AIIP STATISTICS SUMMATIVE

SOLOMON OJOAWO

1. **List at least two variable types and provide unique examples of the corresponding variable in the dataset.**

Categorical Variable – Type of Tenure, Type of Crop Planted, System of Farming etc

Continuous Variable - total number of household and hired labor, number of years the plot has been in operation

2. **Identify and evaluate the study design for this agricultural survey. How was the population sampled? Is the method used appropriately for the application? Are there any sources of bias?**

Sample Method - Multistage Stratified Random Sampling

Eleven countries were selected to represent the four sub-regions of Africa East, West, North and Southern Africa. Samples were randomly selected from the major agricultural district from each country. Entire sample population is then clustered based on climate attribute and then divided into groups based on the size - small, medium and large farms.

The method is appropriate to get representative samples for each country

Selection Bias exists due to **non-representative sample**. This is introduced by **Under coverage** (with the selection of just 5-10 households in a district and the clustered selection of districts to sample) and a **Nonresponse Bias** due to unavailability of some of the owner of the farms.

Measurement error also occurs and missing responses can also be inferred form the dataset

3. Develop 2 key research questions that can be studied based on the dataset provided.

Research Question 1 - Is the yield of a farmland dependent on the number of years the farmland has been cultivated?

Research Question 2 - Do Oil Palm farmers earn higher or lower than Rice farmers?

4. Develop a plan for a statistical analysis of the data in response to one of your 2 key questions. What are your null and alternative hypotheses? (Clearly state the two), Which tests would you use and why?, Why are they appropriate?, How would you determine significance?

Research Question 2:

Null Hypothesis: The net Revenue of Oil Palm Farmers is not different from the net Revenue of Rice farmers

Alternative Hypothesis: There is a significant difference between the revenues of Oil palm Farmers and Rice farmers

Test – Two tailed Two-sample t-test (We want to investigate the difference between 2 independent samples)

Significance is determined by calculating the p-value. If $p<0.025$ or $p>0.025$, there is significant difference and the Null Hypothesis can be rejected.

5. How would you interpret your results if: 1) a significant effect resulted or 2) the results were not significant? What conclusion can you make about the population and your research question?

- If $p<-0.025$ or $p>+0.025$, there exists a significant difference in the net revenue of Oil Palm farmers and Rice Farmers which might indicate that cultivating one of the crops might make the farmers richer than cultivating the other

- If the results were not significant, it could indicate that the net revenue of farmers does not depend on the crop choice between oil palm and Rice

6. Discuss at least three types of visualizations that you may use for the unique/different types of variables identified in the dataset provided.

- Stacked Histograms : To compare the distribution of farmers by type of Crop cultivated per country

-Boxplots : To compare the net revenue by farm size to the mean net revenue

- Scatter plots : To check for correlation between number of farm workers used and Farm Yield

7. During the research, data on fertilizer use, pesticide use and the irrigated area was compared to national average values from the FAO and the World Bank. Is this important for research? Discuss the reasons as to why or why not.

The Comparison of the dataon fertilizer use, pesticide use and the irrigated area is not important for research. The values reported does not specify the context and details of the data used for comparison. Research would most likely have been carried out under different conditions and data reported would have included certain elements not reflected in the dataset.