

LESSON: What's the Plan?

Summary: Students read a brief article on a recent study showing the deadly impact of extreme hot and extreme cold periods on specific medical subgroups. Then they relate these findings to their local emergency response plan.

Lesson Type: Integrated lesson. This lesson extends beyond traditional science content and can be used in other academic subjects.

EHP Article: "A Lethal Change in the Weather"
EHP Student Edition, December 2006, p. A545
<http://www.ehponline.org/docs/2006/114-9/ss.html#alet>

Objectives: By the end of this lesson, students should be able to

1. summarize what type of medical and other conditions increase the risk of dying from an extreme heat or extreme cold event;
2. describe the emergency plan in place locally to prevent exposure-related mortality from extreme heat or cold; and
3. recommend changes to the local emergency plan to address the populations at greater risk of dying from an extreme heat or cold event.

Class Time: 1 hour, with some outside research time

Grade Level: 9–12

Subjects Addressed: Environmental Science, Environmental Health, Health

► Prepping the Lesson (15 minutes)

INSTRUCTIONS:

1. Download the entire *EHP Student Edition* at <http://www.ehponline.org/science-ed/>, or download just the article "A Lethal Change in the Weather" at <http://www.ehponline.org/docs/2006/114-9/ss.html#alet>.
2. Review the Instructions, Background Information, and Student Instructions.
3. Make copies of the Student Instructions.

MATERIALS (per student):

- 1 copy of "A Lethal Change in the Weather"
- 1 copy of the Student Instructions
- 1 copy of a state, regional, or local emergency plan (if students do not have Internet access)

VOCABULARY:

- atrial fibrillation
- cardiac arrest
- cardiovascular
- case-only
- chronic
- diabetics
- mortality
- subgroup



- susceptibility
- time-invariant
- time-variant
- vulnerability

BACKGROUND INFORMATION:

The study of environmental health goes beyond the analysis of pollution and environmental toxicants. One definition of the field reads “the subfield of public health concerned with assessing and controlling the impacts of people on their environment and *the impacts of the environment on them*” (Moeller 1992). Certainly one of the most obvious features of the environment that impacts humans is the weather, particularly extreme weather. Weather crises can range from temperature extremes to extremes of wind (hurricanes, typhoons) or water (tsunamis, floods).

In the wake of Hurricane Katrina, much attention has been paid to disaster preparedness. Significant money has been provided through the Department of Homeland Security to local cities and towns. Although extremes of hot and cold may not be preventable, there is much that can be done to prepare for these events and limit their impact on the elderly and the poor, two groups statistically shown to suffer the highest rates of mortality during extreme weather events. While government level action plans for disasters and other emergencies exist, there is a general agreement that individuals and families must do more to prepare themselves, at least for the initial days of a crisis. Practical and personalized knowledge about how to cope and prevent serious harm from a disaster or emergency is key to our national preparedness. Students will access a variety of informational materials in this exercise and see how municipal preparedness complements the efforts of individuals in the community.

Reference:

Moeller DW. Environmental health. Cambridge, MA: Harvard University Press; 1992: 1.

RESOURCES:

Environmental Health Perspectives, Environews by Topic page, <http://ehp.niehs.nih.gov>. Choose Natural Disasters

American Red Cross, assorted fact sheets about major disasters and how to be prepared (local chapters can provide information about shelters and specific resources for your area), <http://www.redcross.org/>

Department of Homeland Security, fact sheets about winter storms and heat-related emergencies, <http://www.ready.gov/>

Federal Emergency Management Agency, “Are You Ready? A Guide to Citizen Preparedness,” <http://www.fema.gov/areyouready/index.shtm>

► Implementing the Lesson

INSTRUCTIONS:

1. Have students read the article.
2. Hand out the Student Instructions and review the instructions. If needed, provide printouts of state, regional, or local emergency plans.
3. Allow one or two evenings for research and completion of the questions.
4. As a class, review and compare students' findings.

NOTES & HELPFUL HINTS:

- If the students do not have Internet access, you may need to print out copies of state, regional, or local emergency plans for students to use. If there are multiple plans, you could assign one plan per group, and then discuss and compare plans as a class.
- The vocabulary in the article is relatively easy and therefore appropriate for lower grades or groups with a lower reading level.
- To simplify this exercise, arrange for the class to interview someone who is responsible for local extreme weather response, such as a police officer or fire-rescue professional, health officer, or a city or county disaster management official. Prepare a list of questions in advance, and extend a formal invitation to your guest to visit the school to assist with this lesson. Prepare students to be good hosts and polite interviewers.
- As an alternative extension, have students make their own family disaster plan for the most common local weather-related emergency. Have students estimate the cost and time required to assemble a basic preparedness kit.



