



Research Problem, Research Hypotheses and Literature Review

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Outline

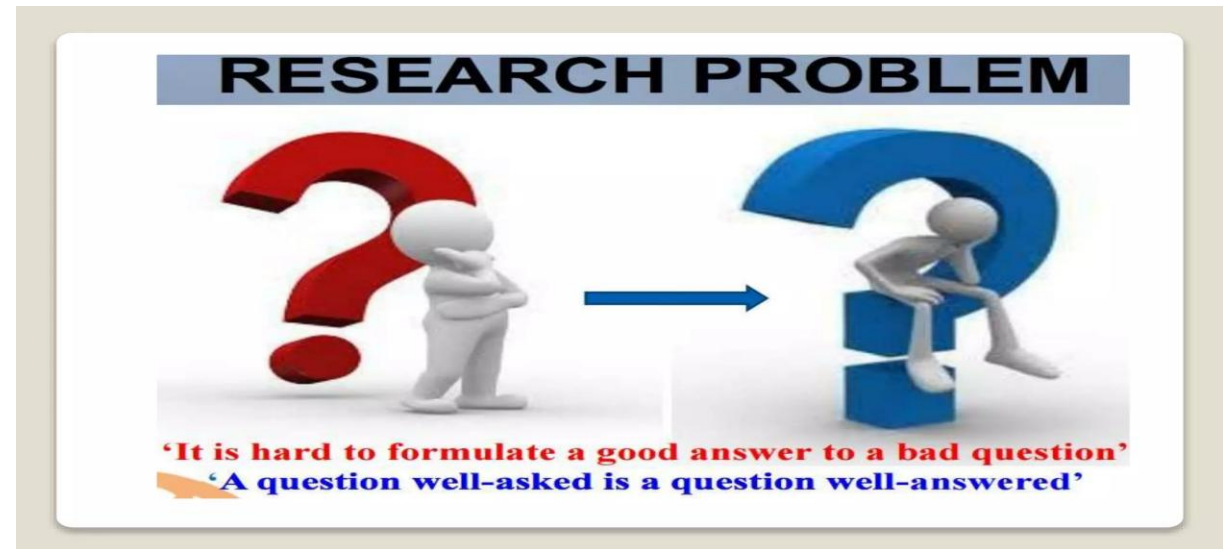


- What is Research Problem
- Sources of Research Problems.
- Research Objectives
- Research Hypotheses
- Types of Hypotheses
- Literature Review
- Steps in Conducting a Literature Review

❑ What is Research Problem?



- A **research problem** is a **clear and specific statement** of an **issue**, **gap in knowledge**, or **question** that a study aims to investigate.
- It identifies **what the researcher wants to study** and **why it is important**.



❑ Features of a Good Research Problem



- A good research problem should be:
 - i. Clear and specific.
 - ii. Researchable and measurable.
 - iii. Relevant to the field of medical analysis.
 - iv. Feasible within available time and resources.
 - v. Ethically acceptable.

❑ Sources of Research Problems:



➤ Research problems may arise from:

1. Clinical observations in laboratories or hospitals
2. Previous research findings
3. Public health concerns
4. Technological advances in diagnostics

❏ Example of Problem statement



➤ Example 1:

- Many patients in the hospital are diagnosed with urinary tract infections, but the common bacteria causing these infections in our laboratory are not clearly identified. Without this information, choosing the correct antibiotic may be difficult.
- Therefore, it is important to identify the most common bacteria found in urine samples in our laboratory.

❏ Example of Problem statement



➤ Example 2:

- Anemia is frequently observed in patients visiting the clinic, but the most common type of anemia in our area is not known. Without proper laboratory data, treatment may not be accurate.
- Therefore, a study is needed to determine the common types of anemia among patients in our hospital.

❏ What is Research Objectives



➤ Definition: Research objectives are **specific goals** that the researcher **intends to achieve**. They provide direction and focus for the study.

➤ Types of Objectives:

1. **General objective:** Broad aim of the research. It describes the main purpose of the study in a single, clear statement.

Example: To determine the prevalence of intestinal parasitic infections among university students in Erbil City.

2. Specific objectives:

- Are the detailed, **measurable steps** needed to achieve the general objective. They break the main aim into smaller research tasks

➤ Example

- To determine the prevalence of intestinal parasitic infections among university students.
- To identify the common species of intestinal parasites found among the participants.
- To compare the prevalence of infection between male and female students.

