an emergency call or when firefighters are called to a fire. Pertaining to outbreaks of disease, once a disease has been identified, it is important to take measures to stop further spread of the disease.

Prior Knowledge

☐

Recommended Prior Activities

- [Analyzing BioBlitz Data](#)
- [Getting Sick: How Diseases Spread](#)
- [Mapping the Spread of Disease in a Community](#)

Vocabulary

Term	Part of Speech	Definition
Centers for Disease Control and Prevention (CDC)	<i>noun</i>	agency, part of the Department of Health and Human Services, whose mission is "to create the expertise, information, and tools that people and communities need to protect their health through health promotion, prevention of disease, injury and disability, and preparedness for new health threats."
contain	<i>verb</i>	to keep under control, hold, or prevent escape.
diagnose	<i>verb</i>	to identify a disease or problem.
medical treatment	<i>noun</i>	care given to a patient for an illness or injury, relating to the science or practice of medicine.
non-pharmaceutical interventions	<i>noun</i>	actions, apart from getting vaccinated and taking medicine, that people and communities can take to help prevent or limit the spread of illnesses.
outbreak	<i>noun</i>	sudden occurrence or rapid increase.
policy	<i>noun</i>	set of actions or rules.

Term	Part of Speech	Definition
recall	noun	manufacturer's request that all the purchasers of a certain product return a product that may be defective or contaminated.

ACTIVITY 2: PROACTIVE POLICIES AND PRACTICES FOR DISEASE CONTROL AND PREVENTION | 50 MINS

DIRECTIONS

Menacing Microbes Unit Driving Question: How does a community get ready for an outbreak?

Controlling the Contagion Lesson Driving Question: How can we prevent the spread of disease?

1. What does it mean to be proactive?

- Ask your students: *What does it mean to be proactive?*
(Potential responses: Anticipating what might happen, planning ahead, preparing in advance and acting ahead instead of simply reacting to circumstances, being ready.)
- Have students turn and talk to their neighbor about ways that they are proactive in their daily life. Have students share out their answers with the rest of the class to check for understanding.
- Add proactive to the word wall that was started at the beginning of the Menacing Microbes unit.

2. Use learning stations to identify proactive policies and practices to be included in an outbreak action plan.

- Introduce this step of the activity by informing students that there are many proactive measures that individuals, communities, and governments can take to prevent outbreaks of infectious diseases. In these learning stations, students will learn about six of them.
- Set up six learning stations in the room grouping the materials listed into the following categories:

1. Vaccines

- Reading: [Here's Why Vaccines are so Crucial](#)
- Timeline: [History of Vaccines](#)

2. Food safety

- Video: [Foodborne Diseases](#)
- Reading: [Washing Food: Does it Promote Food Safety?](#)

3. Pest control

- Website: CDC, [Controlling Mosquitos at Home](#)
- Website: CDC, [Preventing Tick Bites](#)

4. Clean water

- Video: [How Do We Clean Water?](#)
- Website: WHO, [Drinking-water](#)
- Reading: [Nov 19, 2001: World Toilet Day](#)

5. Large-scale community plans

- Press Release: [Statewide drill tests ability to receive and deliver emergency medicine and supplies](#)
- Press Release: [Disaster exercise on intentional release of plague set for April 30](#)

6. Personal Hygiene

- Infographic: [Cover your Cough](#)
 - Website: CDC, [Show Me the Science - Why Wash Your Hands?](#)
 - Video: [Fight Germs. Wash Your Hands.](#)
- Before students begin their station rotations, assign students specific roles in the group to help focus their attention at each station.
 - Each group should have a designated recorder to write down the important information on the Action Plan Research worksheet.
 - Other group members can use the columns of the [Action Plan Research](#) worksheet to focus their attention on particular aspects of each source (e.g., student A will look for the definition and people involved, student B will consider whether the method will work for the group's disease and whether it is realistic).

- Have student project groups visit all six stations to explore more about each proactive measure.
 - As project groups visit each station, they add to the corresponding rows of their Action Plan Research worksheet. For each policy or practice, students will discuss: *What is the definition? Is it proactive or reactive? Who is involved (government, community, and individuals)? Will this work to effectively contain our disease? Is this a realistic measure to implement? Why or why not? Should we include it in our action plan?*
 - Once they discuss each question, they can record their response in the corresponding box on the table.
 - As students are working through the stations, circulate the room and check-in with them. Use the Action Plan Research worksheet to assess their understanding of the different reactive and proactive measures. Use the organizer to ask students questions about how each of these measures would work for their disease.
 - As students finish their last learning station, have them move on to completing the exit ticket outlined in the assessment section.

