Natural Disasters
HASPI MS Medical Earth Science Lab 07

Types of Natural Hazards

Natural hazards are severe and extreme geological processes and weather events that occur naturally in all parts of the world. Natural hazards become natural disasters when people’s lives and livelihoods are destroyed. In the United States alone, there are well over 350 natural disasters that are registered every year, affecting millions of people and causing billions of dollars in damages. Since 2003, natural disasters worldwide have claimed an average of well over 100,000 individuals every year.

Natural hazards can be classified into a few broad categories: geological hazards, hydrological hazards, and meteorological hazards. Geological hazards are driven by geological, or earth processes, in particular, plate tectonics. These include earthquakes and volcanic eruptions. Meteorological hazards are driven by meteorological or weather processes, in particular those related to temperature and wind. Examples of meteorological hazards include heat waves, winter storms and extreme cold, tropical cyclones, and thunderstorms. Hydrological hazards are hazards driven by hydrological or water processes, including floods, droughts, landslides and tsunamis. Each of these hazards is unique in their own nature and can have devastating effects on human communities. Some hazards, like tornadoes and flash floods, are short-lived, violent events that affect relatively small areas. Other hazards, like droughts, develop slowly but can affect large regions and entire populations for long periods of time.

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<tr>
<th>Winter Storms &amp; Extreme Storms Cold</th>
<th>Thunderstorms &amp; Lightning</th>
<th>Volcanoes</th>
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<td>Winter storms can range from moderate snow over a few hours to a blizzard with blinding, wind-driven snow that lasts for several days. Many winter storms are accompanied by dangerously low temperatures and sometimes by strong winds, icing, sleet and freezing rain that can knock out heat, power and communication services. Heavy snowfall and extreme cold can immobilize entire regions.</td>
<td>All thunderstorms produce lighting, which is one of the top storm-related killers in the United States. Other dangers associated with thunderstorms include tornadoes, strong winds, hail and flash flooding. Dry thunderstorms that do not produce rain that reaches the ground are most prevalent in the western U.S. Falling rain evaporates, but lighting can still reach the ground and start wildfires.</td>
<td>Volcanoes are vents in the earth’s crust through which molten rock can escape to the earth’s surface. When pressure from gases within the molten rock becomes too great, an eruption occurs. Eruptions can be quiet or explosive. There may be lava flows that can flatten landscapes and start wildfires, plumes of poisonous gas, or flying rock and ash that can sometimes travel hundreds of miles downwind.</td>
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<td><strong>Drought</strong></td>
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<td>The primary cause of any drought is a lack of rainfall. Droughts develop slowly and cause water supplies to dry, crops and animals dies, malnutrition, and poor health.</td>
<td>The sudden rolling or shaking of earthquakes are caused by movement under the earth’s surface. They happen along fault lines, or cracks, in the earth’s surface and can be felt over large areas.</td>
<td>A heat wave is an extended period of extreme heat that is often accompanied by high humidity. These conditions can be dangerous and even life threatening, especially for older adults and young children.</td>
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<tr>
<th><strong>Tropical Cyclones</strong></th>
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<td>![Tropical Cyclone Image]</td>
<td>![Landslide Image]</td>
<td>![Flood Image]</td>
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<td>Hurricane, typhoon, and tropical cyclone are different names for cyclonic storms that form over oceans. They intensify over warmer waters and are known for their devastating wind speeds. (Hurricane: Atlantic and Easter Pacific Oceans, Typhoon: Western Pacific Ocean, Tropical Cyclone: Indian Ocean)</td>
<td>In a landslide, masses of rock, earth or debris move down a slope and can be caused by a variety of factors including earthquakes, storms, volcanic eruptions, fire, or human modifications of land. Similarly, avalanches occur when large amounts of snow slide down mountainsides.</td>
<td>Floods can occur within a few minutes or hours of excessive rainfall, excessive snow melt, a dam or levee failure, or the flooding of rivers or streams. Flash floods often have walls of roaring water carrying rocks, mud and other debris. Floods can also cause extensive damage to agriculture.</td>
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<th><strong>Wildfires</strong></th>
<th><strong>Tornadoes</strong></th>
<th><strong>Tsunamis</strong></th>
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<td>![Wildfire Image]</td>
<td>![Tornado Image]</td>
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<td>Wildfires often begin unnoticed and are usually triggered by lightning or by human accidents. They spread quickly, igniting brush, trees, and homes. The intensity of a wildfire can quickly escalate in times of low humidity and high winds.</td>
<td>Tornadoes spawn from thunderstorms where areas of high and low pressure systems meet. A tornado appears as a rotating, funnel shaped cloud that extends from a thunderstorm to the ground with winds that can reach up to 300+ mph. Tornadoes develop so rapidly that little, if any, advance warning is possible.</td>
<td>Tsunamis are seismic sea waves, or tidal waves, created by an underwater disturbance such as an earthquake, landslide, volcanic eruption, or meteorite. Tsunamis can move hundreds of miles per hour in open ocean and smash into land with waves as high as 100 feet or more.</td>
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The Devastating Impacts of Natural Disasters

