STATISTICS SUMMATIVE ASSESSMENT: SUSAN MANI

QUESTION 1

An **observation study** design **with parallel group design** was used. Observation study is a type of correlational (i.e., non-experimental) research in which a researcher observes ongoing behaviour in a natural setting without influencing them in any way. Parallel design ensures that different groups were covered and the allocation of subjects to groups is usually achieved by randomisation.

The population was sampled using **Multi-stage stratified random sampling**. 3 stages of sampling were used with final stage clustered in villages.

Even though the **methods used are appropriate** there are limitations in that the actual causes of the behaviour cannot be known or it is impossible to determine if the observation is truly representative of what normally occurs.

Various **biases could be present**. The sampling was clustered in villages to reduce the cost of administering the survey hence there could be **convenience** bias. **Non-response** bias could arise since reserve lists created to cater for it was not used to redo surveys due to monetary constraints in travelling. **Subjective** bias could also have occurred considering one of the sections of the questionnaire had a face-to-face interview where the interviewer's presence could have affected the response.

QUESTION 2

Key Question 1: Does increasing the Length of the Growing Season have more effect on quantity of harvest than decreasing the Length of the Growing Season in winter in Zimbabwe?
ad715 Adaptation Climatic Variation: Shortening the Length of the Growing Season
ad716 Adaptation Climatic Variation: Increasing the Length of the Growing Season
s1qharv Quantity Harvested (kg) [calculate mean of both samples]

Key Question 2: Does soil conservation techniques influence quantity of crop harvested in winter?
ad7120 Adaptation Climatic Variation: Soil Conservation Techniques
s1qharv Quantity Harvested (kg)

QUESTION 3

Key Question 1 is used to set the hypothesis. *The following data is required for the analysis:* The data is first pre-processed to remove non-responses and outliers. Outliers are calculated as any value beyond two standard deviations from the mean by visual analysis of box-plots. Response data is divided into those farms who have responded yes to increasing growing season length and those who have indicated yes to decreasing length. The sample means must be calculated using Quantity Harvest (kg). 95 % confidence level is used for the test for differences. Subscript 1 refers to the quantity of harvest for increasing length and 2 for decreasing length.

$H_o: \mu_1 \leq \mu_2$ A lower or equal quantity of harvest exhibits in the sample who indicated yes to Increasing the Length of the Growing Season compared to those who indicated yes to decreasing the length of growing season in winter in Zimbabwe.

$H_A: \mu_1 > \mu_2$ A higher quantity of harvest exhibits in the sample who indicated yes to Increasing the Length of the Growing Season compared to those who indicated yes to decreasing the length of growing season in winter in Zimbabwe.

To test the hypothesis, a **one tailed two - sample t test** is used to determine if two population means are equal or unequal. This is appropriate since these are two normally distributed but independent populations, and σ is not known.

The t value is calculated as follows: $t = \frac{\bar{x}_1 - \bar{x}_2 - \Delta}{\sqrt{\frac{s_1{}^2}{n_1} + \frac{s_2{}^2}{n_2}}}$

Since a one tailed two sample t test is used the α **level is 0.05**. $t_{0.05,n}$ where n is sample size is found in the t- table and gives a critical value = $t_{critical}$. The values of $t_{computed}$ is compared to $t_{critical}$.

QUESTION 4

If $\boldsymbol{t_{computed}}$ does not exceed $\boldsymbol{t_{critical}}$, then we fail to reject H_o and cannot accept H_A. We accept H_o, in this case, and conclude, within a 95% confidence interval that increasing the Length of the Growing season has less or the same effect on quantity of harvest as decreasing the Length of the Growing Season in winter in Zimbabwe.

If $\boldsymbol{t_{computed}}$ does exceed $\boldsymbol{t_{critical}}$, then H_o is rejected. In this case, it can be concluded, within a 95% confidence interval, that the sample indicating yes to Increasing the Length of the Growing Season has a higher quantity of harvest than those indicating yes to decreasing the Length of the Growing Season in winter in Zimbabwe.