Aims, Objectives and Hypothesis in Research

Shiraz Shaikh
Learning Objectives

• To differentiate between Aims and Objectives
• To enlist the characteristics of good objectives
• To describe and classify types of hypothesis
• To phrase aim, objective(s) and hypothesis for a Research Question
## Aims and Objectives

<table>
<thead>
<tr>
<th>AIMS</th>
<th>OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad statement of desired outcomes, or the general intentions of the research</td>
<td>Steps you are going to take to answer your research questions</td>
</tr>
<tr>
<td>Emphasize what is to be accomplished</td>
<td>Describes how you are going to achieve that aim</td>
</tr>
<tr>
<td>Address the long-term project outcomes</td>
<td>Address the more immediate project outcomes</td>
</tr>
<tr>
<td>Do not need to be numbered</td>
<td>Are usually numbered and may be classified into primary and secondary objectives</td>
</tr>
</tbody>
</table>
Aims and Objectives

Examples

**AIM**
To reduce respiratory illnesses in workers exposed to dust and smoke

**OBJECTIVES**
• To estimate the prevalence of respiratory illnesses in workers exposed to dust and smoke
• To determine the occupational factors leading to respiratory illnesses in workers exposed to dust and smoke
A Good Objective should be …

S PECIFIC
M EASURABLE
A CHIEVABLE
R ELEVANT
T IME-BOUND
Exercise: Is this objective SMART

• To estimate proportion of incomplete abortions that are induced in hospital-based settings in Saudi Arabia

SPECIFIC ×
MEASURABLE ✔
ACHIEVABLE ×
RELEVANT ×
TIME BOUND ✔
Exercise: Is this objective SMART

- To describe the demographic and social characteristics of the married women with at least one child obtaining family planning services in a rural area of Sind

SPECIFIC ✓
MEASURABLE ✓
ACHIEVABLE ✓
RELEVANT ✓
TIME BOUND ✓
How to Phrase Research Objectives: Choice of Verbs

For Descriptive Studies

• To **describe** dietary patterns of women in reproductive age attending OPD at JPMC Karachi
• To **estimate** the frequency of iron deficiency anemia in women of reproductive age attending OPD at JPMC Karachi
• To **identify** the factors related to healthy diet in women of reproductive age attending OPD at JPMC Karachi

For Analytical Studies

• To **determine** the association between type of job and dietary patterns of women in reproductive age attending OPD at JPMC Karachi
• To **compare** the dietary patterns between urban and rural women in reproductive age attending OPD at JPMC Karachi
Hypothesis

• It is a formal statement that presents the expected relationship between an independent and dependent variable (Creswell, 1994)
• Research question is essentially a hypothesis asked in the form of a question
• Not required in exploratory and descriptive studies
<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Alternate Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Represents the traditional approach</td>
<td>Represents the alternative approach</td>
</tr>
<tr>
<td>Predicts that no difference or relationship exists</td>
<td>Challenges null hypothesis and claims that difference or relationship exists</td>
</tr>
<tr>
<td>Example: There is no difference between average scores of MPH and MSPH students</td>
<td>May be directional or no-directional</td>
</tr>
<tr>
<td>Example for directional: Scores of MPH students are higher than MSPH students in descriptive subjects</td>
<td>Example for non-directional: There is a difference between average scores of MPH and MSPH students</td>
</tr>
</tbody>
</table>
# Errors in Hypothesis Testing

<table>
<thead>
<tr>
<th>Hypothesis Testing Outcomes</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Null Hypothesis is True</td>
<td>The Null Hypothesis is True</td>
</tr>
<tr>
<td>The Alternative Hypothesis is True</td>
<td>The Alternative Hypothesis is True</td>
</tr>
</tbody>
</table>

- **The Null Hypothesis is True**
  - Accurate: $1 - \alpha$
  - Type II Error: $\beta$

- **The Alternative Hypothesis is True**
  - Type I Error: $\alpha$
  - Accurate: $1 - \beta$
Type I error
(false positive)

You're pregnant

Type II error
(false negative)

You're not pregnant
Errors in Hypothesis Testing

• Random.............Chance
• Systematic-------BIAS

**Chance**

➤ Inherent in every study and cannot be eliminated altogether
➤ Can be minimized by increasing the confidence level and power
➤ Is of two types

1. **Type 1 (α)**
   • Probability of Rejecting null hypothesis when it is true (usually 5%)
   • There was actually no association but we wrongly made an association
   • $1 - \alpha$ is called confidence level (probability of not rejecting the true Ho)

2. **Type 2 (β)**
   • Probability of failing to reject null hypothesis when it is false (usually 10-20%)
   • There was actually an association but we did not pick it
   • $1 - \beta$ is called **POWER** (probability of rejecting the Ho when it is false i.e. ability of detecting the difference when it is actually there)
• THANKS