BCB744 (BioStatistics): Contextualising your Hons project in biostatistics

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About this assessment

To apply the concepts you learned in BCB744 to your Honours project, follow the structure outlined below. This framework will help anticipate the nature of your research and contextualise it in a clear scientific framework.

Not all biological and conservation biology research projects produce data suitable for statistical analysis. Please proceed with **Option A** for research that permits a hypothesis-driven approach and will generate data that can be analysed using statistical methods introduced in BCB744, such as regression, ANOVA, or non-parametric tests. This quantitative path aligns with investigations that anticipate numerical data, which can be used to test predictions derived from your hypotheses.

Conversely, follow **Option B** if your research will not yield quantifiable data conducive to statistical evaluation–at least not those taught in BCB744. Such projects might instead be rooted in qualitative inquiry, taxonomic/systematic examinations, quantitative ecological studies, theoretical explorations, model development, or case studies that provide descriptive insights or novel perspectives on ecological systems or processes. In these instances, your methodologies may encompass molecular systematic analyses, ecological surveys, content analysis, structured or semi-structured interviews, phenomenology, grounded theory, or comparative study.

Regardless of which option best describes your research, it is important to maintain the principles of the scientific method—posing unambiguous questions, undertaking systematic information collection, and applying thoughtful interpretation—to maintain rigour in your quantitative or qualitative analysis. This ensures that hypothesis development, testing, validation, and interpretation are coherent and robust, even if some inquiries lack statistical data analysis.

Notes

- This project will be assessed out of 50 marks and it contributes to the BCB744 Summative Task 2, which is due 12 April 2024.
- **The mark obtained for this assignment will not influence your research project mark—for that, an entirely separate assessment applies.**
- Working through this exercise can provide guidance on how to structure your Honours project proposal and design your research approach. **It is meant to supplement that process, not replace it.**
- The work reported on here should be discussed with your Honours project supervisor, who will provide guidance on your research design. It is not my intention to interfere with your project's direction but to ensure that you have a clear understanding of the statistical methods that can be applied to your data.
- I acknowledge the fact that you are still very early in the process and might not have all the information at your disposal, or that some changes might almost inevitably creep in as you develop your research.
- The structure outlined here is a guide and can be adapted to suit your specific research question and methodology.
- Your response to each item need not be verbose or excessively comprehensive. Take guidance from the examples I provide.
- If you are unsure which option to choose, consult with your supervisor or course coordinator to determine the most appropriate path for your project.

Option A

Aim and Objectives

Aim: Provide a concise statement summarising the primary goal of your project. The aim should reflect the broader impact of your study.

Example: "The aim of this study is to investigate the effects of X on Y in Z population, to understand how changes in X influence Y."

Objectives: List the specific objectives that, when achieved, will help accomplish the aim. These are more detailed and action-oriented.

Example:

1. To assess the baseline levels of X in the Z population.
2. To examine the relationship between changes in X and its impact on Y.
3. To evaluate the potential mechanisms through which X influences Y.

Predictions

Outline your expectations based on the literature review or preliminary data. Predictions are informed guesses on the study's outcomes.

Example: "It is predicted that increasing levels of X will lead to significant improvements in Y, given the known relationship between X and Y in similar populations."

Hypotheses

State the hypotheses you will test. Hypotheses are specific, testable statements derived from your predictions.

Example: "H0 (Null Hypothesis): There is no significant relationship between X and Y in the Z population. H1 (Alternative Hypothesis): There is a significant relationship between X and Y in the Z population."

Experimental or Sampling Design

Describe how you plan to conduct the research to test your hypotheses. This should include the study setting, type of study (e.g., experimental, observational), population/sample, sampling method, and any controls used.

Example: "A randomised controlled trial will be conducted with subjects from the Z population, where individuals will be randomly assigned to either the treatment group (receiving X) or the control group (not receiving X)."

Anticipated Data

Explain the type of data you expect to collect (e.g. quantitative or qualitative; character, categorical, integer, or continuous), including any specific measures, scales, and variables of interest.

Example: "Continuous-scale quantitative data on Y will be collected using the Y Measurement Scale, along with both continuous-scale (e.g. size) and categorical data (e.g. sex) for all individuals participating in the trials."

Statistical Analyses

Detail the statistical methods you will use to analyse your data, which are linked to your hypotheses and the nature of your data.

Example: "Descriptive statistics will be used to summarise demographic data. The relationship between X and Y will be assessed using a linear regression, controlling for potential confounders. A p-value of less than 0.05 will be considered statistically significant."

Option B

For projects that delve into qualitative research within the realms of biological and conservation biology sciences, your approach should be as robust and structured as that of quantitative research. The following expanded version of Option B provides comprehensive details that will help you in designing your research framework:

I provide an example for socio-ecological studies. Molecular or systematic studies will have their own research framework that you can adapt and expand upon here. Please discuss with your supervisor.

Aim and Objectives

Aim: Clearly state the overarching goal of your research. The aim should embody the anticipated contribution to knowledge within the field of biological and conservation biology sciences.

Example: "The aim of this project is to understand the sociocultural factors influencing community-based conservation efforts in region X."

Objectives: List the specific objectives that, when achieved, will help accomplish the aim. These are more detailed and action-oriented.

Example:

1. To document local perceptions and narratives regarding conservation in region X.
2. To identify cultural practices and traditions that influence conservation attitudes.
3. To develop a model for community engagement in conservation initiatives.

Research Questions

Formulate open-ended questions that guide your inquiry. These should stem from gaps in current knowledge or emerging issues in the field.

Example: "How do local cultural practices shape the conservation strategies in region X? What narratives support or hinder the acceptance of conservation programs?"

Theoretical Framework

Identify the theoretical basis that will inform your analysis. This framework will underpin your understanding and interpretation of the qualitative data.

Example: "The study will be guided by the Social Ecological Systems framework, focusing on the interactions between society and natural resources."

Methodological Approach

Detail the specific qualitative methodologies you will employ. These methods should align with the research questions and theoretical framework.

Example:

- Ethnographic fieldwork for deep immersion in the community's cultural context.
- Narrative analysis to explore conservation stories and local history.
- Content analysis for systematic examination of communication content related to conservation.

Data Collection Techniques

Explain how you will gather qualitative data, considering ethical implications and ensuring a comprehensive understanding of the subject matter.

Example:

- Semi-structured interviews with community leaders and local conservationists.
- Focus group discussions with different stakeholder groups to capture diverse perspectives.
- Participant observation at community events and conservation activities.

Anticipated Data

Describe the form and content of the qualitative data you expect to collect, which could include textual, audio, or visual data.

Example: "The study will yield rich textual data from interview transcripts, field notes from observations, and thematic content from focus groups."

Analytical Procedures

Outline the steps for analysing the qualitative data, from coding to pattern identification, ensuring a systematic approach to interpretation.

Example:

- Thematic coding of transcripts to identify common themes and patterns.
- Narrative analysis to understand the storytelling structure and its implications for conservation.
- Comparative analysis of cultural practices across different communities within region X.

Validation Strategies

Specify the techniques to be used for increasing the credibility and reliability of your findings, such as member checks, triangulation, or reflexivity.

Example: "Triangulation will be used to cross-validate findings from interviews, focus groups, and observations. Reflexivity will be practiced to account for researcher bias and influence on data collection and analysis."