Aside from the obvious dangers that natural disasters present, the secondary effects can be just as damaging. One of the most immediate effects of natural disasters is population displacement. When communities, cities, or even countries are hit by major events many people are forced to abandon their homes to seek shelter in other areas. Such dramatic changes in population of any area can disrupt everything from accessibility of health care to food supplies and basic hygiene. Crops and agricultural supplies are easily destroyed, and a loss in power can leave people with no way to prevent food from spoiling. The impacts of hunger following a natural disaster can be tremendous. Typhoons, hurricanes, and tsunamis often cause severe flooding, which can result in the spread of waterborne bacteria and malaria. As a result, health complications are very common among survivors of natural disasters and can add to rising death tolls well after the immediate danger has passed. These events can also be very traumatic for many individuals. Confronted with scenes of destruction and death, many individuals develop post-traumatic stress disorder (PTSD), a serious psychological condition resulting from extreme trauma.

Much of the disaster relief effort is aimed at alleviating these secondary effects. Many organizations, like the American Red Cross, provide overnight shelters that give people a place to stay and access to trained volunteers for both physical and mental support. Health workers can provide first aid treatment for injuries, replace lost medications, as well as provide emotional support for people coping with the disaster. Often times, other communities from all over the world will send care packages full of relief items to help. Non-perishable food items, bottled water, and basic personal supplies such as toothbrushes, deodorant, and shampoo can be a tremendous help during the immediate aftermath of a disaster and in the days and weeks that follow.

Preventing Natural Hazards from Becoming Natural Disasters

Because they occur naturally, it is important to note that natural hazards cannot be avoided. Instead of concentrating on the impossible task of stopping natural hazards from happening, it is better to focus time, effort, and resources to keep natural hazards from becoming natural disasters.

There are many institutions world-wide like the World Meteorological Organization (WMO), the United States Geological Survey (USGS), and even NASA that collect and analyze data of the Earth in order to predict when certain natural phenomena will occur to give us more warning to prepare for them. Ocean currents, wind speeds, precipitation, soil content, seismic activity, temperature, off-shore cameras and satellite imagery are some of the many things taken into consideration when monitoring natural phenomena.

http://www.wmo.int/worldmetday/sites/default/files/WMO993.pdf
Some events, like hurricanes and volcanic eruptions, are well known and their progression can be predicted, sometimes up to two or three days ahead. Other phenomena, like tornadoes and earthquakes, on the other hand cannot be predicted. Instead, live data is compared to past records to generate specific trends of when and where these natural phenomena typically occur. Severe weather doesn't just occur randomly. It occurs at certain times and in certain places.

Hurricanes, for example, target the southeast region of the United States and are expected towards the end of summer and into fall. Tornadoes, which most commonly occur in the Midwest, can occur at any time, but are favorable during the spring and least common in the winter. This is when there are more chances of cooler air meeting with warmer air, resulting in more thunderstorms. Wildfires are typical of the Western United States and tend to be more dramatic during times of low humidity, increased temperatures and increased wind speeds. Earthquakes are favorable along fault lines along the entire west coast, along the borders of Arkansas, Tennessee, Kentucky, Illinois and Missouri where the tectonic plate buckles, and in areas of hot zones like in Yellowstone National Park.