By the end of this step, students should have the following rows in the Action Plan Research worksheet completed: NPIs, quarantine, isolation, closing public spaces, food recall, vaccines, food safety, pest control, clean water, large-scale community planning.

Tip

Step 2: Add each of these proactive methods to the word wall after completing the learning stations.

Tip

Step 2: Personal hygiene is a form of an NPI. You may want to clarify this with students by giving them examples of community and environmental NPIs.

Tip

Step 2: Read through the materials in advance and decide how you want to organize and facilitate your stations. How will you indicate that it is time to change stations? How long will students spend at each station?

Tip

Step 2: There are blank rows in the [Action Plan Research](#) worksheet. Students may want to add additional policies and practices to these. Some students may want to research Testing People for Disease and Public Health Education, which are listed on the table for students to research on their own.

Modification

Step 2: This activity works best with computers. If you do not have access to computers, you will need to print the text of the websites, and show any videos and or interactive timelines from the learning stations to the entire class.

Informal Assessment

Have students complete and submit an exit ticket that identifies one proactive policy or practice that will work for their disease. Have students submit the following details on the proactive policy or practice they have chosen:

1. *What is the name of response?*
2. *Who oversees this response?*
3. *What happens during the response?*
4. *When is this response used?*

An example of a completed exit ticket on food washing:

1. Wash produce.
2. People preparing food to eat.
3. Wash produce with cold running tap water to remove dirt. Firm produce such as apples or potatoes can be scrubbed.
4. Just prior to preparing (e.g., cutting, cooking).

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Social Studies

- Civics

Learning Objectives

Students will:

- Identify the different roles that individuals, organizations, and the government have in enacting proactive policies for response to disease outbreaks.
- Evaluate which proactive measures are most appropriate to implement in a disease outbreak.

Teaching Approach

- Project-based learning

Teaching Methods

- Reading
- Self-directed learning
- Visual instruction

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Information, Communications, and Technology Literacy
 - Media Literacy
 - Life and Career Skills
 - Social and Cross-Cultural Skills
- 21st Century Themes
 - Health Literacy

- Critical Thinking Skills
 - Analyzing
 - Applying
 - Understanding

National Standards, Principles, and Practices

ENERGY LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- D2.Civ.10.6-8:

Explain the relevance of personal interests and perspectives, civic virtues, and democratic principles when people address issues and problems in government and civil society.

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- CCSS.ELA-LITERACY.RH.6-8.2:

Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.

- CCSS.ELA-LITERACY.RH.6-8.7:

Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

THE COLLEGE, CAREER & CIVIC LIFE (C3) FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS

- D2.Civ.12.6-8:

Assess specific rules and laws (both actual and proposed) as means of addressing public problems.

- D2.Civ.2.6-8:

Explain specific roles played by citizens (such as voters, jurors, taxpayers, members of the armed forces, petitioners, protesters, and office-holders).

- D2.Civ.6.6-8:

Describe the roles of political, civil, and economic organization in shaping people's lives.

Preparation

BACKGROUND & VOCABULARY

Background Information

Preventing infectious disease outbreaks requires planning ahead. Prevention plans can help reduce illness, hospitalization, and death. Proactive measures anticipate future outbreaks of disease and work to prevent the transmission of disease among people. Rather than waiting for the outbreak to occur, proactive measures keep people healthy.

Proactive measures are recommended in contexts outside of disease prevention any time people are forward planning and acting accordingly. For example, communities educate people about the tolls of drug abuse as a proactive step to keep people from using them. Students who study for their tests are proactive in an effort to prevent low grades. An outbreak response and prevention plan that includes both reactive and proactive measures will not only control an outbreak once it starts but will help keep future outbreaks from occurring.

Prior Knowledge

[]

Recommended Prior Activities

- [Analyzing Disease Outbreaks](#)
- [Getting Sick: How Diseases Spread](#)
- [Investigating Infectious Diseases](#)
- [Mapping the Spread of Disease in a Community](#)
- [Reactive Policies and Practices for Disease Control](#)

Vocabulary

Term	Part of Speech	Definition
------	----------------	------------

Term	Part of Speech	Definition
Centers for Disease Control and Prevention (CDC)	noun	agency, part of the Department of Health and Human Services, whose mission is "to create the expertise, information, and tools that people and communities need to protect their health through health promotion, prevention of disease, injury and disability, and preparedness for new health threats."
outbreak	noun	sudden occurrence or rapid increase.
personal hygiene	noun	action or habit of keeping oneself clean, especially as a means of maintaining good health.
practice	verb	to do or perform often, customarily, or habitually

ACTIVITY 3: WHERE YOU LIVE CAN IMPACT HOW YOU GET SICK! | 50 MINS

DIRECTIONS

Menacing Microbes Unit Driving Question: *How does a community get ready for an outbreak?*

Controlling the Contagion Lesson Driving Question: *How can we prevent the spread of disease?*

1. Watch National Geographic photographer Pete Muller's video to learn about how Ebola impacts a rural community in Sierra Leone.

