

# Research process

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# Learning objectives

- *To Describe the components of research process.*
- *To Review basic concept & characteristics of each step.*

# ***STEPS OF RESEARCH PROCESS***

## ***1. Define and formulate a research problem.***

- I– Reviewing about problem zone ...
- II– Formulating a “research problem or Question”
- III– Setting the objectives ....
- III– Identifying variables ....

## ***2. planning a research study by:***

- I– Conceptualizing a research design
- II– Constructing an instrument for data collection
- III– Selecting a sample
- IV– Writing a research proposal

# ***STEPS OF RESEARCH PROCESS***

## ***3. Conducting a research study***

- I– Collecting data
- II– processing and displaying data
- III– Writing a research

Define and formulate a research problem.

- *Narrowing down the research topics,*
- *R Zone ...formulating R (problem, Question, hypothesis) ... objectives ... Variables...*
- *RQ pinpoints exactly what you want to answer in your work*

# Points need to be considered for the selected research problem (RQ):

- *Current and existing problem, needs solution*
- *Affecting a wide target population ..*
- *Effects on the health service programs*
- *A problem concerns the planners, policy makers and the communities at large.*

# Criteria for a “good RQ”

- *Feasible ...???*
- *Interesting, For whom ..??*
- *Novel .. ??*
  - *Is it necessary “not been done before??*
  - *“Re”search ...*
- *Ethical ....*
- *Relevant .*

✓ *Collectively called the*

✓ *F.I.N.E.R*

## *Importance of RQ?*

- ❖ To find similar studies ....
- ❖ Is the foundation for the; Research Topic, research objectives, methodology, work plan, etc.....



# Objectives

- The General statement (Aim)
- Specific “objectives”.. **Main characteristics:**
  - More specific, related to the research problem
  - Indicate the variable to be examined..
  - Realistic, Meet the purpose of the study ...
  - Measurable statements.

**Examples of action verbs** : - to determine –to assess - to compare - to verify - to calculate - to describe - to find out - to establish.

**Avoid the non-action verbs**; - to appreciate - to understand - to study - to believe..

- Avoid stating too many study objectives “forgotten”.. Or.. (should not exceed three).

# Objectives

## *Example:*

“to assess missed opportunities for EPI in Baghdad”??.

the specific objectives could be:

- To find out the magnitude of missed opportunities for children who attend PHCs. in Baghdad,
- To examine the reasons for children not being immunized while attending the PHCs.

e.g: To examine whether the increase in the frequency of face washing is followed by a reduction in trachoma prevalence .. Set your objectives....

*The formulation of objectives will help us to:*

- **Organize our research work.**
- **Focus the study (narrowing it down to essentials)**
- **Avoid collection of unnecessary data ...**
- **Defining and selecting suitable design, results and ...**

# Identifying Variables?

*A variable* is a property that can be manipulated OR measured in a study or experiment.

- The ***Independent variable***: is what the researcher is changing in the study. It is the variable that is being ***manipulated***. (Exposure)
- The ***Dependent variable***: is what is being ***measured*** in the study. (Effect)

***The independent variable is responsible for changing the dependent variable.***

- Smoking is (independent variable), cancer is the (dependent variable) and all the variables that might affect this relationship, are “***Extraneous variables***”
- “***Chance or random variables***”?? Changes in the dependent variable, because of the respondent’s state of mood or ambiguity in the research instrument, are called random variables or chance variables. The error thus introduced is called the chance or random error.

Hence in any causal relationship, changes in the dependent variable may be attributed to three types of variable:

- Changes in independent variable.
- Changes in extraneous variable.
- Changes in chance or random variable.

*How do we minimize the effect attributable to extraneous and chance variables?*

In most situations we cannot; however, it can be quantified.