Although it may be impossible to predict the exact moments natural hazards occur, the data from constant surveillance can be used to limit the number of natural hazards turning into natural disasters. We can retrofit buildings to withstand strong winds, heavy rainfall, or massive earthquakes. Governing officials can institute water restrictions during times of drought and even issue evacuations of entire communities in dire situations.

Up to the minute data not only allows for short term warnings of hazards, but also helps speed up response and recovery teams that focus on lessening the effects of these hazards on society. If they can anticipate a severe storm coming, hospitals and first responder crews can be more prepared to treat possible injuries.

Increases in Populations Lead to More Natural Disasters
Finding trends that tell us where and when natural hazards occur is vital to avoiding disastrous situations. However, with the exponential rise in populations across the globe, it is getting harder and harder to avoid such disasters. As populations increase, so does the demand for more land to build cities and housing communities. Areas that were once avoided because of known hazards are now becoming populated, opening up the possibilities for disasters to occur. Volcanoes, for example, have been known to erupt periodically, but they are not considered hazardous until farms and human settlements are developed on the rich soil underneath them.
Rising populations also puts pressure on certain ecological structures that could help alleviate the effects of natural hazards. Human activity, for example, is one of the main causes for the destruction of many coral reefs around the world. This removes a shore’s first line of defense against strong ocean currents and storm surges and diminishes the ability of an ecosystem to protect itself.

An increase in global population has also been linked to the consistent rise in global temperature. Since many natural hazards are weather related, the change in climate drastically increases the chances of natural disasters. Urbanization, deforestation, and the overall destruction of the environment have led to higher temperatures, events of extreme precipitation, and more violent storms. In particular, the steady rise in global temperature has caused both ocean surface temperatures and the amounts of water vapor in the atmosphere to rise, providing more fuel to increase wind speeds of tropical storms and hurricanes. Many studies have shown that over the past 30 years, the duration and maximum wind speeds of each tropical storm has increased around 70 percent in both the Atlantic and Pacific Oceans. One particular study, published in the journal of Science in 2005, revealed that the percentage of hurricanes classified as Category 4 or 5 has increased over the same 30-year period.

**Review Questions**

1. What is the difference between a natural hazard and a natural disaster?
2. What are the dangers associated with a drought?
3. What is the difference between a hurricane, typhoon and tropical cyclone?
4. What causes earthquakes?
5. Which individuals are most susceptible to dangers associated with a heat wave?
6. What weather conditions can intensify the severity of a wildfire?
7. What are some of the secondary effects that result from natural disasters?
8. Natural hazards cannot be ________________.
9. What does WMO and USGS stand for?
10. What are some of the things that are monitored to prepare for natural hazards?
11. __________________ is compared to ___________________ to generate specific trends of when and where natural hazards typically occur.
13. What are the benefits of having up to the minute data on potential natural hazards?
14. Provide an example of how the increase in global population leads to more natural disasters.
15. How has the rise in global temperature led to an increase in hurricane intensity?
Background

2005 was the most active hurricane season in recorded United States history. Between June 1 and November 30, there were 28 tropical storms that formed in the Atlantic Ocean, of which 15 became hurricanes. The most noticeable was Hurricane Katrina. It caused severe destruction affecting over 90,000 square miles from central Florida to Alabama, Mississippi, Louisiana, and even Texas.

The devastation caused by Hurricane Katrina was most noticeable in the city of New Orleans, Louisiana. 100+ miles an hour winds and heavy storm surges broke through levee systems and seawalls that were in place to protect the city, whose average elevation is about six feet below sea level. Hurricane Katrina displaced hundreds of thousands of individuals from their homes and resulted in over $100 billion in damages, making it the costliest natural disaster in the history of the United States. It is also one of the five deadliest hurricanes in U.S. history, claiming nearly 2,000 lives.

