Disease Detectives Test (2018)

Name: _____

Part 1: _____/16   Part 2: _____/54   Total: _____/70   Won Tiebreaker: _____

Part One: General Epidemiology
(16 pts)

1. (4 pts) Explain the differences between the following terms: **Outbreak, Cluster, Epidemic, and Pandemic.**

2. (4 pts) On the timeline below, label where the following would occur: **Exposure, Pathologic Changes, Onset of Symptoms, and Usual Time of Diagnosis**.

Stage of Susceptibility	Stage of Subclinical Disease	Stage of Clinical Disease	Stage of Recovery, Disability, or Death

3. (2 pts) Give an example of a vector of transmission and explain the process by which it transmits disease.

(1 pt each) For Questions 4-9, classify the study described using one of the following choices. Answers may be used more than once or not at all.

    A. Experimental
    B. Observational cohort
    C. Observational case-control
    D. Observational cross-sectional
    E. Not an analytical or epidemiologic study

4. _____ A representative sample of Toronto residents was surveyed by telephone and asked whether they smoke with any regularity and whether they have been diagnosed with heart disease.

5. _____ A pharmaceutical company offered low-cost trials of a pill designed to relieve chronic pain symptoms for a period of 6 months.

6. _____ Standardized weight and height measurements were taken for 16,875 participants between the ages of 2 and 19 and 27,395 participants 20 years or older.

7. _____ Persons from a physician's practice diagnosed with new-onset Lyme disease were asked how often they walk through woods, use insect repellent, wear short sleeves and pants, etc. Twice as many patients without Lyme disease from the same physician's practice were asked the same questions, and the responses in the two groups were compared.

8. _____ Two-month-old children enrolled in a study were vaccinated with one of two types of a new Hepatitis B vaccine. Parents were asked over telephone one week later whether the children had experienced any of a list of side effects.

9. _____ Occurrence of cancer for a 10-year period was compared between 10,000 persons residing within 1 mile of a facility using ethylene oxide in sterilization and 10,000 persons who resided elsewhere during the same period.

Part Two: Outbreak Investigation
(56 pts)

<u>Cholera</u>

 Cholera is an acute, diarrheal illness caused by infection of the intestine with the toxigenic bacterium *Vibrio cholerae* serogroup O1 or O139. An estimated 2.9 million cases and 95,000 deaths occur each year around the world. The infection is often mild or without symptoms, but can sometimes be severe. Approximately one in 10 (10%) infected persons will have severe disease characterized by profuse watery diarrhea, vomiting, and leg cramps. In these people, rapid loss of body fluids leads to dehydration and shock. Without treatment, death can occur within hours.

 Dadaab Refugee camp in Garissa County, Kenya, hosts nearly 340,000 refugees in five subcamps. On November 18 and 19, 2015, during an ongoing national cholera outbreak (2), two camp residents were evaluated for acute watery diarrhea (three or more stools in ≤24 hours); Vibrio cholerae serogroup O1 serotype Ogawa was isolated from stool specimens collected from both patients. Within 1 week of the report of index cases, an additional 45 cases of acute watery diarrhea were reported. (CDC)

1. (5 pts) Write a case definition for the outbreak. Make sure to define both a suspected case and a confirmed case.

2. (6 pts) Draw a logical chain of infection for the spread of cholera.

3. (4 pts) Name and explain two possible risk factors for cholera associated with living in a refugee camp.

4. (2 pts) Describe two strategies for preventing future cholera outbreaks in the camp.

Figure 1. Suspected and confirmed cholera cases (N = 1,797), by week of illness onset — Dadaab refugee camp, Kenya, November 18, 2015–June 6, 2016
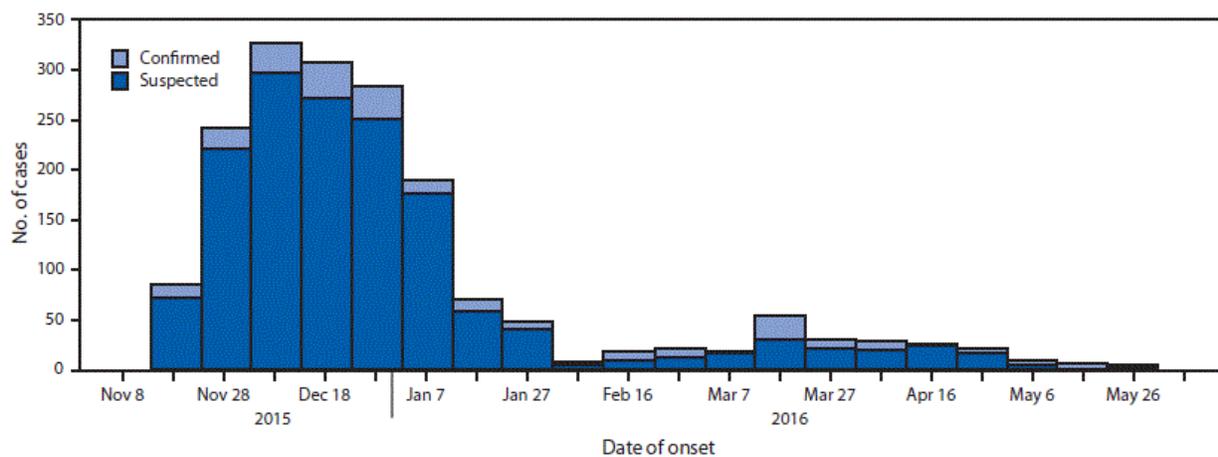
The incubation period of cholera is 1-3 days.

