**Homework 5**

**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. Please attempt to keep your report to **500 words or less** (it is OK if it is longer, but it should not exceed 2 pages)**.**
4. In your homework, share statistical summaries or inferential results (**edited into tables**) or graphs that further your argument, making sure to give titles to all tables and graphs/figures (example: Table 1 or Figure 1 in the title). Make sure you label graph axes and round statistical summaries or inferential results to two decimal places or 3 significant figures.
5. All graphs and tables should be in the appendix after the report and should be referred to by title.
6. Tables cannot be screenshots or pictures from other sources (including software) and should instead be created in your homework assignment.
7. Write your homework as you would for a client or collaborator, in full sentences and paragraphs, not bullet points. 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 = 480) were women (all identified as women) in active labor at a hospital in Argentina, who consented to be the study and did not have a C-section.

While the study did not show a difference between route of injection and post-partum hemorrhaging (PPH), there were several health measures taken either before or right after delivery. Administrators at this hospital wonder if any of these measures could help predict the amount of blood loss after delivery. In particular, the Shock Index, which is the heart rate divided by the systolic blood pressure, has been linked with various circulatory issues, including hemorrhage and ectopic pregnancies.

**Tasks**

Suppose you are a researcher on this study and are asked to write guidance for health care providers about using Shock Index (SI) directly after delivery to predict total blood loss during delivery. Specifically, can a woman’s SI 15 minutes after they deliver their child help predict the total amount of blood lost during the delivery? If so, how well does it predict the amount of blood loss?

NOTE: to do this analysis, you will need to **create the Shock Index variable:**

* + Create a variable for the Shock Index 15 minutes after delivery (SI15) by dividing the variable HR15 by the variable SBP15.
  + Confirm your coding worked in your coding script.

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

**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 type of data.

**Exploratory Data Analysis:**

* Create a graph that visualizes the relationship between Shock Index 15 minutes after delivery and total blood loss.
* Summarize the trends in the graph
* Provide one summary statistic that summarizes the **strength** and **direction** of the relationship between Shock Index 15 minutes after delivery and total blood loss.
* Create a linear regression model to predict total blood loss from Shock Index 15 minutes after delivery.

**Results:** Carry out inferential methods to answer the question.

* + Create diagnostic graphs and assumptions for your model.
    - If assumptions are met, explain each assumption and how it is met, citing evidence.
    - If assumptions are not met, log transform total blood loss, create a new model and check assumptions again to confirm they are now met.
  + Test to see if the Shock Index 15 minutes after delivery is a significant predictor of the total blood loss during and after delivery.
  + Find the coefficient of determination for your final model.

**Conclusion:** Summarize the information requested in plain language. Keep the focus on the meaning and avoid jargon **except please present a p-value as evidence for your claim of significance**. Explain how much of the variability in total blood loss can be directly explained by the Shock Index 15 minutes after delivery.

**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:

* + A graph that illustrates the relationship between blood loss after birth and the shock index 15 minutes after delivery.
  + Diagnostic plots necessary for checking assumptions.

**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)