

COMPREHESIVE EXAM SAMPLE QUESTIONS

The following is a set of sample questions drawn from previous SPPH comprehensive exams. The sole intention of providing these sample questions is that they be used as one tool for review of your comprehension of content areas/topics. These sample questions DO NOT reflect the current comprehensive exam format (e.g. length) and they DO NOT span the entire examinable content of the exam.

SAMPLE QUESTION:

Please describe how each of the following scenarios (a-d) might alter the observed odds ratio in case-control studies examining the relationship between a risk factor (low physical activity) and a disease (heart disease). For each answer, please explain (qualitatively, no numbers) which cell(s) in a hypothetical 2x2 table would change and in which direction (Maximum 2 sentences per scenario)

- a) Controls selected from a population that tends to be much healthier in terms of exposure to risk factors (lower level of exposure) than the population from which the cases are drawn.
- b) Poor recall of exposure, non-differential with respect to disease status (i.e., equally poor recall of exposure among cases and controls).
- c) Early signs of disease that lead to reductions in exposure (i.e., reductions in 'highrisk' behaviours) immediately prior to diagnosis of disease.
- d) Cases recall more exposure than actually occurred.

SAMPLE QUESTION:

In survival analysis, one important assumption is that censoring is non-informative. In other words, we assume that not having observed the event is not related to the probability of the event occurring. Suppose that censoring was related to the probability of the event occurring. In other words, censoring was informative. Create an example to demonstrate how this may bias survival upward, or downward. The example does not have to be numeric, but it should refer to a specific disease and outcome, and explain the reason why censoring is informative.

SAMPLE QUESTION:

Below is output from an Analysis of Covariance (ANCOVA) and a Linear Regression model, with categorical and continuous independent variables on a simple random sample of cafeteria employees.

This is a statistical model examining the relationships between retirement savings and future retiree characteristics. In the model, the dependent variable is retirement account savings (measured in thousands). The independent variables are: high school completing (Y/N) and age (numeric).

The ANCOVA table is:

Source	DF	Sum of Squares	Mean Square	F-stat	P-value
Model	2	100	50	13	0.001
Error	23	92	4		
Total	25	192			

The Model Parameters are:

Coefficient	Estimate	Standard Error	t-stat	P-value
Intercept	17	5	3.4	0.001
High School (N)	-4.0	1	4	0.001
High School (Y)	0.0	.	.	.
Age	1.5	0.5	3	0.030

Please use the above to answer the following questions:

1. Please respond to the following:
 - (a) Does completing high school have an effect on retirement savings?
 - (b) Describe the relationship between high school and pension savings
2. What is the expected retirement savings of a 30 year old who did not complete high school?
3. What is the expected difference in savings for two individuals that are 10 years apart in age?
4. For someone 40 years old and finished high school, what is the approximate probability that pension savings exceeds 81 thousand?
5. What is the approximate probability that the difference in retirement savings between person A and person B is greater than 5 thousand, when person A did not finish high school and is 50 years old, while person B did finish high school and is 40 years old?

SAMPLE QUESTION:

Background Information

The escalating overweight/obesity epidemic is a significant public health concern, threatening the health of North Americans.^{1,2} Overweight and obesity are responsible for nearly one in ten premature deaths, making it the third greatest risk factor for early mortality in adult men and women in North America.³ An alarming 34.1% of North American college students are overweight or obese.⁶

During the transition from adolescence to adulthood – which typically occurs during the college years – critical health behaviors are shaped and often permanently adopted.⁷ Specifically, the transition into college life has been shown to be a critical period for significant weight gain, often attributed to changes in eating and physical activity habits, social influences, newly found independence, and stress.^{8,9} It is estimated that only 5% of college students consume the recommended 5 or more servings of fruits and vegetables per day, and only 47% meet exercise recommendations (moderate-intensity aerobic exercise for ≥ 30 minutes on five or more days per week or vigorous-intensity aerobic exercise for ≥ 20 minutes on three or more days per week).⁶ To gather information to address the rising tide of obesity in Canada, researchers at the School of Population and Public Health recently partnered with The Centre for Campus Life and Athletics at Douglas College to conduct a survey of students entitled ‘the Douglas College Health and Wellness Survey (DCHWS)’.

