



Framework for Research

Guidelines for Process

RESEARCH
Administration
&
Development

...fostering a culture of
curiosity within a
climate of spirited
scientific inquiry



fraserhealth

Better health.
Best in health care.

Purpose



- To provide researchers with information on research basics and research study designs.
- To guide researchers through the research process.
- To create awareness about Fraser Health Services related to research.

Research Basics

- You have a question that you think would make an interesting research study. What should you do?
- How do you formulate your idea into a researchable question?
- How do you take this question and turn it into a research study?
- It is important to understand research basics before beginning the research process.



Proto-Professor Algarth Zag, pioneer in fire research.

Past Research



Past research is an essential component of future research.

- It is very important to conduct an exhaustive review of the literature to gain an understanding of what research has been done, and how it has been done.

What is an exhaustive literature review?

- Include all past and current articles that focus on your topic and related areas in your search.
- Reviewing previous research is important to determine if your research question has already been answered.
- There is no need to re-invent the wheel; make sure your research question expands on previous literature, or looks at the topic in a new way.

Past Research



- If you are confident that you have a good research question, but are concerned because there are a large number of related studies, do not despair.
- Justify the importance of your research question, build on previous research, and work with previous ideas to come up with something new and exciting.
- The purpose of a literature search is to:
 - determine if your research question has already been answered.
 - gain an understanding of research in the area.

Past Research



Although the purpose of the literature review is to support your initial research question, sometimes your research question will be modified or have changed entirely following the search.

- Reading other studies in related fields often sparks exciting research questions that would have never been thought of otherwise.
 - For this reason, a literature search can also help formulate new research questions.

Types of Research



- The purpose of your research will determine what type of study will be conducted.
- The complexity of your research question will reflect the type of research method chosen.
- What exactly do you want to do?
- Qualitative research?
- Quantitative research?

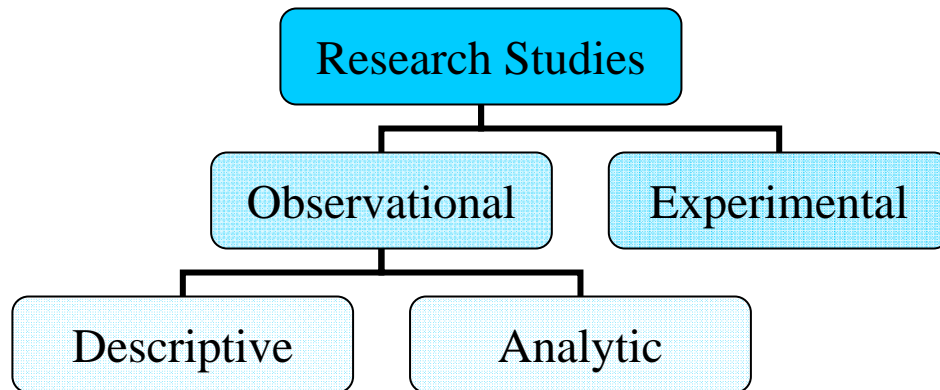
Qualitative vs. Quantitative



What is the difference between qualitative and quantitative research?

- Qualitative research looks at:
 - How? What? Why?
 - Focus groups, case studies
 - Results NOT projected onto population
- Quantitative research looks at:
 - How much? How many?
 - Numeric
 - Results ARE projected onto population

Classification of Research Studies



Observational Studies:

Descriptive Studies:

Focus on describing populations and describing the relationship between variables

Analytic Studies:

