

Are You at Risk? (90 minutes—over 2 class periods, plus homework)

Section

Your Safety, Your Life

Investigative Questions

What is the actual risk of a given natural disaster in your community? How do people respond to the stress of a disaster? What are steps young people can take to prepare their families for a natural disaster? What are the dangers to public health from natural disasters?

Description of Content

Working with students so they accurately assess their risk of natural disasters, understand the nature of media coverage of these events, and develop an emergency preparedness plan can help them reframe the problem and reduce their stress.

In this activity, students determine which types of natural disasters are most likely to strike their area. They then conduct interviews and do research on those natural disasters. They also discuss the geologic and geographic factors that make a particular place more or less at risk for a given natural disaster. Students explore the effect that pervasive news coverage of natural disasters (those that occur locally, as well as those striking outside the community) does to stress levels of people who read, watch, or listen to the reports. Finally, students research and report what individuals and families can do to prepare for natural disasters most common to their area.

Relevant Standards

This activity fulfills science and health education standards.

Objectives

Students will:

- Research a variety of natural disasters and determine those most likely to affect their community
- Research through the Internet and community interviews natural disasters that have affected their community and record their findings
- Research the geologic and geographic factors that make a particular place more or less at risk for a given natural disaster and record their findings
- Discuss the effect of news coverage of natural disasters on stress levels and how to evaluate such coverage
- Research and discuss emergency preparedness measures

Ideas and Behaviors Common Among Students

This activity offers information from the literature on ways students think and act when exposed to large-scale stress, such as natural disasters.

Materials

- Student Reproducible 1: *Natural Disasters in Your Community: Are You at Risk?*
- Student Reproducible 2: *Planning for an Emergency*
- Access to online reference materials or newspapers, magazines, almanacs, and an encyclopedia

Safety

Normal classroom safety procedures should be observed.

Teacher Background

While the odds of being the victim of a natural disaster are low, children who suffer such an experience are at risk for post-traumatic stress disorder. But even children who are exposed only to the pervasive coverage by the news media of natural disasters can be worried that the disaster will happen to them, and that they may be separated from their family and friends. Working with students so they accurately assess their risk, understand the nature of media coverage of these events, and develop an emergency preparedness plan can help them reframe the problem and reduce their stress. This activity, as well as another *BAM! Body and Mind™* activity entitled “Helping Hands”, is designed to help you help your students better understand natural disasters, and overcome the anxiety associated with them.

One important task for teachers is to remind students that while the world is full of surprises, the really big ones don't happen very often and don't affect the vast majority of people. Terrible as hurricanes, floods, tsunamis (series of waves when water is rapidly displaced on a massive scale), blizzards, wild fires, and avalanches (large snow or rockslides) are, most people are *not* directly affected, except for the very real concern that they feel for other human beings.

When natural disasters do hit, the health concerns associated with them are manifold. After the rescue of survivors, the primary public health issues are clean drinking water, food, shelter, and medical care for injuries. Loss of shelter leaves people vulnerable to insect exposure, heat (or cold), and other environmental hazards. According to the CDC, over the long term, public health agencies must: monitor for environmental, infectious, and food-, water-, or insect-transmitted diseases; restore normal primary health services and water systems; advise on safe housing; and assist the community to recover mentally and socially when the crisis has subsided.

There is a great deal of easy-to-read information on natural disasters and how to prepare for them on the Web. The U.S. Department of Homeland Security hosts Ready.gov (<http://www.ready.gov/>) with a special section on natural disasters at

<http://www.ready.gov/natural-disasters>. From this page, you can access the Federal Emergency Management Agency (FEMA) fact sheets on natural disasters including earthquakes, hurricanes, floods, landslides, volcanoes, and others. Each of these fact sheets includes information on the areas within the United States most at risk for natural disasters, as well as the science behind why the disaster happens. FEMA is the first responder to all natural disasters in the United States.

