Hantavirus Student Guide

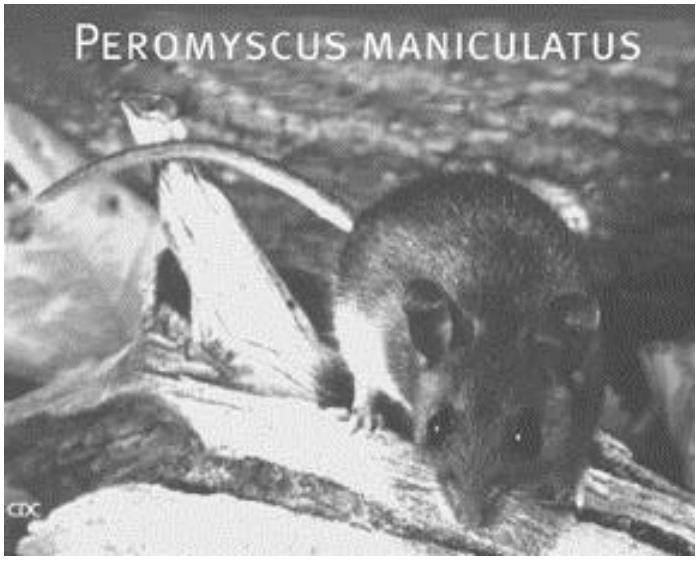
History of Hantavirus

An outbreak of unexplained illness occurred in May 1993 in the Four Corners area of the Southwest. The name Four Corners comes from the high plateau region where the corners of Arizona, Colorado, New Mexico, and Utah meet. A number of previously healthy young adults suddenly developed fever, chills, and muscle pain — followed by a hard time breathing; about half of them died.

Hantavirus was first identified during the Korean War in the early 1950s when several thousand U.S. soldiers were infected. After that, there was not another outbreak amongst the U.S. population until May of 1993. Upon investigating, researchers realized that they were dealing with a form of Hantavirus, which is transmitted by rodents.

They began to trap rodents in the affected area, doing tissue studies both of rodents and Hantavirus victims. The virus and its principal carrier — the deer mouse —were positively identified. This disease causes "Hantavirus pulmonary syndrome" (HPS).

The deer mouse often lives in and near human dwellings to obtain food. This photograph shows a deer mouse (scientific name *Peromyscus maniculatus*), courtesy of the Center for Disease Control.



Early on, researchers also established that person-to-person spread was unlikely. Rodents, especially deer mice, were the keys.

Why the Four Corners Area?

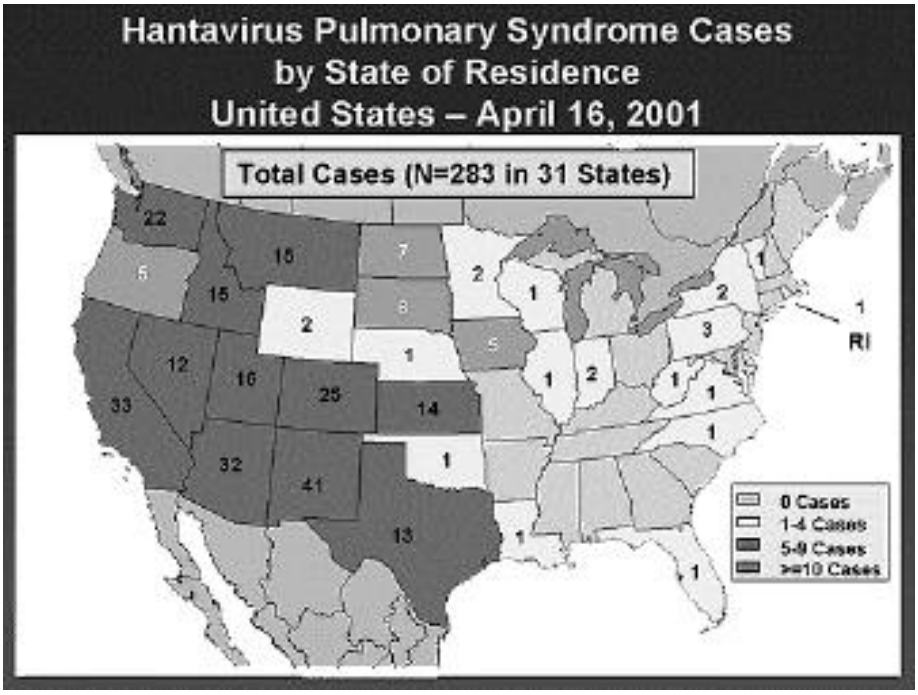
There was a "bumper crop" of rodents in the Four Corners, due to heavy rains during the spring of 1993. The wet weather produced an extra-plentiful supply of the foods that rodents eat. More food helped rodent populations grow.

