**Homework 3**

**Submission Rules**

1. This is an **individual** assignment. While you are welcome to ask for help from the instructor(s) and teaching assistants, you must complete the data analysis and write-up of the homework on your own. Having current or former students or any other individual write your code or homework is considered academic misconduct.
2. We recommend you submit your homework as one **PDF file** and the coding script (either .R or .sas file) in the separate homework code submission page.
3. Your report summarizing your findings should be no longer than **one page.**
4. In your homework, share statistical summaries or inferential results (**edited into tables**) or graphs that further your argument, making sure to give titles with indicators to all tables and graphs/figures (example: Table 1 or Figure A). All numbers should be rounded to two decimal places or three significant figures. All graphs and tables should be in the appendix after the report and should be referred to by title.

**Graphs** can be screenshots or downloaded directly from software. Titles, including indicator information, should be added to graphs in software and not in your word processing program. Axes should be relabeled to be clear to the reader and include measurement units where appropriate.

**Tables** cannot be screenshots or pictures from other sources (including software) and should instead be created in your word processing program. Please include only those statistics or information relevant for your report.

1. Write your homework as you would for a client or collaborator, in full sentences and paragraphs. Make sure your presentation of your work is clean, readable, and professional. Sloppy presentation makes any data analysis less trustworthy.

**Background**

Administration of oxytocin is recommended for prevention of PPH (blood loss) during the third stage of labor. However, research on the route of administration is scarce. A double-blind randomized controlled trial investigated the effect of route of prophylactic administration of oxytocin (IV infusion or IM injection) on PPH outcomes[[1]](#footnote-1). Study subjects (n = 477) were people (all identified as women in the paper) in active labor at a hospital in Argentina, who consented to be the study and did not have a C-section.

Before the researchers conduct the analysis of the administration route, they want you to examine some potential covariates. Covariates are concepts that may influence our outcome of interest. Here, our outcome of interest is the total blood lost during delivery, or TotalBloodLoss. The two covariates that may influence total blood loss are:

* whether or not the person had pre-existing conditions (NoPriorIllness) and
* whether this infant will be the parent’s first birth, the second birth, or the parent had given birth to more than one child before (BBO).

**Tasks:** We are interested in the following research questions:

1. Does the average blood loss (**TotalBloodLoss**) differ for those who have a pre-existing condition versus those who don’t (**NoPriorIllness**)?
2. Is there a difference in average blood loss (**TotalBloodLoss**) based on whether this is their first child (first), they had given birth once before (second), or they’ve given more than one time before (third or more)? (The variable is **BBO**.)
3. If there is a significant difference for either comparison, which group (or groups) average more blood lost?

**Page 1: Report**

The report should have 5 sections. Aim for each section to be under 250 words, if possible.

**Introduction:** Briefly state the research question(s) that your report is addressing.

**Dataset and Methods:**

* Name the dataset you are using and where it came from
* provide some basic information about the data, such as how many variables are measured and how many participants are in the study
* List which variable or variables you will be using in your report and what type of variable they are.
* Explain what techniques you will use to analyze the data. Name the type of inference you are performing, being specific for the variables and participants in this study.

**Exploratory Data Analysis:**

* Briefly describe blood loss by group for each covariate.
* Using the summary statistics and graphs in your appendix for each **NoPriorIllness** group, check the Central Limit Theorem for question 1 above (assume the big 3 assumptions are met). Based on your answer, explain what test you will perform.
* Using the summary statistics and graphs in your appendix for each **BBO** group, check the Central Limit Theorem for question 2 above (assume the big 3 assumptions are met). Based on your answer, explain what test you will perform.

**Results:** for each covariate:

* + Conduct a hypothesis test to answer question 1.
    - List the Hypotheses
    - Give a p-value
    - Give a decision and conclusion
  + Conduct a hypothesis test to answer question 2.
    - List the Hypotheses
    - Give a p-value
    - Give a decision and conclusion
  + If either test shows a significant difference, explain which group or groups have significantly higher average blood loss compared to which other groups.

**Conclusion:** Summarize the information requested in plain language. Keep the focus on the meaning and avoid jargon, instead focusing on what the results mean for the question of interest. Specifically:

* Explain the results of the test to see if, on average, those who have preexisting condition differ in terms of average blood loss from those who do not have a pre-existing condition.
* Explain the results of the test to see if, on average, blood loss differs depending on the number of births for the parent (first, second, third or more).
* If there are any significant differences in either test, outline which group or groups have a significantly higher blood loss.

**Page 2: Appendix** (can be longer than one page if needed.)

Provide any graphs and/or tables presenting the information used or referenced in the Report. While you can give other tables and graphs, please make sure you include:

* + Create **one** graphical summary, visualizing average blood loss by group for each covariate.
  + Calculate summary statistics by group for average blood loss. Make sure to present summary statistics that describe both spread and center by group for each covariate.
  + Provide a table with any confidence intervals needed

**Separate submission:**  Please submit either the R script (it will have .R at the end of the file name) or the SAS script (.sas at the end of the file name) in the separate assignment submission.

* Please do not submit as a .pdf or .doc

1. Durocher, J., Dzuba, I. G., Carroli, G., Morales, E. M., Aguirre, J. D., Martin, R., & Winikoff, B. (2019). Does route matter? Impact of route of oxytocin administration on postpartum bleeding: A double-blind, randomized controlled trial. *PLOS ONE*, *14*(10), e0222981. [↑](#footnote-ref-1)