5. (2 pts) Based on the epidemic curve, what type of outbreak is this and why?

In December 2015, the Kenya Ministry of Health conducted a study in the subcamps most affected (Dagahaley and Hagadera) to identify risk factors for cholera. A standardized questionnaire was developed that adopted some questions from previous efforts, and it was administered to study participants (or their caregivers) to collect demographic and exposure information.

Table 2. Reported exposures among Dadaab refugee camp residents during a cholera outbreak — Kenya, December 2015

Exposure	Sick (N=32)	Healthy (N=64)
Factor X	13	3
Factor Y	15	5

6. (2 pts) What type of epidemiological study was conducted? How do you know?

7. (4 pts) Calculate the appropriate measure of risk (relative risk or odds ratio) for each possible risk factor. Round to two decimal places. Show your work.

Factor X:

Factor Y:

8. (2 pts) Write a one-sentence conclusion interpreting your findings for each exposure.

Factor X:

Factor Y:

Indoor Air Pollutants

In June 2017, the Alabama Department of Public Health (ADPH) conducted a Community Assessment for Public Health Emergency Response (CASPER), focusing on indoor air pollutants in seven neighborhoods in Madison County, Alabama, where a large percentage of homes were built before 1980. Local health partners had concerns about indoor air quality and environmental risks such as radon. According to ADPH's Radon Program, Madison County's underground geology, which allows radon gas to accumulate and more readily enter houses and other buildings above ground, places it at high risk for elevated radon levels.

The sampling frame for the CASPER included seven neighborhoods identified by community partners as having a majority of homes built before 1980. Within each cluster, seven households were selected for interviews using systematic random sampling, for a target of 210 interviews. If one of the original seven households was not available or the residents refused to participate, systematic random sampling was used to select another household. Two-person interview teams conducted interviews with one respondent aged ≥18 years from each selected household. (CDC)

9. (4 pts) What are two possible biases/limitations of this study? Explain.

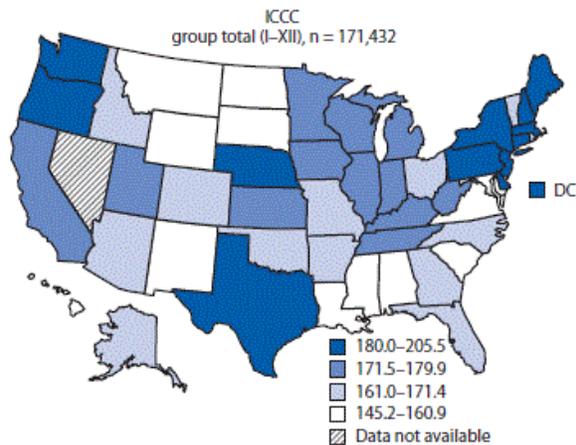10. (2 pts) Name one other indoor air pollutant and describe its health effects.

Respondents in 70.2% of households reported awareness of radon. Although 87.8% of household respondents who reported awareness of radon agreed with the statement that prolonged exposure to radon could be harmful, only 23.9% were aware that prolonged radon exposure could cause lung cancer. Among 131 respondents reporting awareness of radon, 7.3% stated that their homes had been tested.

11. (2 pts) Imagine you work at the ADPH. After collecting this information, what steps would you take to promote the health of the Madison County community? Name two strategies.

<u>Cancer</u>

During 2003–2014, CDC identified 171,432 new cases of pediatric cancer (using data collected by local cancer registries). Rates were highest in the Northeast U.S. Census region, followed by the Midwest, the West, and the South. Rates were highest in the Northeast across all age groups. (CDC)

Figure 1. Age-adjusted incidence of cancer among persons aged <20 years, by U.S. state — United States, 2003–2014

ICCC
group total (I–XII), n = 171,432

- 180.0–205.5
- 171.5–179.9
- 161.0–171.4
- 145.2–160.9
- Data not available

DC

12. (2 pts) Identify units for the data depicted on the map.

13. (4 pts) Why would there be geographic variation in pediatric cancer incidence? Name and explain two possible factors.

14. (4 pts) Explain two potential limitations/sources of bias in this study.

15. (3 pts) What is the epidemiological triad, and would it be appropriate to apply it to a type of cancer? Why or why not?

16. (6 pts) If you wanted to conduct a study analyzing possible risk factors for a very rare cancer, what type of epidemiological study would you use? Why? List <u>two benefits</u> and <u>two drawbacks</u> of using this type of study.

**TIEBREAKER: Describe the steps you would take to conduct the study you described in Question 16.