Douglas College is one of the largest colleges in British Columbia with an annual population of about 14,000 for-credit students, and an additional 9,000 non-credit students that take short-term courses. The student population at Douglas College is one of the most diverse in Canada, and takes pride in celebrating and honouring the multitude of cultures that are represented within the student population. The institution is also a popular destination for international students, 1,000 of whom study at the college every year.

All Douglas College students enrolled during the winter-spring of 2012 (n=10,383) received an email invitation in early April to participate in an online health and wellness survey. The 74-item survey was administered online from April 11 to April 17, 2012.

The online survey contained questions about students’ age, gender, ethnicity, socioeconomic status (parental education) and body mass index (BMI) calculated as the ratio of self-reported weight in kilograms to height in meters squared. Students were classified as underweight or normal weight if they had a BMI < 24.9 kg/m² and students with a BMI ≥ 25 kg/m² were deemed overweight or obese. Health behaviors for smoking, alcohol consumption, physical activity, eating habits, and with weight gain or loss were assessed via the online survey. Students were classified as meeting the Centers for Disease Control and Prevention’s (CDC) recommendation for aerobic activity and muscle-strengthening activity if they engaged in ≥ 30 minutes of moderate intensity aerobic activity on five or more days per week, and engaged in muscle-strengthening activities on two or more days per week, respectively. Students rated the “healthiness” of their eating habits with the following response options: “excellent/good”, “average”, and “fair/poor”. Alcohol consumption was categorized as never, less than 3 days per week, and 3-7 days per week. Smoking status was categorized as current/former smoker (has smoked ≥ 100 cigarettes in lifetime) or never smoker. Students answered “yes” or “no” to questions about whether they had gained or lost weight in the past 30 days. Students also indicated whether or not they were satisfied with their weight (“satisfied” or “unsatisfied”).

Of the 863 students who completed the survey, 706 students reported their height and weight. The remaining 157 students participated in the survey but did not provide data on height and weight. Given that 10,383 students were enrolled at Douglas College during the winter-spring 2012 and all received the invitation to participate in the survey, the overall response rate was 6.8%. However, this response rate would likely have been much higher if participant enrollment had not been halted by investigators one week after the invitation was sent out due to funding constraints associated with gift card costs.

Question 1

1a. Based on the survey data available, outline an analysis of the data and how you would present the results in a report to answer the following research question: ‘How much of a problem is obesity among students at Douglas College?’ Your plan should include methods for examining the bi-variable relationships between obesity and other factors such as gender, diet and exercise. Your description of the bi-variable relationships can be numeric, graphical, or both.

1b. Please identify one or two of the more important limitations of using data from this student survey to address the research question, and describe how you might address these limitations in a future study.

Question 2

Given the ethnic diversity of the student population at Douglas College, the Director of the Douglas College Health and Wellness Centre would like you to determine if ethnicity is related to obesity and whether ethnic differences might be explained by differences in physical activity and diet. Using the information collected in the survey, please describe the analyses you would conduct and the ways you would present your findings (e.g., graphs, tables) to investigate the relationship between ethnicity, obesity, exercise and diet. Please discuss one or two major limitations you feel are important to consider when interpreting and presenting the findings. Please keep in mind when presenting the findings to the Douglas College Health and Wellness Centre, administrators are interested in the extent of the problem and how they might direct resources to reduce and prevent obesity among the Douglas College student population.

Question 3

Douglas College Health and Wellness Centre developed an intervention to reduce obesity by developing a “Healthy Eating Media Campaign” that was focused on providing students with information on healthy eating and providing students with simple, healthy and very inexpensive ways to prepare meals. The media campaign lasted 4 months and included emails, a Facebook Page, a recipe app, YouTube videos, and extensive on campus promotion. Given the ethnic diversity of Douglas College, the recipe app was developed for each of the four major ethnic groups of students at Douglas.

3a. Please describe how you would evaluate the impact of this intervention. Describe the study design, the type of data you would use or collect (this could include, for example, medical records, direct measures, self-reports et cetera), your main outcomes and explanatory measures with a list of key confounders or covariates, and the analyses you would use.

3b. What do you think would be the major biases for investigating the effect of the intervention on your outcome measures and how would you try to mitigate their impact in the design, data collection, measures and analyses. What limitations would you consider when interpreting your results.