Using knowledge gained from previous AMI assignment and the current events of the times, answer the following short answer/paragraph questions.

1. List two changes to the environment that can lead to the spread of infectious diseases.

2. Explain why some diseases are likely to spread as a result of global warming.

3. Explain why the environment is an important factor in the spread of cholera.

4. Explain the term emerging virus.

Terms to Define from previous reading assignment of AMI 15.

Pathogen

Host

Vector
A case study and geographical exercise on Lyme Disease

From Medical & Life Sciences NEWS -

Lyme disease was first recognized in 1975 after researchers investigated why unusually large numbers of children were being diagnosed with juvenile rheumatoid arthritis in Lyme, Connecticut, and two neighboring towns. The researchers discovered that most of the affected children lived and played near wooded areas where ticks live. They also found that the children's first symptoms typically started in the summer months, the height of the tick season. Several of the patients interviewed reported having a skin rash just before developing their arthritis. Many also recalled being bitten by a tick at the rash site.

Further investigations discovered that tiny deer ticks infected with a spiral-shaped bacterium or spirochete (which was later named Borrelia burgdorferi) were responsible for the outbreak of arthritis in Lyme.

In Europe, a skin rash similar to that of Lyme disease had been described in medical literature dating back to the turn of the 20th century. Lyme disease may have spread from Europe to the United States in the early 1900s, but health experts only recently recognized it as a distinct illness.

Small rodents and deer play an important role in a deer tick's life cycle. Both nymphs and adult ticks can transmit Lyme disease-causing bacteria. The recent increase of the deer population in the Northeast and of housing developments in rural areas where deer ticks are commonly found probably contributed to the disease's increased spread.

The number of reported cases of Lyme disease as well as the number of geographic areas in which it is found have increased. Lyme disease has been reported in nearly all states in the United States, although more than 95 percent of all reported cases are concentrated in the coastal Northeast, mid-Atlantic states, Wisconsin, Minnesota, and northern California. Lyme disease is also found in large areas of Asia and Europe.
Use the Lyme Disease risk map for the United States above to answer questions 1-5.

1. Using the map above, determine the risk of contracting Lyme disease in your city or town.

2. In what general region of the United States is the risk of contracting Lyme disease greatest?

3. Can you determine the relationship between the risk of contracting Lyme disease and the concentration of ticks that act as vectors for the disease? Explain your answer.

4. What is the difference between the risk of contracting Lyme disease in rural Massachusetts and the risk of contracting Lyme disease in rural Nevada?

5. What factors might account for the relatively high risk of contracting Lyme disease in the Northeast?
EVSC – AMI 18 -Chapter 20 Environment and Human Health

Read the following about changing environment and the possible influences on human health. Consider the tools we, as humans, and our healthcare providers to improve our health and then the consequences of these solutions.

Environmental Change and Disease

Many ways in which we alter the environment make the environment more suitable for pathogens to live and reproduce. For example, soil is often polluted with chemicals and pathogens. When soil erodes, these pollutants blow away and wash away with the soil and may contaminate areas thousands of miles away. Many parasites are spread through soil that is contaminated with feces. Hookworm, which causes acute exhaustion, was once common in the United States. People are infected by walking barefoot on soil that contains human and animal feces or by consuming contaminated food or water. In Nepal this has been illustrated in recent history. One from continuing development and also from unchecked soil erosion in this steep and mountainous region. In 1984, 87 percent of the population was found to be infected by parasitic worms, which people were exposed to due to widespread soil erosion as described previously.

Antibiotic Resistance

Our actions cause pathogens to evolve resistance to antibiotics that are used to kill them. For example, in the United States, large quantities of antibiotics are fed to livestock each year to speed their growth. As a result, Salmonella, Escherichia coli (E. coli), and other bacteria that live in livestock evolve resistance to antibiotics. These bacteria now make thousands of U.S. citizens sick each year when they eat contaminated meat that has been improperly refrigerated or undercooked.

We also use enormous amounts of antibiotics to treat human illnesses. In 1979, 6 percent of European strains of pneumonia bacteria were resistant to antibiotics. Ten years later, 44 percent of the strains were resistant. Tuberculosis (TB) is another illness treated with antibiotics. The spread of TB in recent years is mostly due to the evolution of antibiotic resistance in the bacterium that causes TB.

Resistance to Treatment

The United States Food and Drug Administration provides facts about disease-causing organisms that have developed antibiotic resistance. In hospitals, 70 percent of the microbes that can cause infection are resistant to at least one common antibiotic. Some strains of Staphylococcus aureus, which is the most common bacterium to infect surgical wounds, are resistant to all antibiotics except for vancomycin, which is considered the antibiotic of last resort. There are now some organisms that are resistant to all available antibiotics. These microbes must be treated with powerful experimental drugs. Part of the problem lies in the overprescribing of antibiotics by doctors.