The CDC assists in natural disasters taking place in the United States and around the world. After a natural disaster, teams from CDC and other emergency response groups (governmental and private) work with local and state agencies to address public health issues. The CDC also has information on specific natural disasters at www.bt.cdc.gov/disasters/. For example, the hurricane site, which can be found on www.bt.cdc.gov/disasters/hurricanes/, contains useful information on emergency preparedness and response before, during, and after a hurricane, as well as key health issues that arise after hurricanes, such as flooding.

While this lesson specifically focuses on natural disasters, it is important to note that students' responses to stress from man-made disasters (such as violence) are similar to their responses to natural disasters. Many of the techniques that reduce stress from natural disasters are also effective in the event of a man-made disaster.

Procedure

Engagement (10 minutes)

1. Ask students to list natural disasters they have heard about. Make a list on the board of their answers.
2. Ask students to share their own personal stories of natural disasters they, or someone they know, have experienced. What types of worries, problems, or stress did they (or the people they know) experience as a result of these natural disasters—either before the disaster occurred, during the disaster, or afterward?
3. Ask students a series of questions about relative risks.
 - a. Which is more common in our country—a hurricane or a tsunami? (Answer: Hurricane. On average, approximately five hurricanes strike the United States coastline each year from Texas to Maine. Alaska, Hawaii, and the coasts of Washington, Oregon, and California are most at risk for tsunamis. Tsunamis hit Hawaii about once a year and damaging tsunamis hit about once every seven years. Alaska is at high risk too, but California, Oregon, and Washington experience a damaging tsunami about every 18 years.)
 - b. Which has a higher fatal accident rate: driving a car or taking an airplane trip? (Answer: Over a lifetime, the risk of dying in a passenger car is 1 in 228; over a lifetime, the risk of dying in an airplane is 1 in 5,704. In effect, riding in a car is about 25 times more

deadly than riding in a plane.)

- c. What are the odds of being struck by lightning in any given year? (Answer: Not very likely—1 in 700,000.)
4. Ask students if any of these answers surprised them. Why? What have they seen or heard that would make them think differently?

Exploration (30 minutes over two class periods plus homework)

1. Divide students into groups. Distribute Student Reproducible 1: *Natural Disasters in Your Community: Are You at Risk?*
2. Using reference materials (Internet search engines, local newspapers, news magazines) have students research the history of natural disasters in their community.
3. For homework, have students interview family members, older relatives, or friends *who live in their community*. What do they recall about disasters in their community?
4. Have students complete the last column on the chart (What kinds of places are most at risk for this type of natural disaster?). One excellent resource on earthquakes is the U.S. Geological Survey, <http://earthquake.usgs.gov/earthquakes/states/?old=states.html>. Other information on natural disasters is available at the Ready.gov site. You may want to tell students that “geology” is the study of the origin, history, and structure of the earth, and that “geography” is the study of the earth and its features, and of the distribution of life on the earth.

Explanation (20 minutes)

1. After students have completed the chart, review their findings.
2. Discuss with students: Has our community experienced any of the natural disasters listed? When? What are the geographic and/or geological factors that put our community at risk for this kind of natural disaster? What about the other natural disasters listed on the chart? Is the risk for each of these natural disasters high or low for our community? Why?
3. Discuss with students: How have news stories affected their view of the frequency of natural disasters? (Extensive news coverage of disasters, local and worldwide, makes people think this disaster might happen to them, even though that might not be likely.) After news reports about natural disasters, do you feel more or less vulnerable? Why? For more information on this topic students can visit the “News You Can Use” article on the *BAM!* Site.
4. Remind your students that news reports aren't necessarily about everyday activities. Instead, they often reflect what is new or controversial, or a crisis,

conflict, celebrity, or scandal—all in the space and time limits of the print, TV, or radio news. Continuing news coverage about a natural disaster doesn't mean that these events are recurring or more significant. News organizations cover a story and then often do a follow-up. News organizations cover disasters because their viewers are interested. Ask students: Why do you think people are so interested in disasters that happen to other people?

5. Put statistics in perspective. Although news coverage of natural disasters is pervasive, the leading cause of death for American children and young adults— traffic crashes—is covered less often. Hurricanes claim an average of 162 lives in the United States each year. In 2004, there were 42,800 highway deaths in the United States. (That's why it's so important to wear seatbelts. People who are wearing them in a crash are less likely to get injured or killed.)

