# Bank of Test Questions, EEPH, 4th Edition

# A. Some Basics (Chapter 1)

1. As you know, epidemiology is the study of the distribution and determinants of disease frequency in humans and the application of this study to control health problems. Briefly describe two different types of activities that epidemiologists perform.

There are many possible answers, including:

1. Identify the etiology of a disease (e.g., causes, risk factors, preventive factors)

2. Determine the extent and distribution of disease in a population

3. Study the natural history or course of a disease

4. Evaluate existing and new preventive and therapeutic measures, modes of health care

delivery, etc.

2. A group of researchers met to plan a study of causes of poor eating habits among graduate students in public health. After the meeting, the group left their building and walked outside into a raging snowstorm. Their planning notes were ripped from their hands and tossed to the street. Although the notes were recovered, they were hopelessly mangled and out of order. Suppose that you were the team member who offered to re-construct the notes. Describe in a logical order at least three steps that the team should undertake to develop, test, and evaluate a hypothesis on the causes of poor eating habits among public health students. Be sure to state what type of study design you would use and why.

Examine existing data on the possible causes of poor eating habits data from one of the following sources: clinical practice, lab research (yes, even lab rats may provide relevant data!), descriptive statistics, descriptive and analytic studies. Formulate a specific hypothesis. For example, “Stress stemming from studying for and taking exams lead to an increased consumption of junk foods among graduate students in public health.”

Design and conduct an epidemiological study to evaluate this hypothesis. For example, conduct a prospective cohort study of public health students to determine if there is an association between stress from exams and an increased consumption of junk foods. Because of its prospective nature, this study will enable the investigator to collect good quality data on the exposure and outcome. Review the manner in which the epidemiological study was conducted. Evaluate the role of chance, bias and confounding when interpreting the study results. Make a judgment about the causality of the association using the “totality” of evidence.

**B. Outbreaks of Gastroenteritis on Cruise Ships (Chapters 2, 3)**

Recently, a report was published describing a string of cases of Norwalk virus gastroenteritis among passengers on cruise ships. From this report, an epidemiologist went on to form a number of hypotheses as to why there had been this rather unusual increase in reported gastroenteritis outbreaks on cruise ships in 2015.

1. What type of study is being described in this report?

**Case series**

2. What is the main limitation of this type of study?

**No explicit comparison group**

The cruise ship owners contacted the Centers of Disease control and Prevention (CDC) to conduct an in-depth analysis of the possible modes of transmission of the Norwalk virus in the cruise ship environment. CDC investigators interviewed all of the passengers on the last affected cruise (N=3,000) and obtained information on the passenger’s recreational activities. They found the following results: 1,000 passengers had gone swimming in the upper deck pool and 2,000 passengers had never gone swimming in the upper deck pool. One hundred (100) of the passengers who swam in the upper deck pool and 100 of the passengers who did not swim in this pool developed Norwalk virus gastroenteritis during the cruise. FYI: The cruise lasted one week.

3. Set up the two by two table for these data.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Developed gastroenteritis | Did not develop gastroenteritis | Total |
| Ever swam in pool | 100 | 900 | 1,000 |
| Never swam in pool | 100 | 1,900 | 2,000 |
| Total | 200 | 2,800 | 3,000 |

4. Calculate the risk ratio of gastroenteritis associated with swimming in the upper deck pool.

**100/1,000 / 100/2,000 = .10/.05 = 2**

5. State in words your interpretation of the above risk ratio.

**Passengers who swam in the upper deck pool had a two-fold increased risk (or two times the risk) of gastroenteritis as compared to passengers who never swam in the upper deck pool.**

6. Calculate the risk difference in the above example.

**100/1,000 – 100/2,000 = .10 - .05 = .05**

7. State in words your interpretation of the above risk difference.

**The excess risk of gastroenteritis associated with swimming in the upper deck pool was .05 or 5%. Or, if swimming in the upper deck pool was the cause of the gastroenteritis, then 5 cases per 100 swimmers could have been eliminated if they had not engaged in this activity.**

8. What measure of disease frequency are you using to calculate the risk ratio and risk difference?

**Cumulative incidence**

9. What measure of association should be used to answer the question, “How many additional cases of Norwalk virus gastroenteritis among all cruise passengers (N=3,000) was associated with swimming in the upper deck pool?”