Deer mice and other infected rodents occur in every habitat type, from desert to alpine tundra. Infection is more common in middle-altitude habitats that occur in the Four Corners area. Deer mice in the Four Corners area commonly carry the Hantavirus. In 1993, 30% of the rodents trapped in the Four Corners area had the Hantavirus antibody.

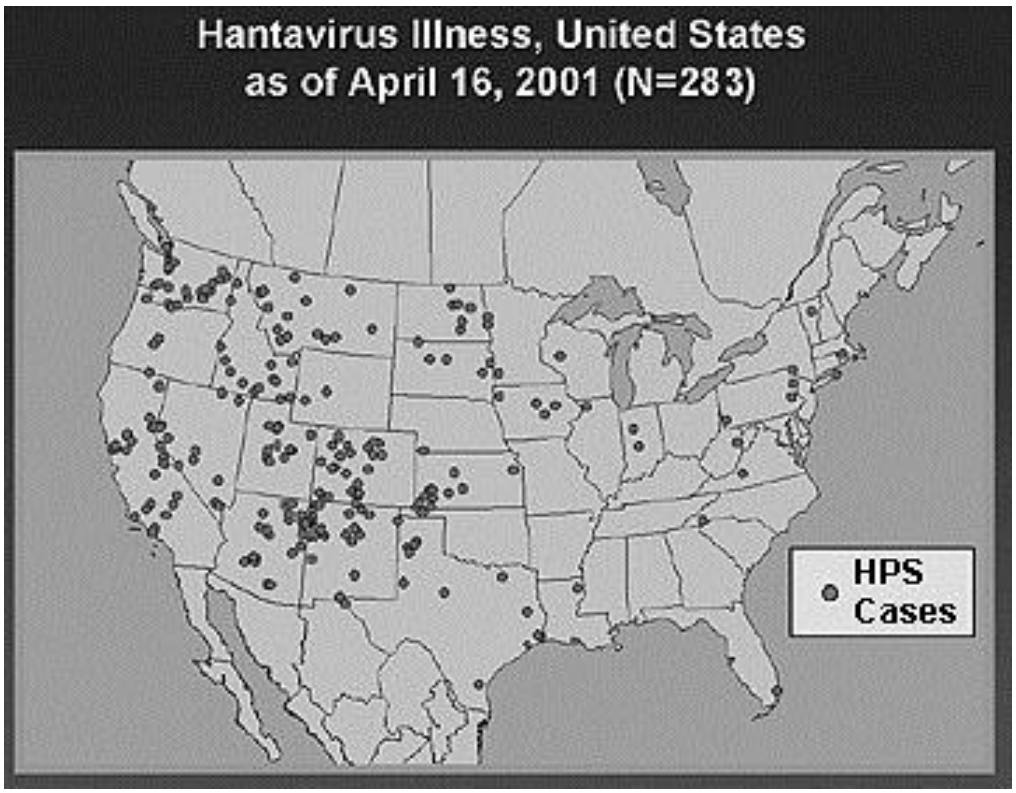
Herman Shortly, Director of the Office of Environmental Health of the Navajo Nation, notes that traditional Navajos observed the problem in the past. When there was an increase in rain in 1918, 1933, and 1934, the increase in food supply led to more rodents and deaths among young healthy Navajos living in the Four Corners region.

