

Participant's Names: _____
School and Team Number: _____

Canyon Park 2008
Invitational

Part I: Define the following terms (14 pts).

a. Determinant:

b. Carrier:

c. Host:

d. Zoonosis:

e. Vector:

f. Vehicle:

g. Fomite:

Part II: Epidemiological Concepts

a. Name the ten steps of investigating an outbreak: (10 pts)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

b. Describe the chain of infection (6 pts).

c. Name the three elements of the epidemiology triad (6 pts).

- 1.
- 2.
- 3.

d. Define the type of study that best matches the description. (10 pts)

_____: This study is based upon exposure status.

_____: This study is used with a small, well-defined population.

_____: This study uses the odds ratio to calculate relevant data.

_____: This type of study is also known as a survey.

_____: This study compares groups of people to determine a cause of a disease.

Part III: Infectious Diseases

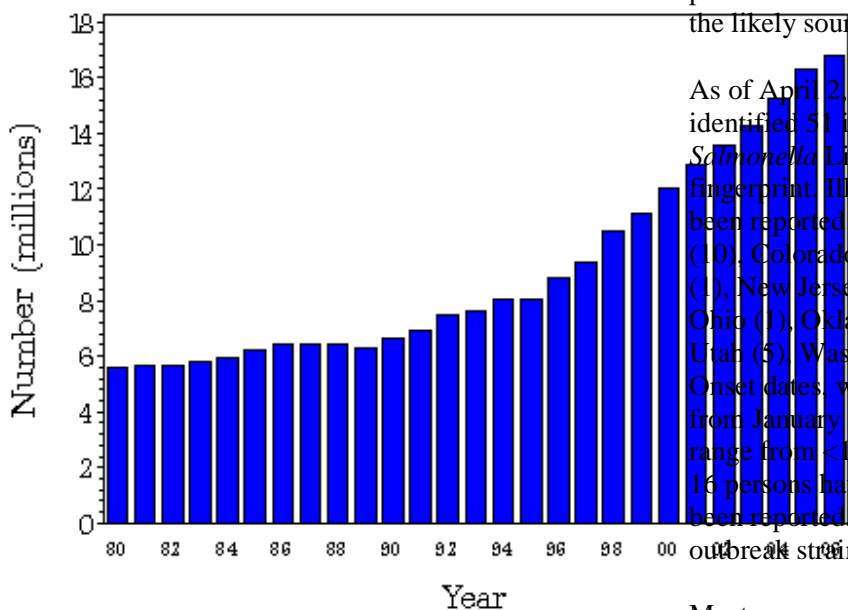
Match the description with the appropriate disease: (20pts)

- | | |
|----------------------------|--|
| 1. Smallpox | A. Three classifications of this disease include bubonic, septicemic, and pneumonic |
| 2. Plague | B. Also known as 0157:H7 |
| 3. Cholera | C. This disease was first identified by Robert Koch. |
| 4. Ebola hemorrhagic fever | D. This disease is passed to humans through the bite of an infected Anopheles mosquito. |
| 5. E. Coli | E. A sled-dog team raced medicine to Nome in 1925 to cure sick children of this disease. |
| 6. Mad Cow Disease | F. This is one of the deadliest pathogens on earth. |
| 7. Diphtheria | G. The bacterium that causes this disease is airborne; the agent circulates easily through air-conditioning systems. |
| 8. Legionnaire's Disease | H. This disease is caused by a rare protein called a prion. |
| 9. Malaria | I. This disease has been eradicated. |
| 10. Tuberculosis | J. Dr. John Snow was the first person to investigate this disease. |
- Record matches here:
1. ____ 2. ____ 3. ____ 4. ____
5. ____ 6. ____ 7. ____ 8. ____
9. ____ 10. ____

Part IV: Data Interpretation

1. Diabetes is becoming more common in the United States. From 1980 through 2006, the number of Americans with diabetes tripled (from 5.6 million to 16.8 million).

**Number (in Millions) of
Civilian/Noninstitutionalized Persons with
Diagnosed Diabetes, United States, 1980–
2006**



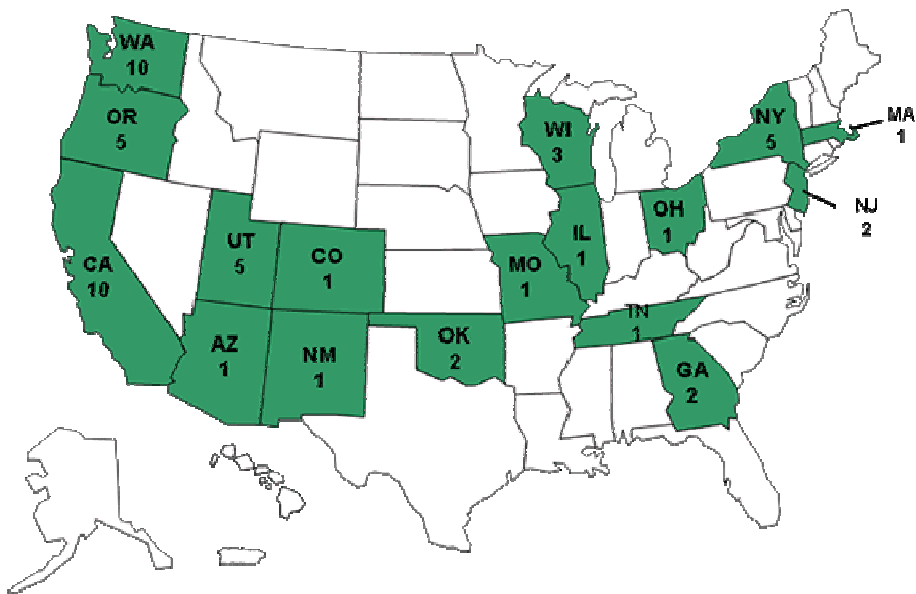
Give three possible reasons for the trend seen in the above graph (15pts)(tiebreaker question).