Elaboration (30 minutes)

1. Hand out Student Reproducible 2: *Planning for an Emergency*. Have students work in groups to find the answers.
2. Have students visit an article on tsunamis on the *BAM! Web* and “News You Can Use” to learn more about preparing for natural disasters. If you do not have enough computers for students to do this easily, you can print out the information at this site. In addition, this CDC site has extensive information about disaster planning: <http://www.bt.cdc.gov/>.
3. Discuss with students the questions on Student Reproducible 2: *Planning for an Emergency*. Given what they have learned about the risk of a natural disaster in their community, what are some things families should do to prepare for an emergency? List them on the board, for example:
 - a. Know which disasters could occur in your area and how to prepare for each
 - b. Have a disaster supply kit at home—water, non-perishable food, first aid supplies, tools and supplies, clothes, and bedding
 - c. Choose emergency meeting places
 - d. Have an evacuation plan
 - e. Learn first aid and CPR
 - f. Keep family records in a water- and fire-proof container
4. Encourage students to discuss planning for a natural disaster with their families. What plans has their family made in case of disaster?

Evaluation

Performance Descriptors

On each of the criteria below, rate students from 3 to 0, with 3 being the highest possible score and 0 being the lowest.

Scoring Rubric: Are You At Risk?				
Performance Descriptor	Rating			
Student actively participated in the discussion about natural disasters.	3	2	1	0
Student researched a variety of natural disasters through the Internet and determined those most likely to affect their community.	3	2	1	0
Student researched and conducted interviews with community members to learn about natural disasters that have affected their communities, and recorded their findings.	3	2	1	0
Student researched the geologic and geographic factors that make a particular place more or less at risk for a given natural disaster, and recorded their findings.	3	2	1	0
Student discussed the effect of news coverage of natural disasters on stress levels and how to evaluate such coverage.	3	2	1	0
Student researched and discussed emergency preparedness measures.	3	2	1	0

Extension

1. Have the group research the measures their own community has in place to mitigate the effects of a natural disaster. Invite a member of the local emergency planning board to address the class.
2. Exposure to natural disasters through personal experience or through the media can cause stress. Have students explore the *BAM!* activities on stress. You also may wish to distribute the Feelin' Frazzled handout.
3. You may take the time to explain to students that natural disasters such as hurricanes can be caused by heat energy carried by ocean currents. This energy has a strong influence on climate around the world. Also, climates have sometimes changed abruptly in the past as a result of changes in the earth's crust, such as volcanic eruptions or impacts of huge rocks from space

Web Recourses

Centers for Disease Control and Prevention: www.cdc.gov

Emergency Preparedness and Response:

www.bt.cdc.gov

The Natural Disaster and Severe Weather section of this Web site includes a comprehensive section on emergency preparedness for natural disasters, including information about the health effects of everything from floods to hurricanes to volcanoes.

CDC *BAM! Body and Mind*TM

BAM! Body and Mind is brought to you by the Centers for Disease Control and Prevention (CDC), an agency of the U.S. Department of Health and Human Services (DHHS). *BAM!* was created to answer kids' questions on health issues and recommend ways to make their bodies and minds healthier, stronger, and safer. *BAM!* also serves as an aid to teachers, providing them with interactive activities to support their health and science curriculums that are educational and fun.

American Red Cross: www.redcross.org

Masters of Disaster: <http://www.redcross.org/disaster/masters/>

A comprehensive curriculum that meets national education standards in health, social studies, and language arts, and consists of age-appropriate, ready-to-go lesson plans for K-12 grade levels. The lesson plans contain preparedness information addressing tragic events, natural disasters, and other human-caused tragedies, including war and terrorism. It was developed within weeks after the September 11 terrorist attacks.

Burton, Jadis, "Dealing with Catastrophic Events":

<http://talhk.squarespace.com/articles/dealing-with-catastrophic-events.html>

Written in 2005 shortly after the Asian tsunami, this paper helps parents and other adults assist children as they struggle to deal with catastrophic events in the world.