► Aligning with Standards

SKILLS USED OR DEVELOPED:

- Communication (note-taking, oral, written—including summarization)
- Comprehension (listening, reading)
- Critical thinking and response
- Research

SPECIFIC CONTENT ADDRESSED:

- Environmental health
- Environmental science
- Disaster and emergency preparedness
- City and county emergency response
- Vulnerable populations

NATIONAL SCIENCE EDUCATION STANDARDS MET:

Science Content Standards

Science as Inquiry Standard

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Science in Personal and Social Perspectives Standard

- Personal and community health
- Natural resources
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

History and Nature of Science Standard

- Science as a human endeavor
- Nature of scientific knowledge

► Assessing the Lesson

Step 1: State, regional, and local governments have disaster and emergency management planning offices. Use the handouts provided by your teacher or go online, find your city, county, and state websites, and locate the office(s) responsible for local response to extreme hot and cold weather events. Try to locate what plans and information are available about extreme temperature emergencies. If no information is available, contact your local government officials. Start with the health department for your community.

Students should easily find their local government website portals. Determining the agencies charged with disaster management may be more difficult, and students may find more than one office that seems to have responsibility for responding. If more than one plan is available, help the student select one. Students could call their local officials with a set of clear questions prepared ahead of time. These questions should be brief and not require too much time on the part of the local official.

Step 2: Write a description of the plans for your area. Differentiate between efforts to prevent dangerous exposure and efforts to respond to victims. Are there partnerships in place with charitable organizations like the American Red Cross? Include in your report a list of the “team” of agencies that would help out in the event of an extreme temperature event in your town.

Answers will vary depending on the locality. Students may need to access the websites listed under Resources to get an idea of what can be done locally to prevent deaths. Students may also search local newspapers for discussion of recent successes or failures in responding to heat waves or blizzards. Generally after such an event there is considerable discussion about what could have been done better, and who is responsible for implementing these changes. Answers will include efforts such as the opening of shelters, the transportation of vulnerable people to these



shelters, the closing of roads, the provision of ice and water to those without power, efforts to prevent loss of power (such as tree trimming), closing of schools, and educational efforts to help people prepare for and avoid behaviors that place them in danger.

Students should list all major partners with disaster relief in the area, including religious organizations (such as the Salvation Army and local churches) and major nonprofit organizations.

Step 3: Referring to the *EHP Student Edition* article or using your own ideas, suggest some improvements to the plan you reviewed.

This answer should reflect the students' own opinion of whether this plan was clear and logical. Was it difficult to understand what would be done and by whom? Were there many parties involved? Has this plan been successful in the past? The study described in the article showed that individuals with heart disease and atrial fibrillation in particular had a higher risk of dying among the populations that already had the highest rates of weather-related mortality. This information could help fire-rescue workers going door to door to identify people who suffer from these conditions and give them priority in getting to a shelter. This might also encourage the county health department to get the word out to doctors, who can communicate this information to patients so they can take extra steps to be with relatives or neighbors if they are at high risk. The media might also assist in getting the word out to individuals to help them prepare better for these types of emergencies.

► Authors and Reviewers

Authors: Wendy Stephan and Lisa Pitman, University of Miami

Reviewers: Susan Booker, Erin Dooley, Laura Hemminger, Stefani Hines, Barry Schlegel, Joseph Tart, and Kimberly Thigpen Tart

Give us your feedback! Send comments about this lesson to ehpscienced@niehs.nih.gov.



- Step 1:** State, regional, and local governments have disaster and emergency management planning offices. Use the handouts provided by your teacher or go online, find your city, county, and state websites, and locate the office(s) responsible for local response to extreme hot and cold weather events. Try to locate what plans and information are available about extreme temperature emergencies. If no information is available, contact your local government officials. Start with the health department for your community.
- Step 2:** Write a description of the plans for your area. Differentiate between efforts to prevent dangerous exposure and efforts to respond to victims. Are there partnerships in place with charitable organizations like the American Red Cross? Include in your report a list of the "team" of agencies that would help out in the event of an extreme temperature event in your town.
- Step 3:** Referring to the *EHP Student Edition* article or using your own ideas, suggest some improvements to the plan you reviewed.