During its progression, Hurricane Katrina, like all other weather systems that develop in the Atlantic and Eastern Pacific Oceans, was monitored by the National Hurricane Center in Miami, Florida. Using weather satellites, reconnaissance aircraft, coastal radars, and measurements from ocean buoys and land stations, the NHC was able to keep government officials updated on Katrina’s location, wind speeds, and anticipatory path. A September 14, 2005 article in National Geographic News, titled “Hurricane Katrina: The Essential Timeline”, outlined some of the major events that unfolded as Hurricane Katrina navigated through the Gulf Coast and included much of the information shared by the National Hurricane Center. In this activity you and your classmates will revisit the events of Hurricane Katrina.

Materials

“Hurricane Katrina: The Essential Timeline” Strips

Directions

Task

You and your group members will receive a copy of the National Geographic News article, “Hurricane Katrina: The Essential Timeline” (http://news.nationalgeographic.com/news/pf/47001822.html) in which the events of Hurricane Katrina will be mixed up and separated into strips. Your task is to cut out each of the strips and arrange them in the correct chronological order on your desk.

When you are done, raise your hand and double-check your results with your teacher.
Analysis & Interpretation

1. Create a graph that tracks the progression of Hurricane Katrina’s wind speed from when it was first detected as a tropical storm through the last advisory from The National Hurricane Center 7 days later. Be sure to label your graph correctly.

Analysis Questions

1. Why was New Orleans so vulnerable to severe weather? What systems did the city of New Orleans have in place to protect itself from this vulnerability?
2. According to reports from the National Hurricane Center in Miami, Florida how strong were the winds during Hurricane Katrina?
3. What caused Hurricane Katrina to re-intensify after it had died down to a tropical storm?
4. What information was collected by the hurricane-hunter aircraft that flew into Hurricane Katrina on Saturday, August 27?
5. How many hours/days was the mandatory evacuation order of New Orleans given before Hurricane Katrina reached the Louisiana shore?
6. The majority of New Orleans residents were able to evacuate the city before the arrival of Hurricane Katrina. Thousands of New Orleans residents were unable to or chose not to leave. Why do you think are some reasons why many individuals stayed?
7. What were some of the issues the people of New Orleans had to deal with after Hurricane Katrina diminished?
8. In all, Hurricane Katrina killed nearly ___________ people, caused more than _________ dollars in damage, and affected some ___________ square miles of the United States. Do a little research and compare the size of your city and the area affected by Hurricane Katrina. How big was Hurricane Katrina in relationship to where you live?
Cut out the following events into strips and organize into correct chronological order.

### Hurricane Katrina: The Essential Time Line
Willie Drye for National Geographic News
September 14, 2005

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<tr>
<th>Date</th>
<th>Event Description</th>
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<td>FRIDAY, SEPTEMBER 2</td>
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2 p.m.: On national television New Orleans Mayor Ray Nagin issues a "desperate SOS" for help from the federal government (See "Photo Gallery: Agony Reigns in Katrina's Aftermath"). Nagin says there's no food for those who took shelter at the Louisiana Superdome and New Orleans convention center.

9:15 p.m.: A. J. Holloway, mayor of Biloxi, Mississippi, says his city is "getting some rain, a little wind, and some lightning and thunder" from Hurricane Katrina.

Holloway survived Hurricane Camille in August 1969, and he's worried that this hurricane will be as bad or worse than that catastrophic storm. He's also worried that many new residents of Biloxi have no idea what they may soon be facing.

"There's a lot of new people who moved into Biloxi with the advent of casino gambling who have never experienced a real hurricane, and they may be taking it lightly," Holloway tells National Geographic News. "And even some of the people who were here during Camille are not worried. But just because your house stood up during Camille don't mean it'll stand up to this hurricane."

During the day: A convoy of U.S. National Guard troops and supply trucks arrives in New Orleans and distributes food and water to residents stranded at the Superdome and convention center. Congress approves 10.5 billion dollars (U.S.) in aid for Hurricane Katrina rescue and relief, and President George W. Bush signs the bill.

5 a.m.: Katrina's strongest winds have reached 115 miles an hour (185 kilometers an hour), making it a Category Three hurricane.

The work of repairing the city's levees, pumping out the floodwaters, and finding homes for tens of thousands of displaced residents is underway.