❏ Example of Objectives



➤ General objective:

- "To assess antimicrobial resistance patterns of bacterial isolates in a teaching hospital."

➤ Specific objectives:

- To identify common bacterial pathogens in clinical samples
- To determine antibiotic susceptibility profiles
- To compare resistance patterns among different hospital units

❑ Characteristics of Good Objectives:

- Objectives should be:

1. Specific.
2. Measurable.
3. Achievable.
4. Relevant.
5. Time-bound.

❑ Research Hypotheses



- Definition: A hypothesis is a **testable prediction** about the **relationship between variables**.
- It is based on **prior knowledge or theory** and can be **supported** or **rejected by data**.

What is Research Hypothesis?



❏ Types of Hypotheses:



1. **Null hypothesis (H_0):** States that there is no significant relationship or difference.
2. **Alternative hypothesis (H_1):** States that a significant relationship or difference exists.

➤ Example:

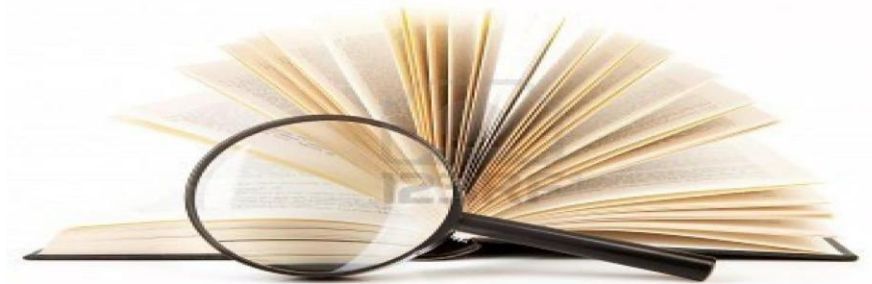
- **H_0 :** There is no significant difference in antibiotic resistance between bacterial isolates from ICU and non-ICU wards.
- **H_1 :** There is a significant difference in antibiotic resistance between bacterial isolates from ICU and non-ICU wards.

❑ Literature Review:



➤ Definition:

- A literature review is a **systematic summary** and **evaluation of previous research related to a topic**.
- It helps researchers understand what is **already known** and **identify gaps in knowledge**.



Literature Review

❑ Purpose of Literature Review:



- **The literature review helps to:**

- Provide background information
- Identify research gaps
- Avoid duplication of studies
- Develop research questions and hypotheses
- Support the significance of the study

❏ Sources of Literature:



1. Scientific journals
2. Textbooks
3. Conference proceedings
4. Online databases (e.g., PubMed, Google Scholar)
5. Government and health organization reports

❑ Steps in Conducting a Literature Review:



1. Define the research topic
2. Search relevant databases
3. Select relevant articles
4. Evaluate the quality of sources
5. Summarize and synthesize findings

❑ Example:



- In a study on antimicrobial resistance, the literature review may summarize **global trends in resistance**, **regional studies**, and **current diagnostic methods** used in clinical microbiology.

❏ Case Study 1:



➤ Antimicrobial Resistance in Hospital Isolates:

- Background: A hospital laboratory notices increasing treatment failure in patients with urinary tract infections.
- Research Problem: Is there an increase in multidrug-resistant *Escherichia coli* among urinary isolates in the hospital?
- General Objective: To determine the prevalence of multidrug-resistant *E. coli* in urinary tract infections.

➤ **Specific Objectives:**

- To isolate and identify E. coli from urine samples
- To determine antibiotic susceptibility patterns
- To compare resistance rates over the last three years

• **Hypotheses:**

- H₀: There is no significant increase in multidrug-resistant E. coli over the past three years.
- H₁: There is a significant increase in multidrug-resistant E. coli over the past three years.



❏ HOME WORK-1:



- Identify a research topic for your final-year project and clearly present the research problem, objectives, hypotheses, and literature review strategy.
- To be Submitted on: 2nd March, 2026.

References



1. National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979). The Belmont Report.
2. World Medical Association. (2013). Declaration of Helsinki.
3. Council for International Organizations of Medical Sciences (CIOMS). (2016). International Ethical Guidelines for Health-related Research Involving Humans.



Thanks