DISEASE DETECTIVE
INVITATIONAL 2014

Directions: Read the following scenarios and answer the questions that follow. Questions are matching, multiple choice, or short answer. The number in parenthesis indicates the point value
for each part.
.
Part 1. Match the following terms on the left with the definitions on the right. Each term will have only one answer. (15)

1. Cohort   __f__

2. Epidemic curve ___l____

3. Fomite ___e____

4. Line list ____h___

5. Attack rate ___g____

6. Endemic ___b____

7. Odds ratio __j___

8. Relative risk___n__

9. Case-control _____m____

10. Vector ___a____

11. Pandemic ____i____

12. Epidemic ___d_____

13. Outbreak ___c___

14. Morbidity ___k____

15. Mortality ____o____

a) An animate, living insect or animal that is involved with transmission of the disease agent.

b) Disease or infectious agent that is habitually present in a community, geographic area, or population group.

c) More cases of a particular disease than expected in a given area or among a specialized group of people over a particular period of time.

d) Occurrence of a disease clearly in excess of normal expectancy.

e) An inanimate object that is laden with disease-causing agents.

f) Study that follows a group of subjects who received a specific exposure in order to examine the differences in incidence of a specific disease or other outcome of interest.

g) The rate that a group experienced an outcome or illness.

h) Chart of information about each case.

i) An epidemic that spans a wide geographic area.

j) Measure of association between frequency of exposure and frequency of outcome (formula is AD/BC).

k) Occurrence of an illness or illnesses in a population.

l) A histogram showing the course of a disease or outbreak.

 m) Study that compares individuals who have a disease with individuals who do not have the disease in order to examine differences in exposures or risk factors for the disease

n) Ratio of the risk of disease or death among the exposed to the risk among the unexposed.

o) Occurrence of death in a population.

Part 2: Read the following information on ozone and answer questions 1-4 on the answer sheet. (4 points)

Scientists 100 years ago would have been incredulous at the idea that, by the late twentieth century, humankind would be affecting the stratosphere. Yet, remarkably, human-induced depletion of stratospheric ozone has recently begun – after 8,000 generations of Homo sapiens. Stratospheric ozone absorbs much of the incoming solar ultraviolet radiation (UVR), especially the biologically more damaging, shorter-wavelength, UVR.

During the 1980s and 1990s at northern mid-latitudes (such as Europe), the average year-round ozone concentration declined by around 4% per decade: over the southern regions of Australia, New Zealand, Argentina and South Africa, the figure approximated 6-7%. Estimating the resultant

changes in actual ground-level ultraviolet radiation remains technically complex. However, exposures at northern mid-latitudes, for example, are likely to peak around 2020, with an estimated 10% increase in effective ultraviolet radiation relative to 1980s levels (World Health Organization)

- What is a possible cause of ozone depletion in the stratosphere? ____emissions of chemicals (chloroflourocarbons CFC's)_____
- What is a possible health risk associated with increase exposure to ultraviolet radiation? ___Wrinkling, Cancer, etc.___
- What measures have been taken by the US to lessen ozone depletion? _____ The Clean Air Act prevented factories from releasing too many chemicals into the air._____
- Ozone is also a pollutant given off by the burning of fossil fuels. Ground-level ozone can be a health hazard for humans. The EPA has an index it uses to measure ozone levels. What is the name of this index? _____Air Quality Index_____

PART 3: READ THE FOLLOWING ARTICLE ON CHOLERA AND ANSWER QUESTIONS 1-8 ON THE ANSWER SHEET. (19 POINTS)

Cholera epidemics have been reported in many districts in Uganda in recent years. In the period July 1999 to May 2000 up to 19 districts from all the four regions of the country registered cholera outbreaks. A total of 4,388 cases with 219 deaths were recorded.
(Hon. Kiyonga C, 2000).
In Rukungiri district there have been several epidemics in the past two decades. In 1978 a severe outbreak occurred in Rwenshama. This was a period of serious socio-economic problems in Uganda. Although hard data were difficult to come by, reliable sources put the case fatality rate at over 40%.

In the period December 1997 to January 1998, an outbreak occurred in Rujumbura and Rubabo counties.

