How To Find Your Topic and Formulate Your Research Question

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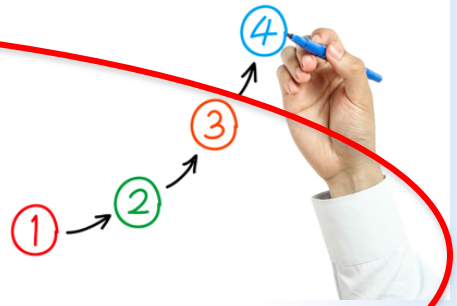
What is a research?

Learning Objectives

At the end of this session, you will be able to:

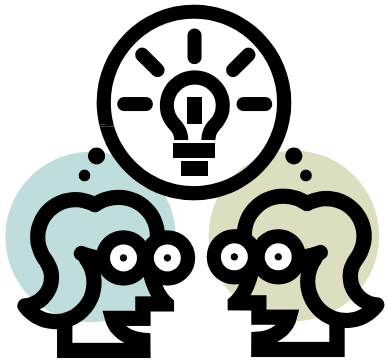
1. Understand the main steps for conducting a high quality research
2. Identify the different approaches to find out your research topic
3. Recognize how to develop a good research question
4. Understand how to formulate specific research objectives
5. Describe the research hypothesis

Steps for Conducting a Research



1) Selecting the **research topic**
2) Define the research **problem**
3) Specify the research **objectives** and **hypothesis**
4) Develop a research **design**
5) Design the **method** of collecting information
6) Manage and implement the **data collection**
7) **Analyze** and interpret the results.
8) **Write** a Final research report/manuscript

Research Topic



Why it is Important?

- The first and the foremost difficult task in research
- The keystone of the entire scientific project.
- It drives the entire study, and is crucial for moving the project forward

A successful research project starts with a good topic.

But how can you decide what to pick?

Tips for Selecting a Research Topic

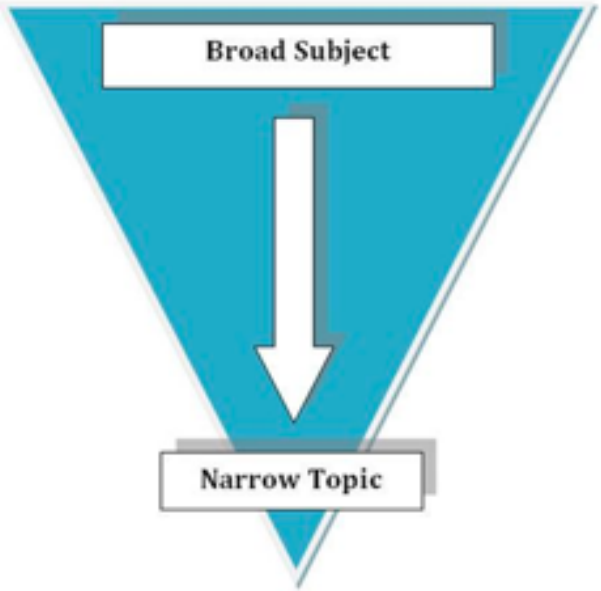
1. Choose a topic that you are **interested** in.
2. Consider the **scope of your topic** (Not too broad, not too narrow)
3. Choose a topic that is **feasible**
4. Choose a topic that is **"research-worthy"**

Where Do You Get Your Ideas From?

Steps For Choosing A Good Research Topic

1) Select a **broad** topic of interest.

2) **Narrow** it down to an effective research topic



Ask following questions initially

- Do I have, **time** for this topic at this point during my course?
- Is this really the **burning topic** for me?
- Will this be worth it?
- Is this a major and relevant **public health problem** or is it too mysterious?
- Are my goals/objectives too big ? Am I covering too much?
- Will **available methods** answer my questions?
- What are the **ethical** and human subject issues here?

Flowchart Of The Development Of A Research Idea

Research Topic → broad subject area to be investigated

↓

Research Problem → the issue within the broad topic area

↓

Research Question → a narrow question to be investigated

↓

Research Purpose → a statement of objectives of the study

↓

Hypothesis → prediction of the outcome


What's
next
?