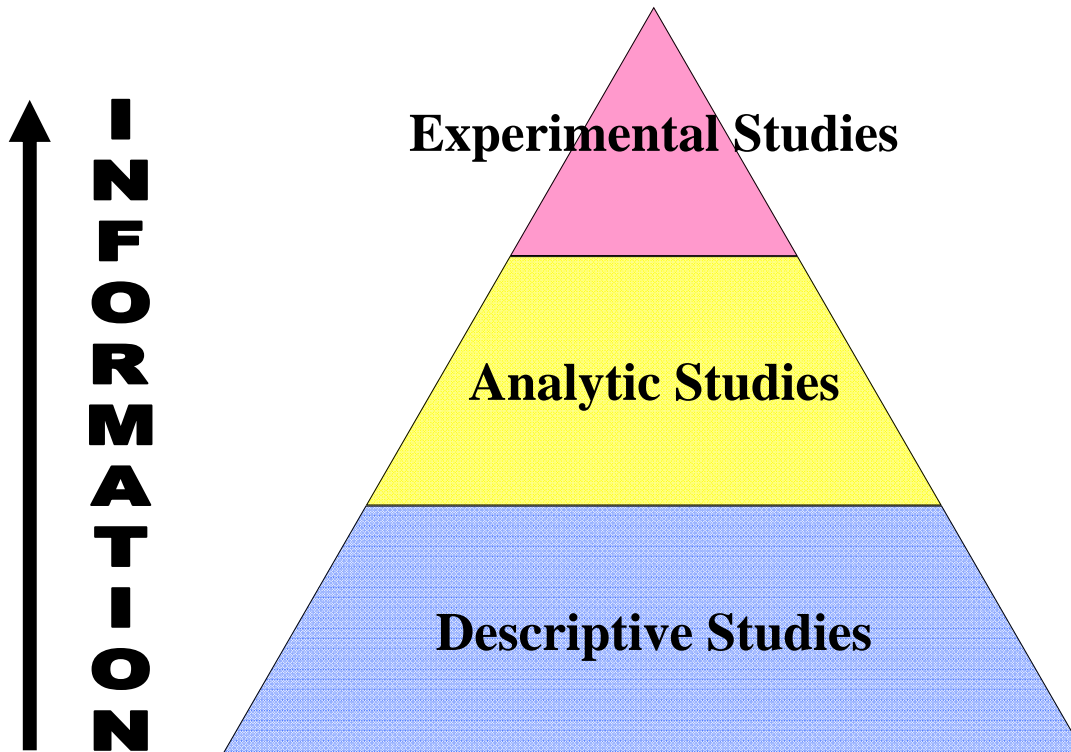
Make inferences about the population based on a random sample.

Experimental Studies:

Test relationships between exposures and outcomes. Investigator has direct control over study condition and exposure status.

Hierarchy of Studies

Type of study is selected according to the purpose of research.



If you want to control the status of an exposure or intervention, in order to examine causality or effectiveness, choose an experimental study.

If you want to make inferences about a population based on a sample, or look at the association between variables, choose an analytic study.

If you want to describe a population, choose a descriptive study.

Research Studies



- **Types of Descriptive Studies:**
- Case report: Detailed description of individual participant. E.g. FAS was first studied this way.
- Case series: Extension of case report. Describes characteristics of a group of individuals with same condition/symptoms.
- Ecological studies: Can be analytic or descriptive. Group is studied.
- E.g. The examination of the association between chlorinated water and cancer among 30 municipalities.
- Variety of ecological studies, including:
 - Exploratory studies
 - Multiple group comparison studies
 - Time trend studies
 - Mixed studies
- Cross-sectional studies: Assess both exposure and outcome status at one point in time, or during a brief period of time. The individual is the unit of analysis. Can be descriptive or analytic.

Research Studies



- **Types of Analytic Studies:**
 - Ecological studies
 - Cross-sectional studies
 - Case-control studies: Subjects selected according to outcome status (present/absent) before exposure/treatment status is determined. New cases and comparable controls are selected and compared to establish causal relationships.
 - E.g. Want to study the relationship between environmental tobacco smoke and lung cancer. Interview non-smoking participants with lung cancer (cases), and non-smoking participants without cancer (controls) about prior exposure to environmental tobacco smoke.
 - Prospective cohort studies: Subjects classified without study disease or condition, and then followed up into the future to determine if the rate of development of the disease/condition is different in exposed/unexposed groups. E.g. Framingham Study.

Research Studies



- Retrospective cohort studies: Sample represents group that is assembled by using past data. Subjects classified according to exposure status at the time the cohort existed, and followed up to present, to see if the development of the study disease is significantly different in exposed/unexposed groups.
- Hybrid study: Mix of study types.