7 a.m.: Hurricane Katrina's eye is about to come ashore in Plaquemines Parish, Louisiana. The hurricane's strongest winds are about 145 miles an hour (235 kilometers an hour). The eye is about 70 miles (115 kilometers) from New Orleans.

1 a.m.: Katrina weakens and is reclassified as a tropical storm. Its center is about 45 miles (70 kilometers) northwest of Key Largo, Florida. Its strongest winds are about 70 miles an hour (115 kilometers an hour).

5 p.m.: The National Hurricane Center in Miami, Florida, issues its first advisory about the tropical system that will become Hurricane Katrina. The advisory notes that the season's 12th tropical depression has formed over the Bahamas. The weather system is about 350 miles (560 kilometers) east of Miami.
11 a.m.: The National Hurricane Center issues its last advisory on the storm that once was Hurricane Katrina. The storm has maximum winds of about 35 miles an hour (55 kilometers an hour), and its center is dumping heavy rainfall on Tennessee.

11 a.m.: The hurricane's eye comes ashore again near the Louisiana-Mississippi border. The storm's strongest winds are about 125 miles an hour (200 kilometers an hour). Katrina's front-right quadrant—which contains its strongest winds and peak storm surge—slams into Biloxi and Gulfport, Mississippi, with devastating force, destroying much of both cities.

11:30 a.m.: The National Hurricane Center reports that the hurricane is "rapidly strengthening" as it crosses the Gulf of Mexico's very warm waters. In only a few hours, the storm's strongest winds have increased to about a hundred miles an hour (160 kilometers an hour).

9 a.m.: The eye is about 40 miles (65 kilometers) from New Orleans and is expected to pass just to the east of the city. The storm's strongest winds are about 135 miles an hour (215 kilometers an hour).

7 p.m.: The eye of Hurricane Katrina comes ashore between North Miami Beach and Hallandale Beach on Florida's southeastern coast. The storm's top winds are 80 miles an hour (130 kilometers an hour). Falling trees kill two people.

8 a.m.: Mayor Ray Nagin reports that water is flowing over one of New Orleans's levees. Meanwhile, a major levee in New Orleans has failed (See "New Orleans Levees Not Built for Worst Case Events"). Water is pouring through the 17th Street Canal, and the city is beginning to flood.

During the day: Governors Kathleen Blanco of Louisiana and Haley Barbour of Mississippi declare states of emergency in their respective states.

During the day: Health and Human Services Secretary Michael O. Leavitt declares a public health emergency in Louisiana, Mississippi, Alabama, and Florida (See "New Orleans Floodwater Fouled With Bacteria, Chemicals"). Meanwhile, Louisiana Governor Kathleen Blanco orders that all remaining residents leave New Orleans (See "Photo Gallery: New Orleans Refugees Struggle, Looters Plunder"). But buses and trucks aren't available to carry out the order.

During the day: Floodwaters continue to pour into New Orleans from breaks in the city's levees (See "Photo Gallery: New Orleans People, Pets Flee Flood").

11 a.m.: The storm has strengthened, become more organized, and been given a name. It is now tropical storm Katrina, the 11th named storm of 2005, about 230 miles (370 kilometers) east of Miami. Its strongest winds are blowing at about 40 miles an hour (65 kilometers an hour).
5 a.m.: Katrina reintensiﬁes into a hurricane. Its strongest winds are about 75 miles an hour (120 kilometers an hour), and its eye is about 70 miles (115 kilometers) northwest of Key Largo. Keys residents are surprised by Katrina's strength as it passes offshore.

"We went to bed last night expecting some possible rain and woke up this morning to learn that Katrina was 75 miles [120 kilometers] north of Marathon [Florida]," says Dan Gallagher, resident of Grassy Key. "A lot of the live-aboards [people living on houseboats] in Boot Key Harbor were surprised to find their boats in new spots."

5 p.m.: The National Hurricane Center describes Katrina as a "potentially catastrophically" hurricane (See "News Video: Hurricane Katrina Animation").

"Some levees in the greater New Orleans area could be overtopped," the center warns. "Significant storm surge ﬂooding will occur elsewhere along the central and northeastern Gulf of Mexico coast."