Although the highest caseload of HPS still occurs in the Four Corners states, it appears that other places where rodents live can host HPS as well.

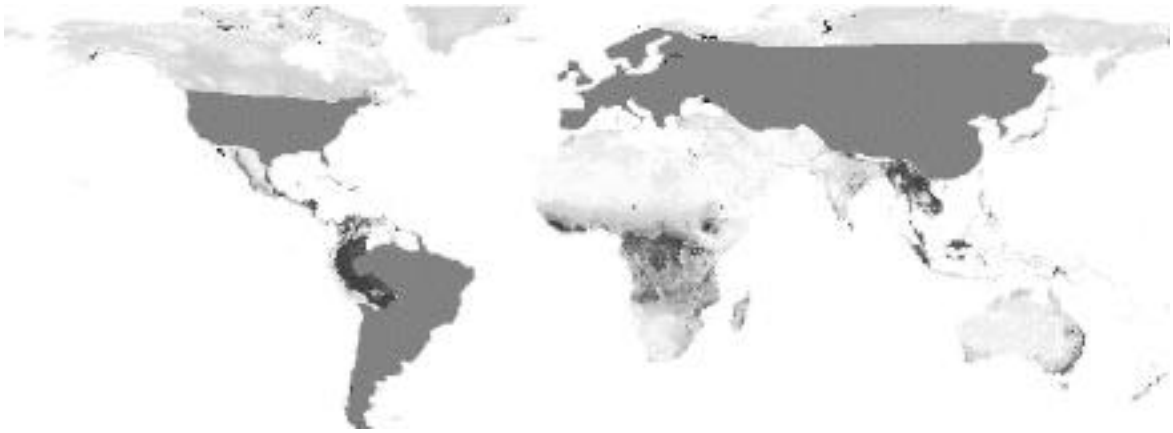
Take a look at this choropleth map, courtesy of the Center for Disease Control (CDC). Chloropleth maps show abundance in an area through shading. In this case, specific numbers have also been placed in each state.



Look at this next map, which is a dot map showing where the different people lived when they got the Hantavirus illness. Using this dot map, you can learn where the cases are found inside different states. Dot maps have trouble showing if many cases occurred in a small area, however, because dots rest on top of each other. This map is courtesy of the Center for Disease Control (CDC).



