A2. EXERCISES FROM CHAPTER 2

Questions 1-5 relate to the following article reference: Patistea, E. and Babatsikou, F. (2003). Parents' perceptions of the information provided to them about their child's leukaemia. *European Journal of Oncology Nursing*, 7 (3), 172-181.

1. Consider the eight variables listed in Table 2 on page 176 of the article. The authors report means and standard deviations for these eight variables. Is the use of means and standard deviations appropriate here? Why or why not?

   No, the use of means and standard deviations is absolute nonsense here. Things such as diagnosis, cause of disease, medical procedure, prognosis, etc. cannot be measured numerically in any meaningful way. The fact that the authors have created a "scale" is irrelevant. Their scale could not possibly be based on any meaningful numerical analysis related to these variables, since it wouldn't make sense to describe these variables using numbers to begin with.

2. If the authors wished to create a graphic that described their satisfaction data from Table 4 (page 177), which graphic(s) would be appropriate for them to use? Explain.

   Level of satisfaction is an ordinal measurement – therefore a bar graph would be appropriate.

3. Consider the information provided in Table 5 on page 178 of the article. Which type of graphical display would be most appropriate for this information? Explain your response.

   These variables all have yes/no responses (they are nominal). A pie graph, or perhaps a comparative frequency-bar graph (that incorporates all seven factors) would be most appropriate here.

4. Explain why it would not be appropriate to conclude from the information in Table 5 (page 178) that a larger percentage of fathers than mothers believe more information about family planning is needed.

   The values given in the table are just descriptive statistics. No hypothesis tests or confidence intervals have been used. Thus no general inference about the overall population of mothers and fathers can be made. (To make such inference would require comparing proportions using Z-tests or confidence intervals.) A different sample of mothers and fathers would almost certainly result in a different set of numbers. The percentages shown in the table apply only to this particular sample and not necessarily to the overall population.

5. In their limitations, the authors suggest that a "result may be biased because of the low number of subjects on which it was based". Based on your knowledge of statistics, discuss whether this is a reasonable statement to make.

This is another nonsensical statement, since sample size does not affect bias. Bias comes from collecting an inappropriate sample. A large, inappropriate sample is just as bad as a small one (perhaps worse, due to the misconception that large sample size will take care of bias).

Questions 6-10 relate to the following article reference: Williams, T.A., Leslie, G.D., Leen, T., Mills, L., and Dobb, G.J. (2013). Reducing interruptions to continuous enteral nutrition in the intensive care unit: a comparative study. *Journal of Clinical Nursing*, 22, 2838-2848.

6. What are the authors' goals? Identify research questions, population, response variable, primary explanatory variables, and measurement types.

   The authors planned to examine whether or not an intervention could decrease interruptions to tube feeding for patients. The population consists of patients who need tube feeding. The response variable in this pre-test / post-test design is the number of interruptions for a given patient feeding. This may be considered an interval-ratio level measurement. The primary predictor is the intervention, which would be a nominal (grouping) factor.

7. Table 1 on page 2842 of the article contains patient characteristics. Explain why p-values are unnecessary in this table. Challenge question: Why is the table itself unnecessary?

   Generally the purpose of a table of demographics is to compare the samples and assess confounding. This is an assessment of the sample, not the population. Therefore sample values are all that we truly need.

   The answer to the challenge question has to do with the matched pairs data. This study allows each patient to act as their own control. For analysis, only patients who provide both "before" and "after" data would be used. There would be no need to make comparison since by design the demographics of each sample (before/after intervention) should be exactly the same.

8. This study took place in a New Zealand ICU. Suppose that a second intervention is proposed, and this intervention is studied in a similar manner at an ICU in Cincinnati. Simultaneously, a third intervention is proposed and studied in a similar manner at an ICU in London. A researcher wishes to combine the results of all three studies into a meta-analysis and assess which of the three interventions would be best. Explain why this researcher would be unable to identify a best intervention as a result of confounding.

   The three interventions take place at three separate locations. It is very likely that cultural differences may have some impact on interruptions to feeding. Therefore the "location factor" would be confounded with treatment. In finding statistically significant differences across the three groups, it would be impossible to know whether or not the difference is a result of differing interventions, differing locations/cultures, or some combination of the two.

9. In Table 2 on page 2843 of the article, the mean length of interruption after intervention was 22 hours for the sample. Suppose the standard deviation associated to this variable is 5 hours. Are there likely to be many interruptions longer than 35 hours?

   No. The empirical rule suggests that around 95% of interruption lengths are between 12 and 32 hours. There may be a few higher than 32 hours but this would be a fairly unusual occurrence.

10. Consider the bar-graph on page 2844 of the article. The authors discuss this as indicative that the intervention group will do better for each of the first ten days after tube feeding begins. Explain why such a statement is not appropriate.

    Charts and graphs are displays of the sample. A different sample would produce a different graph. We cannot tell just by looking at the graph whether the sample differences are statistically significant. So we cannot know from the graph whether those comments generalize to the population.

    Furthermore, if we read a bit more carefully, they do indicate that only one of the ten differences came up as statistically significant. For the rest, there was no evidence of a difference. Therefore we should not discuss the groups as if they are known to be different.

    There is also an advanced issue here of multiple comparisons, which will be discussed in later chapters.