11 p.m.: The National Hurricane Center predicts that Katrina will become a major hurricane by the time it reaches the central Gulf of Mexico. The eye of the storm is now about 460 miles (740 kilometers) southeast of the mouth of the Mississippi River in Louisiana.

3 p.m.: The center of the hurricane is about 20 miles (30 kilometers) west of Hattiesburg, Mississippi. Its winds are down to about 95 miles an hour (155 kilometers an hour).

3 a.m.: The storm's center has emerged from the Florida peninsula and starts strengthening almost immediately as it touches the warm waters of the Gulf of Mexico (See "Katrina's Growth Echoed 1935's "Storm of Century").

During the day: Hurricane-hunter aircraft ﬂy into Hurricane Katrina to measure wind speed, barometric pressure, ocean surface temperature, and other data.

"It was certainly very strong and also was very large," Chris Landsea said later. Landsea, a meteorologist with the National Oceanic and Atmospheric Administration, was aboard a ﬂight into Hurricane Katrina. "When we were ﬂying into it Saturday, its circulation covered the entire Gulf of Mexico."

5 p.m.: Katrina has continued to strengthen and is now a hurricane. Its strongest winds are about 75 miles an hour (120 kilometers an hour), making it a Category One hurricane. The storm is about 15 miles (25 kilometers) east of Fort Lauderdale, Florida, and about to make landfall.

2 a.m.: Hurricane Katrina turns north toward the Louisiana coast, but the storm's strongest winds have diminished slightly to about 155 miles an hour (250 kilometers an hour). The center of the storm is about 130 miles (210 kilometers) from New Orleans. A weather buoy about 50 miles (80 kilometers) east of the river's mouth reports waves at least 40 feet (12 meters) high.
11 a.m.: Hurricane Katrina has mushroomed into one of the most powerful hurricanes ever to form in the Atlantic. The storm's strongest winds are blowing at about 175 miles an hour (280 kilometers an hour), making it a Category Five storm. The center of the storm is about 225 miles (360 kilometers) from the mouth of the Mississippi River.

Late Sunday night: Thousands of New Orleans residents who are unable to leave town or have chosen not to leave seek shelter in the Louisiana Superdome.

1 p.m.: Hurricane Katrina continues to weaken as it moves farther inland. Its strongest winds are about 105 miles an hour (170 kilometers an hour).

9:30 a.m.: New Orleans Mayor Ray Nagin issues a mandatory evacuation order. Tens of thousands of New Orleans residents begin streaming out of the city.

"We're facing the storm most of us have feared," Nagin said. "This is going to be an unprecedented event." (See "News Video: Why New Orleans Is Vulnerable to Hurricanes").

2 a.m.: Hurricane Katrina's winds have increased to 145 miles an hour (235 kilometers an hour), making it a Category Four storm. The eye of the storm is about 310 miles (500 kilometers) south of the mouth of the Mississippi River.

5 a.m.: The hurricane's strongest winds are now about 150 miles an hour (240 kilometers an hour), and its eye is about 90 miles (145 kilometers) from New Orleans and about 120 miles (195 kilometers) from Biloxi.
Emergency Preparedness Plan
HASPI MS Medical Earth Science Lab 07b

Background

The National Oceanic and Atmospheric Administration (NOAA) quotes the current average lead-time for tornado warnings is only 13 minutes. According to the U.S. Geological Survey, current earthquake early warning systems technology on the west coast of the United States can only provide as much as 60 seconds of advance warning. Even with all the emergency alert systems and weather monitoring systems that are in place, it can seem almost impossible to avoid certain emergencies. In August 2005, the people of New Orleans were given a mandatory evacuation order 24 hours before Hurricane Katrina struck the coastline of Louisiana and yet, nearly 2,000 people died and over $100 billion in damages remained.

These statistics are strong reminders that natural disasters and emergency situations can happen suddenly, at anytime, and anywhere. In some circumstances, you may be required to seek shelter in your home for extended periods of time or evacuate your neighborhood to avoid situations that are believed to be potentially dangerous. Knowing what to do before, during, and after an emergency is a critical part of being prepared and staying safe.