National Association of School Psychologists: www.nasponline.org

Lazarus, P.J., Jimerson, S.R., & Brock, S.E. (2002). Best practices in school crisis prevention and intervention:

<http://www.nasponline.org/publications/booksproducts/N0108.aspx>

A thorough literature review of the unique crisis issues related to coping with natural disasters. Written primarily for educators, this publication also includes helpful information for any adult on dealing with children following a natural disaster.

National Institute of Mental Health (NIMH): www.nimh.nih.gov/

"Helping children and adolescents cope with violence and disasters":

<http://www.nimh.nih.gov/health/publications/helping-children-and-adolescents-cope-with-violence-and-disasters-rescue-workers/index.shtml>

This online fact sheet collects research on how violence and disasters affect the mental health of children and teenagers. Many of the suggestions are applicable either for violence or for natural disasters, and are based on ongoing NIMH research projects.

Ready.gov, Natural Disasters: <http://www.ready.gov/natural-disasters>

A Web site developed by the Department of Homeland Security that covers natural disasters. You can access the Federal Emergency Management Agency (FEMA) fact sheets on natural disasters including earthquakes, hurricanes, floods, landslides, volcanoes, and more. Each of these fact sheets includes information on the parts of the United States that are most at risk for the natural disaster, as well as the science behind why the disaster happens.

Text Correlations

Glencoe, *Science Voyages*, Level Blue, Chapter 8: Earthquakes; Chapter 9, Volcanoes

Glencoe, *Teen Health Course 1*, Chapter 10, Safety and the Environment

Glencoe, *Teen Health Course 2*, Chapter 14, Personal Safety and Injury Prevention

Glencoe, *Teen Health Course 3*, Chapter 19, Safety and Emergencies

Relevant Standards

National Science Education Standards

Content Standard D, Grades 5-8

Earth and Space Science:

- The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.
- Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions.
- Land forms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.

Content Standard F, Grades 5-8

Natural Hazards:

- Internal and external processes of the earth system cause natural hazards, events that change or destroy human and wildlife habitats, damage property, and harm or kill humans. Natural hazards include earthquakes, landslides, wildfires, volcanic eruptions, floods, storms, and even possible impacts of asteroids. [See Content Standard D (grades 5-8)]
- Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes.
- Natural hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.

Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).

- Behavior is one kind of response an organism can make to an internal or environmental stimulus. A behavioral response requires coordination and communication at many levels, including cells, organ systems, and whole organisms. Behavioral response is a set of actions determined in part by heredity and in part from experience.

Benchmarks for Science Literacy

Chapter 4, Benchmark B, Grades 6-8: The Earth

By the end of 8th grade, students should know that:

- Climates have sometimes changed abruptly in the past as a result of changes in the earth's crust, such as volcanic eruptions or impacts of huge rocks from space. Even relatively small changes in atmospheric or ocean content can have widespread effects on climate if the change lasts long enough.
- Heat energy carried by ocean currents has a strong influence on climate around the world.

Chapter 6, Benchmark F, Grades 6-8: Mental Health

By the end of the 8th grade, students should know that:

- Individuals differ greatly in their ability to cope with stressful situations. Both external and internal conditions (chemistry, personal history, values) influence how people behave.
- Often people react to mental distress by denying that they have any problem. Sometimes they don't know why they feel the way they do, but with help they can sometimes uncover the reasons.

Chapter 7, Benchmark C, Grades 6-8: Human Society, Social Change

Middle-school students can imagine themselves in situations different from their own. Interviews with senior citizens, literary and media accounts of life in times past, simulations, and role-playing all provide raw material for discussions about social change. Students can be helped to see that cultural patterns change because of technological innovations, scientific discoveries, and population changes. They can identify social changes that happen gradually as well as those that happen quickly because of natural disasters and wars. Students should also begin to identify aspects of family and community life that have remained relatively constant over generations.

- Migration, conquest, and natural disasters have been major factors in causing social and cultural change.