Types of Experimental Studies:

- Randomized Control Trials (RCT): Designed to test efficacy of intervention. Subjects randomly assigned to control and exposure groups, allowing for comparison and the drawing of conclusions.
- Several types of RCT's:
 - Preventative trials (participants with no disease).
 - Intervention trials (participants at high risk for disease).
 - Therapeutic trials (participants with disease).
- Community Trial: Assigns interventions/exposure to entire community or group. One group receives intervention, the other group acts as a control group.

Research Studies



Quasi-Experimental:

- Quasi=Almost
- Lacks random assignment
- Many types:

Pretest Posttest Nonequivalent Group- Both a control group and an experimental group are compared. But, groups are chosen and assigned out of convenience (rather than randomization).

Ex. Examining two groups of students. One group signs up for an educational program, one group does not.

Would measure all of the students' grades prior to the start of the program and then again after the program.

Those students who participated would be our treatment group; those who did not would be our control group.

Research Studies



- Other types of Quasi-Experimental Studies:
 - Time-Series Designs
 - Non-equivalent before and after studies
- Important point: How groups are chosen
 - No randomization involved.
 - Groups often chosen based on convenience.
 - Not as strong as experimental studies, but often used.

Research is a process



1. Generate idea
2. Conduct literature review
3. Refine research question
4. Plan research methodology
5. Create research proposal
6. Apply for funding
7. Apply for ethics approval
8. Collect and analyze data
9. Draw conclusions and relate findings

Research Idea



Step 1: Generate research idea

- You have come up with an exciting research question that you want to explore.
- Once your initial research idea has been formed, it is necessary to think about research intent and previous research.
- What do you hope to accomplish?
- Has this research been done before?



Literature Review



Step 2: Conduct literature review

- Review books, journal articles, and other peer reviewed sources such as registries of evidence based research literature.
- Review the references section of relevant articles to aid in the search for related articles.
- Conducting literature reviews take time, but this is a very important step in the research process.
- The Fraser Health library can help you with your search.

<http://fhaweb/Education+and+Research/Library/default.htm>

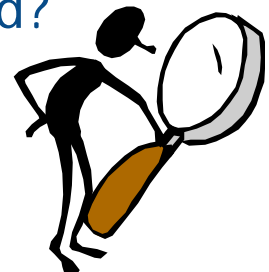


Refine Question



Step 3: Refine research question

- Now that you have exhausted the literature, how has your original research idea changed?
- Start thinking in more detail
 - State the problem or research question
 - Who will your sample include?
 - Who, where, when, and what.
 - What items will be measured? How will they be measured?



Refine Question



What exactly do you want to do?

- Do you want to:
 - Predict?
 - Compare groups for differences?
 - Prove effectiveness?
 - Prove association?
 - Prove causality?
 - Examine for trends?

5 minute Group Exercise: Refining the Research Question



4 Potential Research Questions

- A) Is the question testable?
- B) If it is testable, could we make the question more precise?
If it is not testable, can you think of any solutions to the problem?

POTENTIAL RESEARCH QUESTIONS:

- 1) Do dogs dream?
- 2) Do university students who take more courses have better study habits?
- 3) Does caffeine make people anxious?
- 4) Does memory get worse in old age?

What next?



- Once you have operationalized your terms and defined your research question it is time to plan research methodology...

Research Design



Step 4: Plan research methodology

- Select statistical tests and research methods which will allow you to answer your research question.
- Consider:
 - 1) What is your goal?
 - 2) What kind of data do you plan to collect? What collection method will you use? Questionnaire? Previously collected data? Test results? Chart information?
 - 3) Is your data normally distributed? Can you use a parametric or non-parametric test?
 - 4) What are the assumptions of the statistical test you would like to use? Do the data meet these assumptions?
- Consider the variables you wish to measure, and review the statistical test you wish to use in order to understand if it is appropriate for what you wish to do.



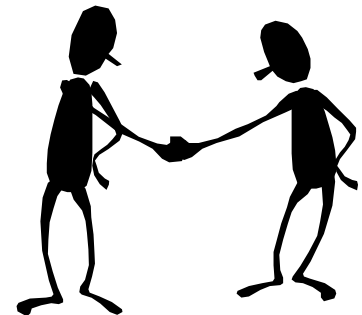
Consultation



Not sure about actual research methods? Ask for help.