- Set the purpose for the video by telling students that they will need to think about the impact of outbreaks on the community when creating their action plans. Suggested statement: *Outbreaks happen differently depending on where you are in the world. In a big dense city, disease may spread differently than it would in a farming community where people live miles away from each other. We are going to watch a video that highlights how the locations of Ebola outbreaks affect the community response to the disease. You will want to consider how the location of an outbreak of your focal disease might impact the things you put in your action plans!*
- Pete Muller, a National Geographic photographer and 2017 Fellow, tells the story of how Ebola has impacted a rural community in Sierra Leone. Have students watch the video [Ebola: Photos From the Heart of the Struggle](#).
- After watching the video, have students discuss the following questions in small groups:

- *How do you think people in the community perceive the disease?*
- *What resources are available in this community to respond to the outbreak?*
- *How might it be different if the Ebola outbreak happened in a big city like New York?*

Suggested follow-up questions to scaffold student thinking might include: *How far away might the nearest hospital be? How clean is the water? Who is preparing food? How educated are people about disease transmission and prevention? How do people communicate with the government to get help?*

- Next, as a whole class, have students brainstorm ideas for how to better educate the community about the Ebola disease and its survivors.
- Record their ideas on chart paper. This chart paper can later be used a resource for students to think about educating the community about their focal diseases.
- Review the concepts of rural and urban and add to the word wall that was started at the beginning of the Menacing Microbes unit.

2. Read about National Geographic Explorer Hayat Sindi and what she is doing to overcome challenges with healthcare in rural India.

- Set the purpose for reading by informing students that monitoring health is an effective and important proactive measure to contain and prevent disease. Suggested statement: *Being in a rural place can have big challenges. You are going to read about, Hyat Sindi, a woman who is learning how to overcome some of these challenges. As you read, think about how you might address similar challenges if there was an outbreak of your focal disease in rural India.*
- Distribute the explorer profile on Hayat Sindi to students and discuss how she is working to overcome challenges with bringing affordable health care to rural India.
 - While reading, have students think about if and how their action plan would work in different kinds of communities.
- In pairs, have students read the [Explorer Profile of Hayat Sindi](#).
- After reading, have the pairs of students discuss how the context of rural India might impact the effectiveness of their action plan.

3. Jigsaw read to learn about additional cultural complicating factors for vaccination.

- Set the purpose for this part of the activity by telling students that there are many factors that complicate disease containment and prevention. Suggested statement: *Location isn't the only thing that can have an impact on disease containment and prevention. Sometimes, there are cultural factors that can impact disease containment and prevention. You are going to read about some cultural factors that have impacted the effectiveness of vaccine campaigns.*
- Conduct a jigsaw read by setting students up in their project groups and assigning each student a different article to read. Students should read their assigned article and then teach the other members of their group about their complicating factor. The four readings are:
 - Cultural Perspectives on Vaccination, Section Two: Religious Perspectives and Vaccine Objections
 - Taliban Assassins Target Pakistan's Polio Vaccinators
 - Vaccines Do Not Cause Autism
 - The Strange History of Vaccines—And Why People Fear Them
- Have students annotate their text as they read by using the following symbols:
 - Checkmark next to something important.
 - Question mark next to things that you do not understand or have questions about.
 - Star next to something your group can use in your action plan.
- After reading, have students with the same article get into a group to share the areas that they still have questions about. Have students try to clear up any misunderstandings as a group.
- Next, have students take a few minutes to write a three-sentence summary of their article. Then, have students reconvene with their project group to share their article summary and discuss how this information should be considered when implementing their disease outbreak action plan.

4. Debrief discussion about how the response to outbreaks might impact people differently in different parts of the world.