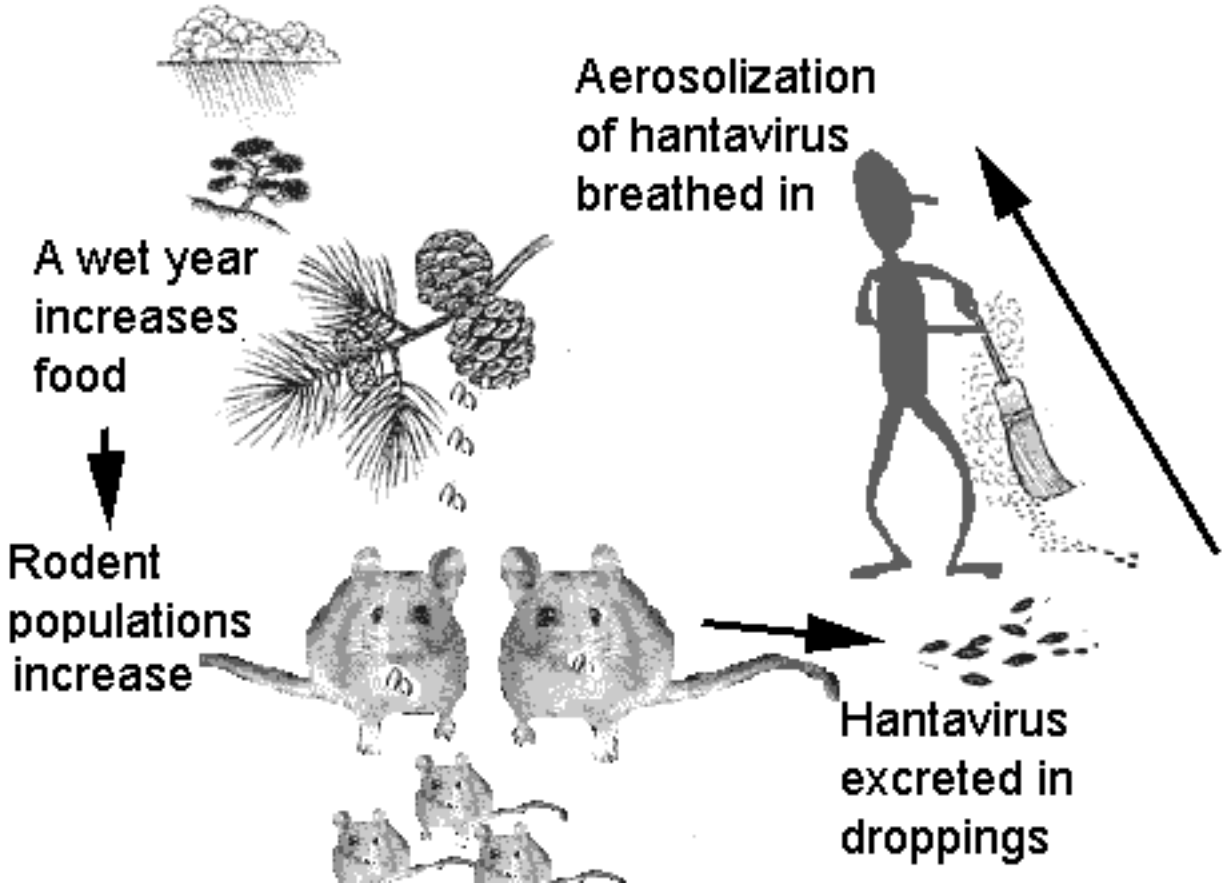
There are other places in the world that also have rodents that carry Hantavirus. This map, courtesy of NASA, shows the places in gray where Hantavirus is known to occur.



How is Hantavirus Transmitted?

Some rodents are infected with a type of Hantavirus that causes Hantavirus pulmonary syndrome (HPS). In the United States, deer mice (plus cotton rats and rice rats in the southeastern states and the white-footed mouse in the Northeast) are rodents that carry Hantavirus.

Rodents shed the virus in their urine, droppings, and saliva. HPS is mainly transmitted to people when they breathe in air contaminated with the virus. An aerosol is a suspension of fine particles (dust) in air. Aerosolization is the name given to the process of how dust gets into the air. Aerosolization happens when fresh rodent urine, droppings, or nesting materials are stirred up. Aerosolization is important, because dust containing the virus can be easily breathed into lungs.



There are several other ways rodents may spread Hantavirus to people. If a rodent with the virus bites someone, the virus may be spread. Researchers believe that people may be able to get the virus if they touch something that has been contaminated with rodent urine, droppings, or saliva, and then touch their nose or mouth. People can also become sick, if virus-infected rodent urine, droppings, or saliva contaminate food that people eat.

Who is at Risk of Getting HPS, and Why?

People are at risk when they open up cabins and sheds or clean outbuildings that have been closed during the winter. Examples of these buildings include barns, garages, or storage facilities for farm and construction equipment.

Construction and utility workers can be exposed when they work in crawl spaces under houses or in vacant buildings Hikers and campers can also be exposed when they use infested trail shelters.