Chapter 12, Benchmark D, Grades 6-8: Communication Skills

By the end of the 8th grade, students should be able to:

- Organize information in simple tables and graphs and identify relationships they reveal.
- Read simple tables and graphs produced by others and describe in words what they show.
- Locate information in reference books, back issues of newspapers and magazines, compact disks, and computer databases.
- Understand writing that incorporates circle charts, bar and line graphs, two-way data tables, diagrams, and symbols.
- Find and describe locations on maps with rectangular and polar coordinates.

National Health Education Standards

Standard 3

Students will demonstrate the ability to practice health-enhancing behaviors and reduce health risks.

- Explain the importance of assuming responsibility for personal health behaviors.
- Analyze a personal health assessment to determine health strengths and risks.

- Distinguish between safe and risky or harmful behaviors in relationships.
- Demonstrate strategies to improve or maintain personal and family health.
- Demonstrate ways to avoid and reduce threatening situations.
- Demonstrate strategies to manage stress.

Ideas and Behaviors Common Among Students

- Among children who experienced a natural disaster, the more they perceived their parents to be upset about the disaster, the less successful the children were at coping (Huzziff & Ronan, 1999).
- Children who feel in control of their stressful situation are more successful at coping with the effects of a disaster. Those without a similar feeling of control, who blame their situation on outside sources such as fate or luck, have a more difficult time coping (Chandler, 1985).
- When dealing with the effects of general violence in their neighborhoods, boys are more likely than girls to be more confrontational in their coping strategies (Rasmussen, Aber, & Bhana, 2004).
- When asked about the effects of the September 11th tragedy 2 to 5 months later, adolescents from areas 3,000 miles from the disaster sites still viewed themselves as having been affected significantly by the events (Whalen, Henker, & King, 2004).
- Middle school girls appear more likely to rate traumatic events as more stressful than boys, while those from socially disadvantaged areas rate everyday events as more stressful than children from more affluent backgrounds (Muldoon, 2003).
- Reports in the media of a disaster focus on the intensity of the event and may cause students to believe it was much more widespread than it really was (American Red Cross, 2001).
- In the months following a hurricane, the noises associated with the storm—roaring winds likened to a freight train—induced acute startle reactions in some survivors. Subsequent storms triggered panic reactions, even when no hurricane was forecasted (Brock, Lazarus, & Jimerson, 2002).
- While hurricane forecasts permit families time to gather supplies and prepare their homes and children, these activities in and of themselves may generate fear and anxiety (Zenere & Lazarus, 1999).
- Unexpected messages or images on television following a tragic event can cause stress-related problems. Those watching the disaster coverage can become a "secondary victim" and suffer emotional and physical problems (American Red Cross, 2001).
- Loss of trust in adults, and concern about a specific disaster reoccurring, are

responses seen among youths exposed to traumatic events (National Institute of Mental Health, 2001).

- Following Hurricane Andrew, boys tended to externalize their reactions, while girls tended to internalize theirs (Shaw, Applegate, & Schorr, 1996).

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Student Reproducible 1:

Natural Disasters in Your Community: Are You at Risk?

Using information found online or in the reference materials in the classroom, complete the following chart to assess your actual risk from a natural disaster.

Natural Disaster	How many have occurred in my community in the last 12 months?	Has this type of disaster ever occurred in my community? When? (Use the Internet and family or community interviews to answer this question.)	What kinds of places are most at risk for this type of natural disaster (the geography and geology of a place)?
Blizzard			
Earthquake			
Flood			
Hurricane			
Tornado			
Tsunami			
Volcano Eruption			

Student Reproducible 2:

Planning for an Emergency

If you do live in an area that is at risk for natural disasters, having a plan to deal with an emergency helps to ease stress.

Do you already have a plan developed for when a natural disaster might happen?

List some things families should do to prepare for an emergency.

- 1.
- 2.
- 3.
- 4.

List the supplies you should keep in your home to have in case of emergency. Check out these sites for some suggestions:

- *BAM!* News You Can Use
- CDC Disaster Preparedness: www.bt.cdc.gov/disasters
- FEMA Emergency Preparedness Checklist:
<http://www.fema.gov/about/odc/preparedness.shtm>

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