- The FH Health Research Intelligence Unit can help you to:
 - 1) Design research methodology.
 - 2) Make recommendations on measuring outcomes.
 - 3) Analyze data.
 - 4) Make sure your study is in fact measuring what it is intended to measure.

- If you need help, contact Ms. Rae Spiwak, Epidemiologist at rae.spiwak@fraserhealth.ca or 604-587-4438



Consultation



- Meet with a consultant to determine research methodology early in the process, but not too early!
- Make sure that you know what you want to do and have done your homework before meeting with a consultant.
- What should you know beforehand?
- Be as clear as possible about your research question, past literature on topic, research purpose, type of sample, and outcome measures.

FH Health Intelligence Unit Consultation Request Form



Please answer the following questions related to the study:

- 1) What is your research question in 30 words or less?
- 2) What are the objectives of your study? Describe the purpose of the study.
- 3) What are the variables of interest in your study?
- 4) Who will be the focus of your study? Who will comprise your sample?
- 5) Will your study be qualitative or quantitative?
- 6) If your study is qualitative, how will you be collecting your data?

- What service is required?

- Research Study Design Consult
 - Statistical Analysis Consult
 - Program Evaluation Consult
 - Grant Facilitation Consult

Contact Rae Spiwak, rae.spiwak@fraserhealth.ca for electronic copy.

Consultation



- Tips:
- Visit the FH Health Research Intelligence Unit early in the project, before you have collected and analyzed your data.
- Make sure to give the consultant enough time to meaningfully answer questions.
- Research methodology and analysis is a process with many factors that need to be considered; this takes time.
- To get the best consult possible, plan to meet with a consultant well in advance.
- After you have decided the research methodology, it is time to write the research proposal.

Research Proposal/Outline



Step 5: Create research proposal

- Create a research proposal that will enable people who are not involved in the study to understand exactly what you plan to do.
- Your proposal should include:
- Introduction, literature review, purpose, expected benefits, hypotheses, objectives, research design, data collection techniques and statistical methods.

A proposal will be helpful when applying for grant funding.



Applying for funding



Step 6: Applying for grant funding

- It is often possible to gain funding to assist in carrying out your research study.
- Funders will require an outline of your research plan, along with detailed information on methods.
- Consult with the FH Health Research Intelligence Unit early in the process to help identify potential grants as well as help prepare applications.
- Contact Mr. Michael Wasdell, Grant Facilitator-Writer at michael.wasdell@fraserhealth.ca for further information regarding grant writing.



Applying for funding



Tips:

- Consult with a grant proposal writer early! Often research grants and competitions have strict deadlines and have specific requirements.
- For example, the Vancouver Foundation has a two stage application process that requires a letter of intent before the formal application is due.
- The funding process takes time, often months. Start early!

Ethics Approval



Step 7: Ethics approval

- Ethics consideration is an essential component of the research process.
- Most studies require ethics approval when dealing with human subjects.
- The Fraser Health Research Ethics Board (REB) reviews submissions on a regular basis.
- See the Fraser Health Research homepage for more information and guidelines.

<http://fhaweb/Education+and+Research/Research/FH+Research+h+Ethics.htm>



Collecting and analyzing data



Step 8: Collect and analyze data

- Collecting data for your study is exciting because you are close to finding out the answer to your research question or hypothesis.
- Remember to be diligent and follow your research plan for collecting data.
- Exercise care in the collecting and coding of data.

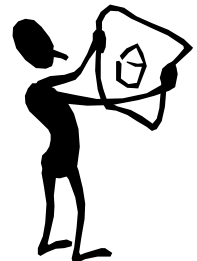


Collecting and Analyzing data



Data should be clean.

- Clean data are:
 - 1) Free of duplicate cases
 - 2) Free of missing cases
 - 3) Free of mistakes/inappropriate responses
 - 4) Examined for outliers (an outlier is an extreme value). Check if outlier is a mistake, if so correct, if not a mistake, try to understand why the outlier is there, what does the outlier tell you about the data?)
 - 5) Recorded and coded properly
- Proper training of the data collectors in a study is essential to having clean data.
- Examine data carefully!