It affected six subcounties: Nyakagyeme, Kagunga, Rukungiri Town Council, Buyanja, Ruhinda and Bugangari. Thirty-two people were taken ill and the case fatality rate was 12.5%. In 1998 from April to June an epidemic occurred in Rwenshama. It affected 76 people with a case fatality rate of 7.9%. Another outbreak in Rwenshama occurred again from November to December 1999 attacking 22 people with case fatality rate of 18% (www.cdc.gov)

- What is cholera? _____An Infection of the Intestine (Food-borne Illness)_____

- What causes cholera? ___The bacterium Vibrio cholerae____ Tie Breaker: Scientific Name

- What are the symptoms of cholera? (two)   ___diarrhea___, ___vomiting___

- What kind of study is this? Case-control study or cohort study
  Case-control study

- What was the case fatality rate in percent for the epidemic occurring between July 1999 to May 2000? (first paragraph above)
  219/4388 = 5.0%

- Give a possible hypothesis for this cholera epidemic:
  The cholera epidemic was caused by bad sewage treatment due to socio-economic problems.

- What are the ten steps in outbreak investigation?

Prepare for field work

Establish the existence of an outbreak

Verify the diagnosis

Identify cases

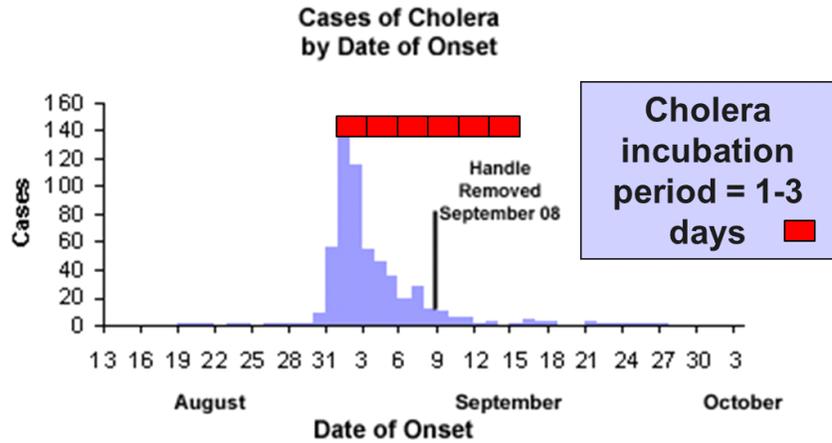Perform descriptive epidemiology

Develop hypotheses

Evaluate hypotheses epidemiologically

As necessary, reconsider, refine, and re-evaluate hypotheses

Implement control and prevention measures

Communicate findings

**Cases of Cholera
by Date of Onset**

- Given the above epidemic curve for the cholera outbreak of 1853 in London, would you describe the source of the epidemic as point source or continuous common source? ___point source___
  9. Describe the conditions in London at this time that lead to the cholera outbreak.
   Cesspools overrunning, London decides to dump waste in the Thames, contaminated water supply

Part 4: Read the following article on a Salmonellosis outbreak and answer questions 1-3 on the answer sheet. (4 points)

A community in Massachusetts experienced an outbreak of Salmonellosis. Health officials noted that an unusually large number of cases had been reported during a span of several days. The table below summarizes some of the salient facts about Salmonella infections. Descriptive epidemiology was conducted, and hypothesis-generating interviews indicated that all of the disease people had attended
a parent-teacher luncheon at a local school. In fact, it was a potluck luncheon, and the attendees each
brought a dish that they had either prepared at home or purchased. The descriptive epidemiology convincingly indicated that the outbreak originated at the luncheon, but which specific dish was responsible? The investigators needed to establish which dish was responsible in order to clearly establish the source and to ensure that appropriate control measures were undertaken.

The source population was obviously the attendees of the luncheon, and 58% of the attendees had developed symptoms consistent with the case definition. Of these, 45 attendees agreed to complete a questionnaire regarding the foods that they had eaten at the luncheon.   For each dish served at the luncheon the investigators compared the incidence of Salmonellosis between those who ate a particular dish (the exposed group) and those who had not eaten that dish (the non-exposed comparison group). For each dish they constructed a contingency table to summarize the result
from the survey. For example, the table below summarizes the findings from the survey regarding the incidence of disease in those who ate the cheese appetizer compared to those who did not eat it.