- **Explore** the issue (quick google search)
- Start **asking** questions

Questions to Ask When Exploring

- ***Who*** → Which groups have an interest in this topic? (eg. parents, particular organizations, students, the government, etc.) Who specifically will you focus on?
- ***What*** → What are the most important issues? What are the different factors involved? What is known about the topic?
- ***Where*** → Where is the topic relevant? Will you focus nationally or internationally? Some sort of comparison?
- ***When*** → When did the situation or event start? Is it ongoing?
- ***Why*** → What interests you about it? Why do you want to write about it?

Selecting a Research Topic

Abnormality	Is the patient sick or well?
Diagnosis	How accurate are tests used to diagnose?
Frequency	How often does a disease occur?
Risk	What factors are associated with an increased risk of disease?
Prognosis	What are the consequences of having a disease?
Treatment	How does the treatment change the course of disease?
Prevention	Does an intervention on well people keep disease from arising?
	Does early detection and treatment improve the course of the disease?
Causes	What conditions lead to disease?
	What are the pathogenic mechanisms lead to diseases?
Cost	How much will care for and illness cost?


Focus

Research Question

Research Questions

- Umbrella questions that **address your topic** and would use question words.
- Include **KEY WORDS** that you can use to help you research your topic in a database or search engine.
- Questions you **DO NOT** know the answer to. You are doing the research to gain new knowledge.

Research Question

- It should be a single sentence in the form of a question.
- It should be clear, unambiguous and specific
- It should NOT be too narrow, too broad, or too challenging

A well-defined and specific research question is the key for making decisions about study design and population and subsequently what type of data will be collected and analyzed.

Factors That Might Help To Develop A Reasonable Research Question

1. **Literature review**
2. **Time**
3. **Cost**
4. **Sufficient number and types of subjects**
5. **Ability to collect and store data**
6. **Ethical issues.**

How To Develop A Research Question

1. Often begins with a general concern
2. Must be narrowed to measurable and can be able to do research

Examples

General Concern	Narrowed Research Question
▪ Should women take hormones to prevent bone loss?	▪ Is taking estrogen associated with a lower risk of osteoporosis in women 60+?
▪ Can a vegetarian diet reverse cardiovascular disease?	▪ Does a plant-based diet reduce serum cholesterol levels in patients with cardiovascular disease?

What Goes In The Research Question?

- Disease or condition of interest
- Population
- Intervention to be tested
- Comparison group(s) -- placebo? Existing treatment?
- Outcome measures

Sample research question (1)

Interest:

Should women take hormones to prevent bone loss?

Research question:

Does **taking estrogen** after menopause reduce the likelihood of bone density loss in women over 60 years of age, compared to women not taking estrogen?

Sample research question (2)

Interest:

Can a vegetarian diet reduce cardiovascular disease?

Research question:

Does an entirely plant- based (vegan) diet reduce blood serum cholesterol levels in men over 50 years old with lipid levels > … compared to a meat- based diet?

Good research question

- **F**easible
- **I**nteresting
- **N**ovel
- **E**thical
- **R**elevant

FINER criteria: a good research question

F Feasible

- Adequate number of subjects
- Adequate technical expertise
- Affordable in time and money
- Is it possible to measure the variables?

I Interesting, to the investigator

- Getting the answer intrigues investigator, peers & community

N Novel, to the field

- Confirms, refutes or extends previous findings

E Ethical

- Amenable to a study that institutional review board (IRB) will approve

R Relevant

- To scientific knowledge
- To clinical and health policy
- To future research

Research Topic → Research Question → Research Objectives → Research Hypothesis

Research Objectives

What are Objectives?

An intent, communicated by a statement describing the plan of the research in **clear**, **measurable** term

Importance of Research Objectives

- Bring Focus to the study
- Avoids collection of unnecessary data
- Determines an appropriate study design
- Helps determine analysis plan

Goals and Objectives

Goals $\not\equiv$ Objectives

Goals and Objectives

Goals

It describes the aim of the work in broad terms (**Over a longer time period**)

Objectives

These are more **specific** and **relate** directly to research question.