Conclusions and Findings



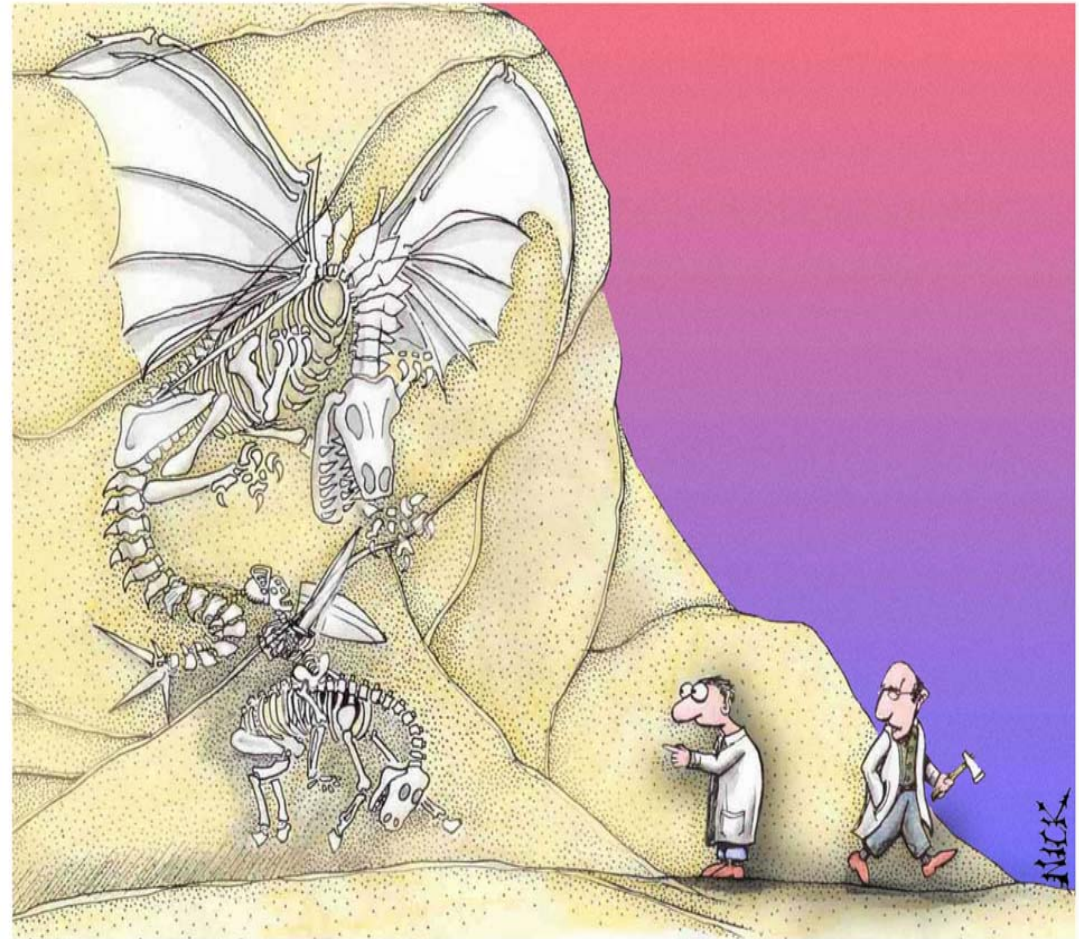
Step 9: Draw conclusions and relate findings

- Now it is time to write up your findings and formulate conclusions.
- Was your research question answered?
- What findings were significant? Not significant?
- Why do you think this was the case?
- What were the limitations of your study?
- What about ideas for future research?

Conclusions and Findings

Tips:

- Try not to get caught up in the idea that significant findings are the only findings that matter.
- Significant findings are exciting, but insignificant findings are just as helpful in understanding your research topic.
- All findings are publishable if they contribute new understanding to the research topic.
- Just because findings are insignificant, does not mean they are unimportant.



"Ignore it, Henderson. It's unscientific."



Good luck!

Research should be fun and exciting!
Enjoy the process and look forward to
learning something new, regardless of
what your findings are.