In summary, these conditions put you at risk:

- closed-up rooms, cabins, and warehouses.
- house cleaning activities.
- stirring up dust.
- living around large populations of rodents.

What are the Symptoms of HPS?

HPS symptoms include fatigue, fever, and muscle aches, especially the large muscle groups—thighs, hips, back, sometimes shoulders. These symptoms are universal.

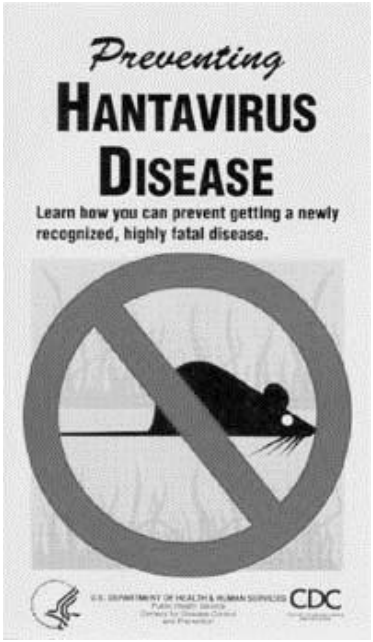
There may also be headaches, dizziness, chills and/or abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain. About half of all Hantavirus patients experience these symptoms.

In summary, these are the symptoms of HPS :

- early (universal): fever, fatigue, muscle aches
- early (about half): headaches, dizziness, chills, abdominal problems
- late (universal): coughing, shortness of breath

Should I Worry about Getting Hantavirus?

We have learned a lot more about HPS since 1993. HPS is treatable if detected early. So, be aware of the symptoms. Also, it is a good idea to take precautions to prevent Hantavirus.



How Do I Prevent Hantavirus?

Indoors:

1. Keep a clean home, especially your kitchen (wash dishes, clean counters and floor, keep food covered in rodent-proof containers).
2. Keep tight-fitting lids on garbage, discarding uneaten pet food each day.
3. Set and keep spring-loaded rodent traps. Set traps near baseboards because rodents tend to run along walls and in tight spaces rather than out in the open.
4. Seal all entry holes 1/4 inch or wider with patching materials, inside and out.

Outdoors:

1. Clear brush, grass and junk from around house foundations to eliminate a source of nesting materials.
2. Encourage the presence of natural predators, such as non-poisonous snakes, owls, and hawks.

Worksheet on Hantavirus

Name: _____
Please answer the following questions.

1. **Name the states that make up the "Four Corners". (Use a complete sentence.)**

2. **What region in the United States has the most cases of Hantavirus? (Circle the best answer)**

a. The choropleth map shows that New Mexico has the most cases.
b. The dot map shows that the eastern United States has the most cases.
c. The region of aerosolization has the most cases.
d. The Four Corners area has the most cases.

3. **What is "aerosolization"? (Use complete sentences.)**

4. **Which answer gives you two ways to prevent Hantavirus indoors? (Circle the best answer)**

a. Clear brush around the house and discard uneaten pet food each day.
b. Put tight lids on your garbage can and don't chase away hawks.
c. Set rodent traps and use rodent-proof containers for food.
d. Clear brush around the house and don't chase away owls.

5. **What causes people to become infected with Hantavirus? (Circle the best answer)**
   a. Changing baby diapers
   b. Shaking hands with an infected person.
   c. Breathing air contaminated with urine from an infected mouse.
   d. Eating food kept in rodent-proof containers.

6. **According to the maps of the Hantavirus Pulmonary Syndrome (HPS) cases in the United States from 1994-2001, how many cases were found in Arizona? (_____) in California? (_____) in the Four Corner states? (_____)**

7. What is the author's main purpose in writing this selection? (Circle the best answer)

a. To encourage tourists to visit Arizona.
b. To explain how to set mousetraps so you can catch the vectors that transmit HPS.
c. To inform about the dangers of camping and hiking.
d. To explain about Hantavirus to help avoid getting the disease.