Materials

Emergency Preparedness Plan worksheet

Directions

Task

With your family, designate a time to complete the following Emergency Preparedness Plan worksheet in order to:

• Identify possible disaster threats in the area you live
• Discuss experiences with previous emergency situations
• Create an emergency contact information list
• Formulate a home evacuation plan
• Assemble an emergency supply kit

Plan on spending at least 30-45 minutes with your family to complete the Emergency Preparedness Plan worksheet. Check your family schedule and write down the day and time you plan to meet in the space provided below.

Scheduled Date & Time: ________________________________
1. Identifying Possible Threats

Make a list of possible disasters that could occur in your area and discuss what should be done in the event of each.

2. Personal Experience

Have you or your parents ever experienced a natural disaster or emergency situation? Describe when the event took place, where you were at the time, and what you remember during the emergency? Did you or your family member(s) feel prepared for what took place? Is there anything you or your family member(s) wish you would have done differently during the situation?
3. Emergency Contact Information

Communication during an emergency situation is very important, but it may not always be easy to stay in contact with one another. A disaster or emergency may strike when family members are not all in the same place and you will need other individuals you can contact to help you reconnect with each other. Put together a list of individuals you can contact in case of an emergency. As you and your family members formulate your list, you may want to consider the following:

- Electricity for cellular phones and other electronic devices where contact information is commonly stored may be unavailable. It important to memorize some contacts and keep a written/printed copy of phone numbers and addresses of the individuals on your emergency contact list in a safe place (i.e. next to the house phone, in your wallet or purse, backpack)
- Phone line networks can be very congested as many individuals are trying to get in contact with one another. Phone calls should be kept brief and to the point. The use of social media and text messaging can be an effective way to communicate with others while freeing up network “space” for emergency agencies.
- Depending on the severity of the situation, friends and family members in the same town may be experiencing the same emergency. Be sure to include an individual that lives out of town on your emergency contact list.

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<td>Telephone Number:</td>
</tr>
</tbody>
</table>
4. Evacuation Plan

Designate a nearby meeting place outside of your home and discuss how you will get there in the event of an emergency. Also determine a meeting place away from your neighborhood in the event that you are unable to return to your home.

Family Meeting Place (Nearby):

Family Meeting Place (Out of Neighborhood):

Sketch the floor plan of your home and establish at least two exit routes from each room in your home. Make sure each room is identified, as well as doors, windows, and stairs.

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Floor 1

Floor 2
Your instructor may assign or allow you to choose any of the following activities. As per NGSS/CCSS, these extensions allow students to explore outside activities recommended by the standards.

1. **EPIDEMICS AFTER NATURAL DISASTERS:** Aside from the obvious dangers that natural disasters present, the secondary effects can be just as damaging. This includes population displacement, accessibility of health care, basic hygiene, the upkeep of food supplies, and the spread of infectious diseases. Read the case study titled *Epidemics After Natural Disasters*, published in the American Journal of Clinical Medicine in 2011.


Create a visual presentation that summarizes the findings of the case study. You may choose to create a poster board or power point presentation to outline:

- The risk of communicable diseases after certain types of disasters
- Types of water borne diseases
- Types of vector borne diseases
- Types of direct contact diseases
- Precautionary steps to avoid the spread of disease
- Risks associated with the presence of dead bodies

2. **TRIAGE FOLLOWING NATURAL DISASTERS:** Triage refers to the evaluation and categorization of the sick or wounded when there are insufficient resources for medical care of everyone at once. The Simple Triage and Rapid Treatment (START) program was developed by Hoag Hospital and the Newport Beach Fire Department in Newport Beach California. The following web link is to a website that contains a detailed description of the START system.

   [http://www.cert-la.com/triage/start.htm](http://www.cert-la.com/triage/start.htm)

- Access the web site to understand the basics of the START triage system.
- Take the following START Triage quiz created by Mary Donahue for her students at De Anza College in Cupertino, CA [http://faculty.deanza.edu/donahuemary/STARTTriagequiz](http://faculty.deanza.edu/donahuemary/STARTTriagequiz)
- Recreate the START flow chart and present it to your classmates. Provide examples of patients that would fit each triage classification.