According to the U.S. Centers for Disease Control, more than 50 million unnecessary prescriptions for antibiotics are written each year.

I. Develop a survey about antibiotics that will be given to students and parents of Greene County Tech School District. This needs to have at least 5 questions
   a. Be sure that the survey includes questions about antibiotic and antibacterial product use. Include questions that will assess people’s knowledge regarding diseases that are treatable (or not treatable) using antibiotics.
   b. Include questions about antibiotic resistance.

II. Develop a hypothesis about the possible outcome based on your own opinion and experiences – this should be at least 2 paragraphs based on the 5 developed questions
Dehydration is a serious threat to human survival—as dangerous as a high fever. However, as any athlete knows, drinking water alone is often not an adequate cure for dehydration. Sports drinks contain sugar and electrolytes (minerals) as well as water. This principle also underlies oral rehydration therapy, which is used to treat people suffering from diseases such as cholera and dysentery. These diseases cause water loss from diarrhea and vomiting. Severe dehydration often causes death, particularly in small children. Patients being treated for dehydration are fed a solution of salt, sugar, and water. The sugar and salt help the body absorb the water from the stomach. Sugar and salt also add electrolytes to the body fluids so that these are not diluted. Millions of lives have been saved by rehydration therapy.

1. According to the passage, which of the following statements about oral rehydration therapy is not true?
   a. A solution containing sugars and salts is absorbed by the stomach more rapidly than water alone.
   b. The salts replace electrolytes in the bloodstream so that these are not diluted by the water.
   c. Any source of water is adequate to make up the solution of salts and sugar.
   d. Millions of lives have been saved by oral rehydration therapy.

2. According to the passage, which of the following statements about dehydration is not true?
   a. It may be fatal.
   b. It is especially dangerous to small children.
   c. It may be caused by diarrhea and vomiting from diseases such as cholera.
   d. It is not often caused by exercising on a hot day without drinking.

The graph above shows the dose-response curves for two chemicals. Use the graph to answer questions 3-5.

3. Which chemical is more toxic at a lower dose?

4. Which chemical is more toxic at a very large dose?

5. Can you tell from the graph which chemical is more likely to be a problem if it persists in the environment?
1. Which of the following is not a true statement about the effects of pollution on health? 
   a. It is difficult to determine how pollution affects health because many factors often contribute to a disease. 
   b. The toxic effects of a pollutant depend upon the dose to which you are exposed. 
   c. Many pollutants cause chronic diseases that result from exposure to the pollutant over the course of many years. 
   d. Persistent chemicals are less toxic than chemicals that break down rapidly. 

2. Which of the following is an emerging disease that was unknown 50 years ago? 
   a. malaria 
   b. dengue fever 
   c. Lyme disease 
   d. schistosomiasis 

3. Cholera is usually transmitted from person to person by water because 
   a. it is caused by a snail that breeds in water. 
   b. it is usually contracted by someone drinking water polluted with human feces that contain the cholera pathogen. 
   c. it is transmitted by mosquitoes. 
   d. it is caused by a virus. 

4. Tuberculosis (TB), which was once almost eradicated, is becoming more common, even in developed countries, because 
   a. new varieties of the tuberculosis pathogen have evolved in rodents. 
   b. livestock are given antibiotics. 
   c. the pathogen that causes TB breeds in polluted water. 
   d. some populations of the pathogen that causes TB are resistant to the antibiotics. 

5. Which of the following statements about environmental pollutants is true? 
   a. Our environment contains fewer toxic chemicals than it did 50 years ago. 
   b. Hormone mimics in our water supply pose no danger to humans. 
   c. There is no health risk from pollutants in indoor air. 
   d. The bodies of people who live in the United States contain lower levels of some toxic chemicals than they did 20 years ago. 

6. Which of the following actions is most likely to prevent yellow fever, which is transmitted by mosquitoes, from becoming epidemic? 
   a. preventing dehydration in patients by treating them with oral rehydration therapy 
   b. taking antibiotics 
   c. encouraging people to empty water out of old cans, tires, plant saucers, and other areas that contain standing water 
   d. spraying the area repeatedly with pesticides
7. Malaria cases increased between 1990 and 1998. What other facts would you want to know before deciding that the United States has a growing malaria problem?

8. By what percentage did the number of typhoid fever cases decline between 1990 and 1998?

9. Which of the Disease represented above indicated to you that they are "emerging" in our society? What is the leading indicator for your response?

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