8. Examine the maps in the reading selection. What map BEST shows the specific location of the HPS cases within each state? (Circle the best answer)

a. The choropleth map best shows the location of the HPS cases, because you can see how many cases there were in a whole state.
b. The contour map best shows the location, because you know the elevation of each case.
c. The dot map best shows where cases occurred.
d. The political map best shows the location because it has the states labeled.

9. The author writes, ". . . there was a 'bumper crop' of rodents." What do you think this means? (Circle the best answer)

a. People were harvesting rodents to eat.
b. Rodents kept bumping into their agricultural crops.
c. Rodents kept eating people's crops until they bumped into each other.
d. There was a great increase in rodents.

10. Do you think the author wants you to be aware of the symptoms of HPS? Why? (Answer in a complete sentence.)

KEY TO Worksheet on Hantavirus

1. Name the states that make up the "Four Corners". Use complete sentences!

Arizona, Colorado, New Mexico, and Utah are the states that make up the Four Corners.

2. What region in the United States has the most cases of Hantavirus? (Circle the best answer)

a. The chloropleth map shows that New Mexico has the most cases.
b. The dot map shows that the eastern United States has the most cases.
c. The region of aerosolization has the most cases.
d. The Four Corners area has the most cases. Even though New Mexico has had more cases than any other state, the article talks about the Four Corners region. So this is the best answer.

3. What is "aerosolization"? Use complete sentences!

Aerosolization is a process describing how dust gets into the air.

4. Which answer gives you two ways to prevent Hantavirus indoors. (Circle the best answer)

a. Clear brush around the house and discard uneaten pet food each day.
b. Put tight lids on your garbage can and don't chase away hawks.
c. Set rodent traps and use rodent-proof containers for food.. All of the other answers do not present **two** correct ways to prevent Hantavirus indoors.
d. Clear brush around the house and don't chase away owls.
e. All of the above answers are correct.

5. What causes people to become infected with Hantavirus? (Circle the best answer)

a. Changing baby diapers
b. Shaking hands with an infected person.
c. Breathing air contaminated with urine from an infected mouse.
d. Eating food kept in rodent-proof containers.

6. According to the maps of the Hantavirus Pulmonary Syndrome (HPS) cases in the United States from 1994-2001, how many cases were found

There are correct styles of answers.

Students may put ≥ 10 (greater than or equal to 10), since the chloropleth map indicates amount by shading. If they do this, then the correct answer would be ≥40 for all of the Four Corner states.

Students may also decide correctly to give specific numbers listed on the map:

in Arizona? __32___
in California? _33_____
in the Four Corner states ? __114___

7. What is the author's main purpose in writing this selection? (Circle the best answer)

a. To encourage tourists to visit Arizona
b. To explain how to set mousetraps so you can catch the vectors that transmit HPS
c. To inform about the dangers of camping and hiking.

d. To explain about Hantavirus to help avoid getting the disease. The other answers are not true.

8. Examine the maps in the reading selection. What map best shows the specific location of the HPS cases within each state? (Circle the best answer)

a. The chloropleth map best shows the location of the HPS cases, because you can see how many cases there were in a whole state.
b. The contour map best shows the location, because you know the elevation of each case.

c. The dot best shows where cases occurred. Even though the answers are longer, this is the only correct answer.

d. The political map best shows the location because it has the states labeled.

9. The author writes, ". . . there was a 'bumper crop' of rodents". What do you think this means? (Circle the best answer.)

a. People were harvesting rodents to eat.
b. Rodents kept bumping into their agricultural crops.
c. Rodents kept eating people's crops until they bumped into each other.

d. There was a great increase in rodents.

10. Why you think the author wants you to be aware of the symptoms of HPS? Use complete sentences!

The author wants me to be aware of the symptoms, so HPS can be detected early and treated.