Section 1: Vocabulary

Write the correct vocabulary word next to the definition.

1. When studied, some subjects may more easily recall specific habits related to a disease or condition than subjects not affected with the disease or condition.
   Recall Bias
2. Cause of a disease
   Agent
3. A widespread occurrence of an infectious disease in a community at a particular time
   Epidemic
4. A measure of the frequency with which an event, such as a new case of illness occurs in a population over a period of time
   Incidence Rate
5. The divergence due to chance alone, of an observation on sample from the true population value, leading to lack of precision in measurement of association.
   Random Error
6. Death rate
   Mortality
7. Birth rate
   Natality
8. First case in an outbreak
   Index Case
9. Occurs when the effects of two risk factors are mixed in the occurrence of the health-related event under study - when an extraneous factor is related to both disease and exposure
   Confounding Bias
10. A surface a pathogen can survive on, and then infect another host
    Fomite
11. The occurrence of cases of disease in excess of what would normally be expected
    Outbreak
12. Disease that occurs infrequently and irregularly
    Sporadic
13. Occurs when selection of participants for a study is affected by an unknown variable that is associated with the exposure and outcome being measure.
    Selection Bias.
14. An aggregation of cases over a particular period closely group in time and space
    Cluster
15. An organism that carries a pathogen to a new host but doesn’t develop the disease
    Vector
16. Systematic collection, analysis, interpretation, & spreading of health data to gain knowledge of the pattern of disease occurrence in order to control & prevent disease
    Public Health Surveillance
17. Any error other than random error.
Systematic Error.
18. A surveillance system in which a prearranged sample of reporting sources agrees to report all cases of one or more notifiable conditions

Sentinel Surveillance
19. Site that harbors pathogenic organisms
Reservoir
20. Degree of pathogenicity
Virulence
21. Short-term immunization by the injection of antibodies
Passive Immunity
22. Error in an epidemiologic study that results in an incorrect estimation of the association between exposure and health-related event
Bias systematic error

Section 2: Acronyms

State what the following acronyms stand for

1. YPLL
   Years of Potential Life Lost
2. CFSAN
   Center for Food Safety and Applied Nutrition
3. DALYS
   Disability-Adjusted Life Years
4. EIS
   Epidemic Intelligence Service
5. HALE
   Healthy Life Expectancy
6. WHO
   World Health Organization

Section 3: Famous Scientists/History

1. Who was the founder of the Red Cross?
   Clara Barton
2. Who’s the director of the CDC?
   Tom Friedan
3. Who proved smoking causes lung cancer?
   Richard Doll
4. Who developed the vaccine that eradicated polio?
   Jonas Salk
Section 4: Descriptions

Describe the listed terms

1. Classical Epidemiology - population oriented, studies community origins of health problems related to nutrition, environment, human behavior, and the psychological, social, and spiritual state of a population.
2. Clinical Epidemiology - studies patients in healthcare settings in order to improve the diagnosis and treatment of various diseases and the prognosis for patients already affected by a disease.
   a. What two types can clinical epidemiology be divided into? Infectious and Chronic disease epidemiology
3. Frequency - refers not only to the number of health events such as the number of cases of meningitis or diabetes in a population, but also to the relationship of that number to the size of the population. The resulting rate allows epidemiologists to compare disease occurrence across different populations.
4. Pattern - refers to the occurrence of health-related events by time, place, and person.
5. Incidence - # of new instances of disease in a population over a given time period.
6. Prevalence - # of affected persons in the population at any given point in time.
7. Duration – time during which the disease lasts

Section 5: Scenario

1,200 people attend an astronomy convention. Of the 1,200 guests, 839 people came down with a case of staphylococcal food poisoning. The foods served were:

<table>
<thead>
<tr>
<th>Foods</th>
<th>Symptoms</th>
<th>No Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg Salad</td>
<td>236</td>
<td>628</td>
</tr>
<tr>
<td>Potato Salad</td>
<td>240</td>
<td>135</td>
</tr>
<tr>
<td>Salad</td>
<td>290</td>
<td>460</td>
</tr>
<tr>
<td>Chicken</td>
<td>764</td>
<td>170</td>
</tr>
<tr>
<td>Hamburger</td>
<td>428</td>
<td>396</td>
</tr>
<tr>
<td>Pizza</td>
<td>532</td>
<td>419</td>
</tr>
<tr>
<td>Cream Pastries</td>
<td>69</td>
<td>53</td>
</tr>
<tr>
<td>Ice Cream</td>
<td>280</td>
<td>74</td>
</tr>
</tbody>
</table>

1. What are the symptoms of staphylococcal food poisoning?

   Sudden and severe nausea and vomiting. Possible diarrhea and fever.

2. What is the duration of staphylococcal food poisoning?
24-48 hours

3. What organism causes staphylococcal food poisoning?

*Staphylococcus aureus*

4. What is the name of the criterion that is used to prove that a certain thing (not necessarily a microorganism) causes a disease?