To wrap up the activity, have students discuss in their project groups questions that challenge them to think about different community structures in the world and their relationship to disease outbreaks:

- Possible questions include: *In what ways might an outbreak of your focal disease in an African tribal community be different from an outbreak in a big city in the United States? From a rural American farming community? In rural India? In a big dense city in Asia, such as Tokyo? In a place where there might be many earthquakes, such as Alaska? In a place where there is war, such as Syria?*
- Ask: *How might the response to the outbreak be different in these areas?*
- Revisit the column of the Action Plan Research worksheet that asks if a policy or practice is realistic. Ask students to consider if there are special geographic or cultural considerations, if there are, have students note them there.

Tip

Step 2: If you have a local article or resource that emphasizes something unique about your context (e.g., perceptions of vaccines, factors influencing a local outbreak), include this in the jigsaw for a close real-world connection.

Modification

Step 2: If students are working in groups of three, they should prioritize reading the [Cultural Perspectives](#) section, the [Taliban article](#), and the CDC site [Vaccines Do Not Cause Autism](#). If your project groups have five to six students, there are additional sections of the Cultural Perspectives article that can be included in the jigsaw.

Informal Assessment

Collect the Action Plan Research worksheet to assess students' understanding of content, reactive and proactive response measures, and the application to their disease. The Action Plan Research worksheet is integral to the students' ability to complete the action plan in the next lesson. If you are unable to return the organizer to them at the beginning of the next lesson, consider collecting this after they complete the action plan.

If you would like an additional assessment, collect students' three-sentence summaries from step three to check for understanding of content.

OBJECTIVES

Subjects & Disciplines

Geography

- Human Geography

Social Studies

- Civics

Learning Objectives

Students will:

- Describe the ways that geographic and cultural context can impact disease containment and prevention.
- Evaluate how geographic and cultural context can impact disease containment and treatment.

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Discussions
- Jigsaw
- Multimedia instruction
- Reading
- Visual instruction

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
- 21st Century Themes

- Civic Literacy
- Global Awareness
- Health Literacy
- Geographic Skills
 - Acquiring Geographic Information

National Standards, Principles, and Practices

ENERGY LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- D2.Civ.10.6-8:

Explain the relevance of personal interests and perspectives, civic virtues, and democratic principles when people address issues and problems in government and civil society.

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- CCSS.ELA-LITERACY.RH.6-8.7:

Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

- CCSS.ELA-LITERACY.SL.9-10.1:

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

- Reading Standards for Literacy in History/Social Studies 6-12:

Key Ideas and Details, RH.6-8.2

THE COLLEGE, CAREER & CIVIC LIFE (C3) FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS

- D2.Civ.13.6-8:

Analyze the purposes, implementation, and consequences of public policies in multiple settings.

- D2.Geo.4.6-8:

Explain how cultural patterns and economic decisions influence environments and the daily lives of people in both nearby and distant places.

Preparation

BACKGROUND & VOCABULARY

Background Information

There are many complicating factors that should inform a community response plan to an outbreak of infectious disease. These include population density, climate, and cultural factors. When a community is difficult to reach, it may be useful to include plans for air life support or at-home treatment until help arrives. There may be a need for access to clean water to prevent dehydration and keep conditions sanitary.

Some communities may need education about transmission of particular diseases, which would be useful to include in a response and prevention plan. When developing an action plan, unique aspects of a community that can impact the mobilization of the plan should be included for the plan to be effective.

Prior Knowledge

[]

Recommended Prior Activities

- [Analyzing BioBlitz Data](#)
- [Getting Sick: How Diseases Spread](#)
- [Investigating Infectious Diseases](#)
- [Mapping the Spread of Disease in a Community](#)
- [Proactive Policies and Practices for Disease Control and Prevention](#)
- [Reactive Policies and Practices for Disease Control](#)

Vocabulary

Term	Part of Speech	Definition
climate	<i>noun</i>	all weather conditions for a given location over a period of time.
containment	<i>noun</i>	act or policy of limiting the spread of an idea or influence.

Term	Part of Speech	Definition
disease	noun	harmful condition of a body part or organ.
outbreak	noun	sudden occurrence or rapid increase.
population density	noun	the number of people living in a set area, such as a square mile.
rural	adjective	having to do with country life, or areas with few residents.
urban	adjective	having to do with city life.
vaccine	noun	preparation of a weakened or killed pathogen, or of a portion of the pathogen's structure that upon administration stimulates antibody production against the pathogen but is incapable of causing severe infection itself.

Informal Assessment

Use the questions below to assess students' understanding of the main ideas of this lesson. Have students write their responses in complete sentences.

- *Based on what you learned about proactive and reactive measures for disease prevention, what is an example of each measure that could help stop the spread of the common cold?*
- *Think about the place where you live. What is at least one unique aspect of where you live that would be important to consider when developing an outbreak response plan?*