**Population risk difference**

10. When the cruise ship owners examined the findings of the CDC investigation, they stated that the crude results (calculated above) were invalid because of the age differences between the people who swam in the upper deck pool and those who did not. Examine the following table and state whether or not you agree with the cruise ship owners.

|  |  |  |
| --- | --- | --- |
| Age Groups (years) | Swam in Upper Deck Pool | Never Swam in Upper Deck Pool |
| 10-20 | 25% | 10% |
| 21-30 | 20% | 10% |
| 31-40 | 20% | 15% |
| 41-50 | 15% | 20% |
| 51-60 | 10% | 20% |
| >60 | 10% | 25% |
| Total | 100% | 100% |

a. Based on these data, do you agree or disagree with the assessment that the crude results were invalid? Briefly justify your answer.

**You should agree. The age distribution of the swimmers and non-swimmers is quite different, and age may be related to the risk of developing gastroenteritis.**

b. Regardless of whether you agree with the cruise ship owners, explain in at least three sentences the method that epidemiologists use to account for age differences in populations. Be sure to mention what additional data would be needed to perform this procedure.

**Epidemiologists use age-standardization to correct for age differences when making comparisons. The method that we have learned is termed “direct standardization.” It involves calculating a single summary rate that accounts for the age difference between populations. The summary rate is calculated from the weighted average of age-specific rates, with the weights equal to the proportion of the population in each category. In order to perform direct standardization in this example, you would need to know the rates of gastroenteritis in each age-swimming group. You would also need to figure out what age structure to use for the standard weights. You could use the age structure of the swimmers, the non-swimmers, or some other group such as the U.S. population.**

**C. Tuberculosis in a Housing Community (Chapter 2)**

Suppose that you began a one-year study of tuberculosis (TB) in a subsidized housing community in the Lower East Side of New York City on January 1st, 2016. You enrolled 500 residents in your study and checked on their TB status on a monthly basis. At the start of your study on January 1st, you screened all 500 residents. Upon screening, you found that 20 of the healthy residents were immigrants who were vaccinated for TB and so were not at risk. Another 30 residents already had existing cases of TB on January 1st. On February 1st, five residents developed TB. On April 1st, five more residents developed TB. On June 1st, 10 healthy residents moved away from New York City were lost to follow-up. On July 1st, 10 of the residents who had existing TB on January 1st died from their disease. The study ended on December 31, 2016. Assume that once a person gets TB, they have it for the duration of the study, and assume that all remaining residents stayed healthy and were not lost to follow-up.

1. Is the subsidized housing community in the Lower East Side of New York City a dynamic or fixed population? Briefly explain the rationale for your answer.

**Dynamic. Membership in the population is defined by a changeable or transient characteristic --“residence in the subsidized housing community.”**

2. What was the prevalence of TB in the screened community on January 1st?

**30/500 or 6%**

3. What was the prevalence of TB on June 30th?

**40/490 or 8.2% Note that the 10 people who moved from New York and were lost to follow-up were excluded from the denominator.**

4. What was the cumulative incidence of TB over the year?

**10/450 or 2.2% Note that the 20 vaccinated residents and the 30 prevalent cases were excluded from the denominator because they were not at-risk.**

5. Suppose that you wanted to calculate the incidence rate of TB in the study population. Calculate the amount of person-time that would go in the denominator of this incidence rate. Be sure to show your work.

**5,230 person-months or 435.8 person-years**

**(5\*1mo) + (5\*3mo) + (10\*5mo) + (430\*12mo) = 5,230 person-months**

**Note that the 20 vaccinated residents and the 30 prevalent cases did not contribute any person-time because they were not at-risk.**