2. CDC is collaborating with public health officials in multiple states across the United States and with the U.S. Food and Drug Administration (FDA) to investigate a multi-state outbreak of *Salmonella* Litchfield infections. An investigation that used interviews comparing foods eaten by ill and well persons is showing that cantaloupe from Honduras is the likely source of the illnesses.

As of April 2, 2008, state health departments identified 51 ill persons in 16 states infected with *Salmonella* Litchfield with the same genetic fingerprint. Ill persons with the outbreak strain have been reported from Arizona (1 person), California (10), Colorado (1), Georgia (2), Illinois (1), Missouri (1), New Jersey (2), New Mexico (1), New York (5), Ohio (1), Oklahoma (2), Oregon (5), Tennessee (1), Utah (5), Washington (10), and Wisconsin (3). Onset dates, which are known for 50 patients, ranged from January 10 to March 10, 2008. Their ages range from <1 to 93 years; 59% are female. At least 16 persons have been hospitalized. No deaths have been reported. In addition, 9 ill persons with the outbreak strain have been reported in Canada.

Most persons infected with *Salmonella* developed diarrhea, fever, and abdominal cramps 12–72 hours after infection. Infection was diagnosed by culture of a stool sample. The illness usually lasted 4 – 7 days.

**Persons infected with the outbreak strain of
Salmonella Litchfield, United States, by state,
January 1 to April 2, 2008.**



Develop a case definition for the above scenario. (12pts)

Disease Detectives Answer Key

Part 1: Vocabulary (14pts)

1. **Determinant:** Any factor that brings about change in a health condition or in other defined characteristics
2. **Carrier:** A person or animal who harbors the infectious agent for a disease and can transmit it to others without showing symptoms.
3. **Host:** A person that is susceptible to an infectious agent under natural conditions.
4. **Zoonosis:** An infectious disease that is transmissible from animals to humans.
5. **Vector:** An animate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host.
6. **Vehicle:** An inanimate intermediary in the indirect transmission of an agent that carries the agent from the reservoir to a susceptible host.
7. **Fomite:** An inanimate object that can be the vehicle for transmission of an infectious disease.

Part II: Epidemiological Concepts

- a. Ten steps of investigating an outbreak (10pts)
 1. Prepare for field work
 2. Establish the existence of an outbreak
 3. Verify the diagnosis
 4. Define and identify cases
 5. Describe and orient the data in terms of time, place, and person
 6. Develop hypotheses
 7. Evaluate hypotheses
 8. Refine hypotheses and carry out additional studies
 9. Implement control and prevention measures
 10. Communicate findings

b. **Chain of infection (6pts):** An **agent** leaves a **reservoir** through a **portal of exit**, and is conveyed by some **mode of transmission**, and enters the appropriate **portal of entry** to infect a susceptible host.

c. **Epidemiology triad (6pts):** host, agent, environment

d. Define the type of study that best matches the description. (10pts)

a. Cohort: This study is based upon exposure status.

b. Cohort: This study is used with a small, well-defined population.

c. Case-control: This study uses the odds ratio to calculate relevant data.

d. Cross-sectional: This type of study is also known as a survey.

e. Case-control: This study compares groups of people to determine a cause of a disease.

Part III: Infectious Diseases (20pts)

1. **I--Smallpox:** This disease has been eradicated
2. **A--Plague:** Three classifications of this disease include bubonic, septicemic, and pneumonic
3. **J--Cholera:** Dr. John Snow was the first person to investigate this disease
4. **F--Ebola hemorrhagic fever:** This is on the deadliest pathogens on earth
5. **B--E. coli:** Also known as 0157:H7
6. **H--Mad Cow Disease:** This disease is caused by a rare protein called a prion.
7. **E--Diphtheria:** A sled-dog team raced medicine to Nome in 1925 to cure sick children of this disease.
8. **G--Legionnaire's Disease:** The bacterium that causes this disease is airborne; the agent circulates easily through air-conditioning systems.

9. **D**--Malaria: This disease is passed to humans through the bite of an infected *Anopheles* mosquito.
10. **C**--Tuberculosis: This disease was first identified by Robert Koch.

Part IV: Data Interpretations

1. Answers will vary. (15pts) Possible answers include:

- a. An increased awareness of diabetes and more diagnoses.
- b. A change in the clinical criteria that allows more people to qualify as diabetics.
- c. A paralleled increase in other conditions that promote diabetes (example: obesity).

2. Answers will vary. Case definitions must include details of time, place, person, and clinical criteria. (12pts)