Statistic Summative Assignment

Question 1: Identify and evaluate the study design for this agricultural survey. How was the population sampled? Is the method used appropriate for the application? Are there any sources of bias?

Answer: A multistage stratified random sampling technique was used in the study design of this agricultural survey

This multistage stratified random sampling involves 3 stages of sampling

1. 11 countries are selected to represent the 4 sub-regions within Africa
2. Districts in each country where selected to capture representative farms across diverse agro-climatic conditions within each country according to the FAO classification
3. Surveys are conducted of farms with the assistance of the respective level agricultural authorities

The multistage stratified random sampling is appropriate for the application as it tries as much as possible to eliminate bias

Several sources of bias can be identified,

a) In all stages of the stratified sampling there is one form of selection bias particularly in stage 1 and 3
b) The stage 3 selection bias may also lead to an omission bias as only farmers with sedentary lifestyle were considered while majority of livestock farmers in East and West Africa are actually nomadic farmers

Question 2: Develop 2 key questions that can be studied based on the dataset provided.

Answer: Two key questions that can be explained using the dataset are

a) To test if there is a relationship between the use of fertilizer and farm output across all the regions in Africa
b) To test if a relationship exists between pesticides used and the volume of crops and produce lost due to diseases and pests.

Question 3: Develop a plan for a statistical analysis of the data in response to one of your 2 key questions. What are your null and alternate hypotheses? Which tests would you use and why? Why are they appropriate? How would you determine significance?

Answer: To test if a relation between pesticides used and the volume of crops lost due to diseases and pests

Null Hypothesis: The use of pesticides has no effect on the volume of crops lost due to diseases and pest

Alternative Hypothesis: The use of pesticides has an effect on the volume of crops lost due to diseases and pest

We will be using a Chi-Square test since we are exploring a relationship between two categorical variables that are also independent of each other and have samples sizes greater than 5.