They may be divided into two types:

- *Primary objectives* → (bound to be achieved)
- *Secondary objectives* → (by the way)

Research Goal & Objectives

- The goal (aim) and objectives must be stated at the very beginning of the study, since they will guide the investigator during the process of formulating research questions and hypothesis.
- They will also help in the prioritization process.
- They will enable the reader or consumer of the work to judge whether the investigator had achieved these objectives or not.

The research objectives should be:

- Closely related to the research question
- Covering all aspects of the problem
- Very specific
- Ordered in a logical sequence
- Stated in **action verbs** that could be evaluated e.g. **to describe, to identify, to measure, to compare, etc.**
- Achievable, taking into consideration the available resources and time
- Mutually exclusive, with no repetitions or overlaps

SMART Objectives

- S ⇒ Specific
- M ⇒ Measurable
- A ⇒ Achievable
- R ⇒ Relevant
- T ⇒ Time-bound

Examples of Research Objectives

- To study whether SNP markers are associated with obesity and hypertension phenotypes.

- To assess the general population knowledge & attitude towards Organ donation

- To determine association between maternal smoking and low birth weight.

Example

Goal:

To reduce risk of cardiovascular diseases in Saudi population by developing evidence based interventions

Question (1)

Is dietary intake of saturated fats over the past xx weeks related to hypercholestrolemia in Saudi adult population ?

Question (2)

Is dietary intake of saturated fats over a period of xx months is associated with increase risk of coronary heart disease in Saudi adult population

Example Cont.

Objective (1)

To determine the daily intake of saturated fats in the past 4 weeks in Saudi adults

Objective (2)

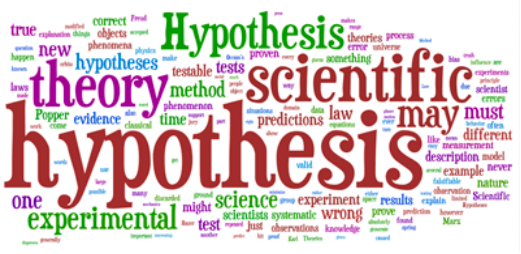
To determine the relationship of dietary intake of saturated fats and blood levels of low density lipoprotein (LDL) in Saudi adults

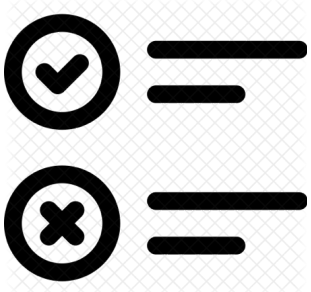
Objective (3)

To determine the association of dietary intake of saturated fats and intimal thickness of coronary artery in Saudi adults

Research Topic → Research Question → Research Objectives → Research Hypothesis

Research Hypothesis





Research Hypothesis

“ Research hypothesis is a statement of the research question in a measurable form”

Research Hypothesis

- A hypothesis can be defined as a **prediction** or explanation of the relationship between one or more independent variables (PREDISPOSING/RISK FACTORS) and one dependent variable (OUTCOME/CONDITION/DISEASE)).

- A hypothesis, in other words, translates the problem statement into a precise, clear prediction of expected outcomes.

Hypothesis formulation

This is based on existing knowledge, deriving it through critical reading of literature and facts

Example:

It is hypothesized that average daily intake of saturated fat in Saudi adult population is **more than 20%** of the recommended intake when measured by xxx test and yyy standards to define dietary saturated fat intake.

Hypothesis formulation

Objective:

To determine the relationship of dietary intake of saturated fats and intimal thickness of coronary artery

Hypothesis:

It is hypothesized that > 20% of recommended saturated fat intake in Saudi population will be associated with 50% increased intimal thickness of coronary artery when compared to the normal intimal thickness measured by XYZ


STOP

- **What is a Research?**

Systematic collection, analysis and interpretation of data to answer a question

- **The main steps in conducting a research?**

- A successful research project starts with selecting a good **topic**

Tips for selecting research topic:

- Interesting you
- Feasible
- Research worthy
- Not too broad, not too narrow

Your research question should be clear, unambiguous and specific

Important information in a research question

- Disease or condition of interest
- Population
- Intervention to be tested
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Thank
you!!