**Hill’s Criteria**

5. List all of the criteria from the above question.

- Strength of association
- Consistency
- Specificity
- Alternative Explanations
- Temporality
- Dose-Response Relationship
- Biological Plausibility
- Experimental Evidence
- Coherence

6. What is the name of the criterion that is used to prove a certain microorganism causes a disease?

**Koch’s Postulates**

7. What disease was the reason for the creation of the criteria mentioned in question 6?

**Tuberculosis**

8. What are the criteria mentioned in question 6?
Microorganism must be observed in every case of disease
Must be isolated and grown in pure culture
Organism must cause disease when introduced to healthy animal
Microorganism must be recovered from the diseased animal

9. What are the steps to investigating an outbreak?

1. Prepare for field work
2. Establish existence of an outbreak
3. Verify diagnosis
4. Define and identify cases
5. Describe and orient in terms of time, place, and person
6. Develop hypothesis
7. Evaluate hypothesis
8. Refine hypothesis and do more studies
9. Implement control and prevention measures
10. Communicate findings

10. What is the attack rate formula for people who are exposed?

\[
a/(a+b)
\]

11. Calculate the attack rate for the potato salad.

\[
\frac{240}{(240+135)} = \frac{240}{375} = 64\%
\]

12. What food item likely caused the staphylococcal food poisoning?

Chicken
13. What is the attack rate for this item (round to the nearest tenth)?

\[
\frac{764}{764 + 170} = \frac{764}{934} = 81.8\%
\]

14. What are three ways to reduce the risk of foodborne illness?

- Cook meat, poultry, and eggs thoroughly
- Don’t cross-contaminate foods
- Refrigerate leftover promptly
- Clean-wash produce, hands, and cooking utensils
- Report suspected foodborne illnesses to your local health department

Section 6: Short Answer

Thoroughly answer all the questions.

1. What are the three components to an epidemiology component? **Time, place, and person. Or agent, host environment**

2. Describe the types of descriptive studies.
   - **Case report** = detail report of a single patient from one or more doctors
   - **Case series** = characteristics of several patients
   - **Correlative studies** = correlates general characteristics of the population with health problem frequency with several groups during the same period of time
   - **Time series analysis** – correlate within the same population a different point in time

3. Describe the chain of infection using the words agent, host, reservoir, portal of exit, portal of entry, and mode of transmission. **Agent leaves reservoir through portal of exit, conveyed by some mode of transmission, enters portal of entry to infect susceptible host.**

4. Name and describe the three characteristics of agents.
   - **Infectivity** capacity to cause infection in susceptible host.
   - **Pathogenicity** capacity to cause disease in a host.
   - **Virulence** severity of the disease that agent brings to host.

5. Name the lines of defense in the body and describe what they do.
   - **Skin and secretions**- acts as initial barrier, mucus catches pathogens enzyme kills pathogens
   - **Inflammatory response**- releases chemical signal, blood flow increases: heat, redness, pain, and swelling
   - **Phagocytosis**- ingests and kills microorganisms
Natural killer cells - kills infected cells and tumor cells
Interferon – the infected cells make proteins which they release into the bloodstream, interfering with the microorganism’s reproduction

Section 7: Calculations/Math

Answer all the questions below. Show all work!

500 people attend a dinner party. Soon afterwards, many of the attendants became sick with salmonella. The egg salad was the suspected culprit. Out of the 500 attendees, 379 ate the egg salad. Out of these 379, 334 became sick. Out of those people who didn’t eat the egg salad, 13 became sick.

1. What is the relative risk formula? \[ \frac{a}{(a+b)} / \frac{c}{(c+d)} \]
2. Based on this information, calculate the relative risk. \( 4.4 \)

<table>
<thead>
<tr>
<th>Disease Yes</th>
<th>Disease No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed</td>
<td>330 ( a )</td>
<td>45 ( b )</td>
</tr>
<tr>
<td>Unexposed</td>
<td>25 ( c )</td>
<td>100 ( d )</td>
</tr>
<tr>
<td>Total</td>
<td>355</td>
<td>145</td>
</tr>
</tbody>
</table>

\( \frac{.88}{.2} = 4.4 \)

3. What does a relative risk greater than one indicate? Increased risk
4. What type of study design is relative risk used in? Cohort
5. What is the formula for odds ratio? \( \frac{ad}{bc} \)
6. What study design uses odds ratio? Case control
7. Describe the different study designs.

<table>
<thead>
<tr>
<th>Study Design</th>
<th>Description</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
</table>
| Case-Control | Works backward from effect to suspected cause. Case group and control group are checked for similar exposures | • Good for rare diseases  
• Long latency  
• Can examine multiple exposures from single outcome  
• Less expensive and faster than Cohort | • Possible error in recalling past experiences (recall bias)  
• Possible time-order confusion |
Cohort

Based upon exposure status whether or not they have illness. Works forward from exposure

- Can examine multiple outcomes for single exposure
- Can examine rare exposures (not rare diseases)
- Can calculate incidence of disease
- Best technique for outbreak in small well-defined population
- Most accurate observational study.

- Bad for rare diseases
- Costly in time and resources.

Cross-Sectional

A survey of a population where participants are selected irrespective of exposure or disease status

- Doesn’t take long
- Least expensive
- Can study several outcomes.
- May not be possible to distinguish whether exposure preceded or followed disease.

8. What is the following called?

<table>
<thead>
<tr>
<th>Id #</th>
<th>Initials</th>
<th>Onset Date</th>
<th>Confirmed</th>
<th>How</th>
<th>Age</th>
<th>Sex</th>
<th>County</th>
<th>Physician</th>
<th>At Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>JD</td>
<td>3/17</td>
<td>Salmonella</td>
<td>Blood test</td>
<td>28</td>
<td>M</td>
<td>Banks</td>
<td>Johnson</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>VS</td>
<td>3/16</td>
<td>Salmonella</td>
<td>Stool test</td>
<td>34</td>
<td>F</td>
<td>Banks</td>
<td>Stevens</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>PQ</td>
<td>3/17</td>
<td>Probable Salmonella</td>
<td>Not Done</td>
<td>51</td>
<td>F</td>
<td>Dixon</td>
<td>Jackson</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>AR</td>
<td>3/18</td>
<td>Salmonella</td>
<td>Blood Test</td>
<td>31</td>
<td>M</td>
<td>Horace</td>
<td>Johnson</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Line Listing
9. What do epidemiologists call this graph? **Epi curve**

10. What are the three types of this graph? **Continuous common source, point source, propagated source**