		Salmonellosis			Incidence
		Yes	**No**	**Total**	↓
Ate Cheese Appetizer (Exposed)	**Yes**	16	7	23	16/23 = 0.70
	No	9	13	22	9/22 = 0.41

- What kind of study is the above example; Cohort or Case-Control? _Case-Control_
- What is the incidence rate in percent for both exposed and non-exposed? (percent) __70%___ and ___41%_____
- Calculate the risk ratio to the nearest .01   _____1.70 although risk ratio is not used for Case-Control studies___

PART 5: COMPARING DATA
DIRECTIONS: READ THE DESCRIPTION BELOW AND ANSWER QUESTIONS 1-3 ON THE ANSWER SHEET. (3 POINTS)

Within a short period of time 20 cases of hepatitis A were identified in the Marshfield area. The epidemic curve suggested a point source epidemic, and the spot map showed the cases to be spread across the entire South Shore of Massachusetts, although the pattern suggested a focus near Marshfield. Hypothesis-generating interviews resulted in five food establishments that were candidate sources. Moreover, the disease was rare, so that even if they interviewed a sample of patrons at each of the restaurants, it is most likely that few, if any would have had recent hepatitis, even from the responsible restaurant.

Consider the following examples: Compare the odds ratio for each of these studies and determine

which study shows a strong correlation between eating at the restaurant and getting the disease?

	Cases	Controls
Ate at Papa Gino's	10	19
Did not eat at Papa Gino's	9	19
	19	38

1. Odds ratio for Papa Ginos: __1.11____

In contrast, consider the findings for Ron's Grill:

	Cases	Controls
Ate at Ron's Grill	18	7
Did not eat at Ron's	1	29
	19	38

2. Odds ratio for Ron's grill: _____74.57_____

3. Which restaurant shows a greater tendency of being the source of the outbreak? _____Ron's Grill_____

Part 6: Using your knowledge and the information listed on the next page answer questions 1-8 on the answer sheet   (8 points)

Asthma affects people of all ages, but it most often starts during childhood. In the United States, more than 25 million people are known to have asthma.

- Define asthma: _____Asthma is a condition in which your airways narrow and swell and produce extra mucus_____

- What percent of children with asthma have allergies? __80%__
- How many deaths per year are attributed to asthma __4,000__of those deaths what percent are women? ___65%___
- How many Americans miss work each day due to asthma? ___40,000___
- What are three environmental factors that can trigger an asthma attack? __cold and dry air, tobacco smoke, infections, pollen, pets, dust mites, etc.__
- What are two signs of an asthma attack? __coughing, shortness of breath__
- In the last ten years there has been a 48% increase in asthma cases. What can this be attributed to? __air pollution__
- What is a quick-relief medication used to help relieve asthma symptoms?
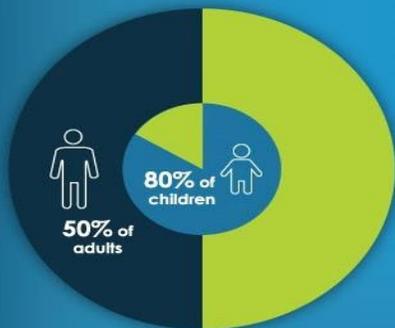   albuterol

Asthma
statistics

Top 10
worst US cities for ASTHMA

1. St Louis, MO
2. Milwakee, WI
3. Birmingham, AL
4. Chattanooga, TN
5. Charlotte, NC
6. Memphis, TN
7. Knoxville, TN
8. McAllen, TX
9. Atlanta, GA
10. Little Rock, AR

Every Day in America

40,000 miss school or work due to asthma

30,000 have an asthma attack

5,000 visit the emergency roomdue to asthma

1,000 admitted to hospital due to asthma

11 die from asthma

1 in 15 Americans suffer from Asthma

80% of children

50% of adults

with asthma also have allergies

4,000 deaths There are more than 4,000 deaths each year due to Asthma

Women account for nearly 65% of asthma deaths overall

65%

RUSTIN INVITATIONAL 2014

DISEASE DETECTIVE

DIVISION B