*HOW?*

- *It is important that you select a study design that helps you to isolate, eliminate or quantify the effects of different sets of variable influencing the dependent variable, other than independent variable.*

## The Research Design (RD)

- A research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems, validly, objectively, accurately and economically.

the most important requirements of a research design is to

- Name the study design per se
- Provide detailed information about the following aspects of the study:
  - ✓ *The constituent of study population? How will be identified? How will it be contacted?*
  - ✓ *How will consent be sought?*
  - ✓ *What method of data collection, Tool, Why, Where, How?*
  - ✓ *How will ethical issues be considered?*



We select the study design according to:

- ▣ Nature of the research question
- ▣ Objective(s) of the study
- ▣ Our resources
- ▣ Your knowledge about the Types of study design

# The main types are divided as:

## Epidemiological studies:

### I. Descriptive studies:

1. Case report
2. case series
3. Ecological
4. **Cross sectional**
6. Biometry
7. hospital records

### II. Analytic studies:

- A- Observational
- B- Interventional

#### A. Observational

- Case control
- Cohort

#### B. Interventional :

- Randomized Clinical Trial (RCT)
- Community trials
- Field trial.
- Lab trial

# Descriptive studies

- ▣ Hypothesis formulation studies.
- ▣ DESCRIBE the occurrence of disease in terms of: *person-place-time*, or *agent-host-environment* .....

## TYPES

- ▣ Case Report
- ▣ Case Series
- ▣ Ecological studies
- ▣ **Cross-sectional ??**
- ▣ Biometry
- ▣ Hospital-records Study
- ▣ Systematic review
- ▣ Meta-analysis

# Case report

- ▣ Describes unusual clinical observations, interesting or novel variation of a disease.

## Advantages:

- simple, quick & easy.
- Calls attention to a novel observation.

Disadvantages: cannot be generalized (single case represent itself).

## Case Series:

Refers to a group of similar cases, to recognize well a clinical pattern and characteristics of specific disease.

### Advantages:

- simple, quick & easy.
- Better recognition of any disease, case definition of new one.

### Disadvantages:

- non-generalizable inferences (small sample size).
- Estimation of risk cannot be done (no comparison).

e.g. Recognition of AIDS began with case reports and case series':

- *Pneumocystis carinii* pneumonia (PCP).
- Kaposi's Sarcoma among white young Americans.
- all of the patients were .....
- The case series led to an **initial AIDS case definition** for the purposes of identifying additional cases.

# Ecological studies..Correlation study

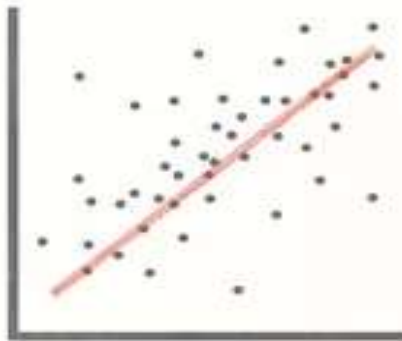
- e.g. there were cigarette consumption rate of 1500 per capita /year in a city in 1999 (lung cancer rate 10/100,000) which raised to 3500 in 2020 (LCR: 40/100,000).

- This type of studies depends on the correlation between factor and disease occurrence, either (+) ve or (-) ve or no correlation.

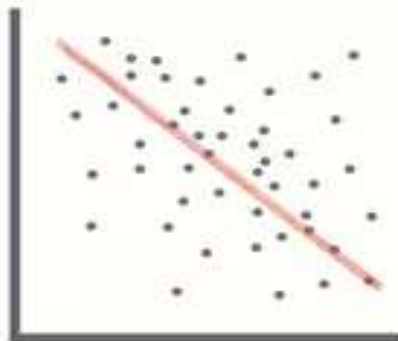
Does this mean that every person in the city was a smoker?

# CORRELATION RELATIONSHIPS

## Correlation Coefficient



**Positive Correlation**



**Negative Correlation**



**No Correlation**



# Ecological studies

- These are studies where exposure data relating to a place (hardness of water) are correlated with health data collected but summarised by place (CHD rates).

## Disadvantages:

- Require additional caution in their interpretation.
- Ecological fallacy.
- Confounding (uncontrolled)

## Advantages:

- (formulate hypothesis).
- simple & quick

# Cross-sectional study

## **PURPOSES:**

- To examine the health problem frequency (prevalence).
- To examine the exposure and health problem at the same time.
- Who are affected ?, and how they behave ?
- KAP of people about any health-related problem.
- Attempts to assess relationship between exposure and effect (comparative cross-sectional studies or analytic ...).