Types of Research & Epidemiological Methods

Dr. Tauseef Ismail

Associate Professor

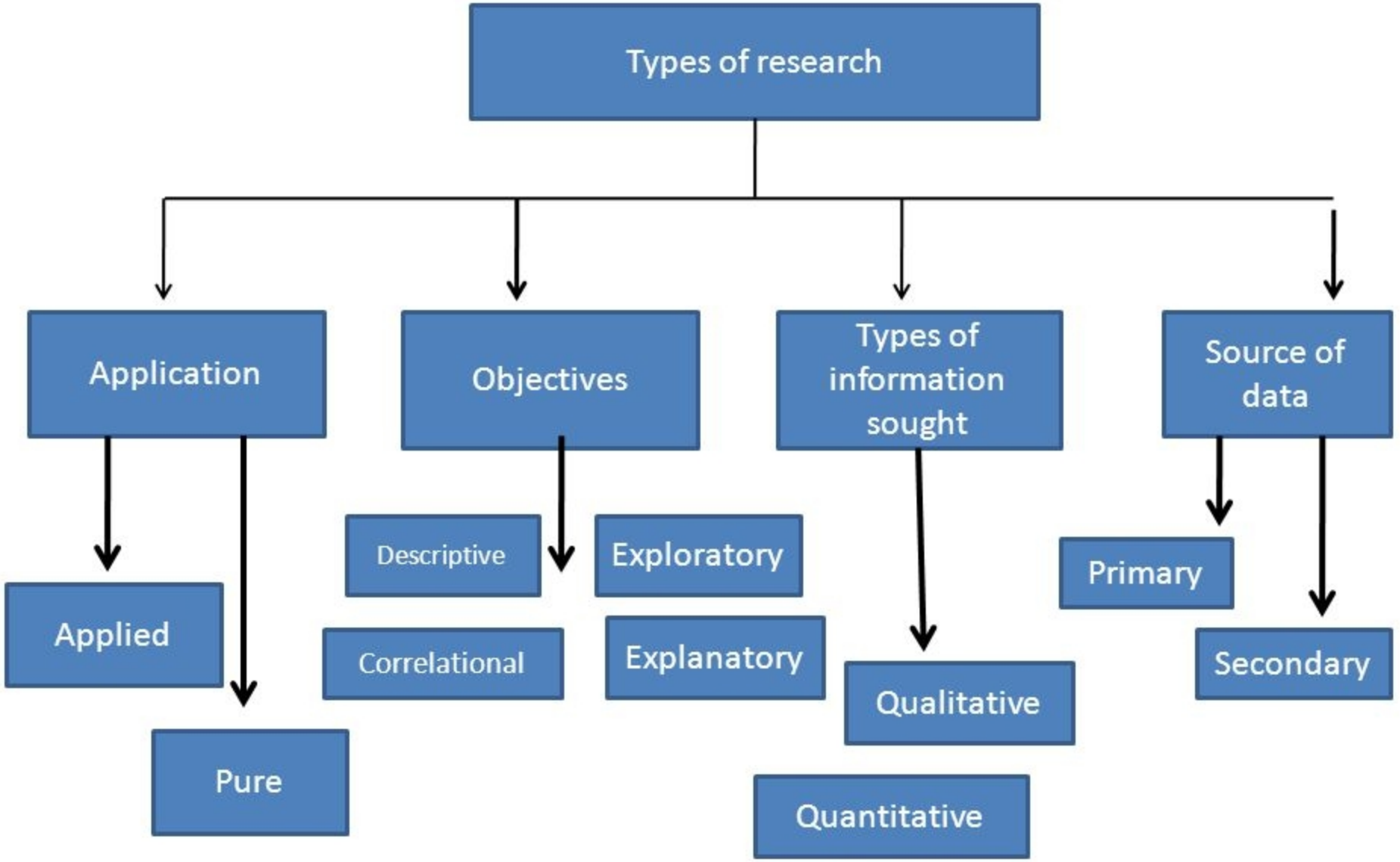
Dept of Public Health, KGMC

Learning objectives:
At the end of this lesson, students should be able to:

- Define Epidemiology
- Identify the different types of research.
- Outline Epidemiological study designs.

The systematic, rigorous investigation of a situation or problem in order to generate new knowledge or validate existing knowledge.

Research


Types of research
Application
Objectives
Types of information sought
Source of data
Applied
Pure
Descriptive
Exploratory
Correlational
Explanatory
Qualitative
Quantitative
Primary
Secondary

Sources of Data

Primary sources

- This kind of data is new and information is directly obtained by the researcher.

Secondary sources

- Researchers do not produce the data personally but obtain it as a second hand report or record and then reuse it in their own research study.

Activity: List all the possible sources of information for both primary & secondary research.

- Primary: questionnaires, interviews, scientific experiment, formal and informal observations etc.
- Secondary: internet, journals, media, books, data from health dept. e.g. disease control programs etc.

Types of Information sought:

Quantitative Research: this type of research always involves measuring in some way e.g. “how many”, “how often”, “what %age or proportion”. Statistical tests are then carried out on the data.

Qualitative Research: deals with phenomenon that are difficult or impossible to quantify mathematically, such as beliefs, meanings, attributes and behaviours.

Based on Objectives

- Exploratory research: is conducted for a problem that has not been clearly defined.
- Explanatory research: Its primary purpose is to explain why events occur; to build, elaborate, extend or test theory.
- Descriptive research: also known as statistical research; provides an accurate portrayal of characteristics of a particular individual, situation or group.
- Correlational research: refers to the systematic investigation or statistical study of relationships among two or more variables

Application

- **Basic or Pure research:** is driven by a scientist's curiosity or interest in a scientific question. The main motivation is to expand man's knowledge, not to create or invent something. There is no obvious commercial value to the discoveries that result from pure research.

For example;

- How did the universe begin?
- How do slime molds reproduce?
- What are protons, neutrons and electrons composed of?

Applied research: Seeks to solve practical problems. It is used to find solutions to everyday problems, cure illness, and develop innovative technologies, rather than acquiring knowledge for knowledge's sake.

For example, researchers may investigate ways to:

- Improve agricultural crop production
- Treat or cure a specific disease

Which of the following statements describes the initial research into a hypothetical or theoretical idea?

A. Exploratory research
B. Descriptive research
C. Analytical research
D. Explanatory research
E. Historical Research

Key: A

If the researcher is interested in finding out the person, place and time characteristics of the sample, then the study is:

A. Exploratory
B. Empirical
C. Applied
D. Descriptive
E. Correlational

key: D

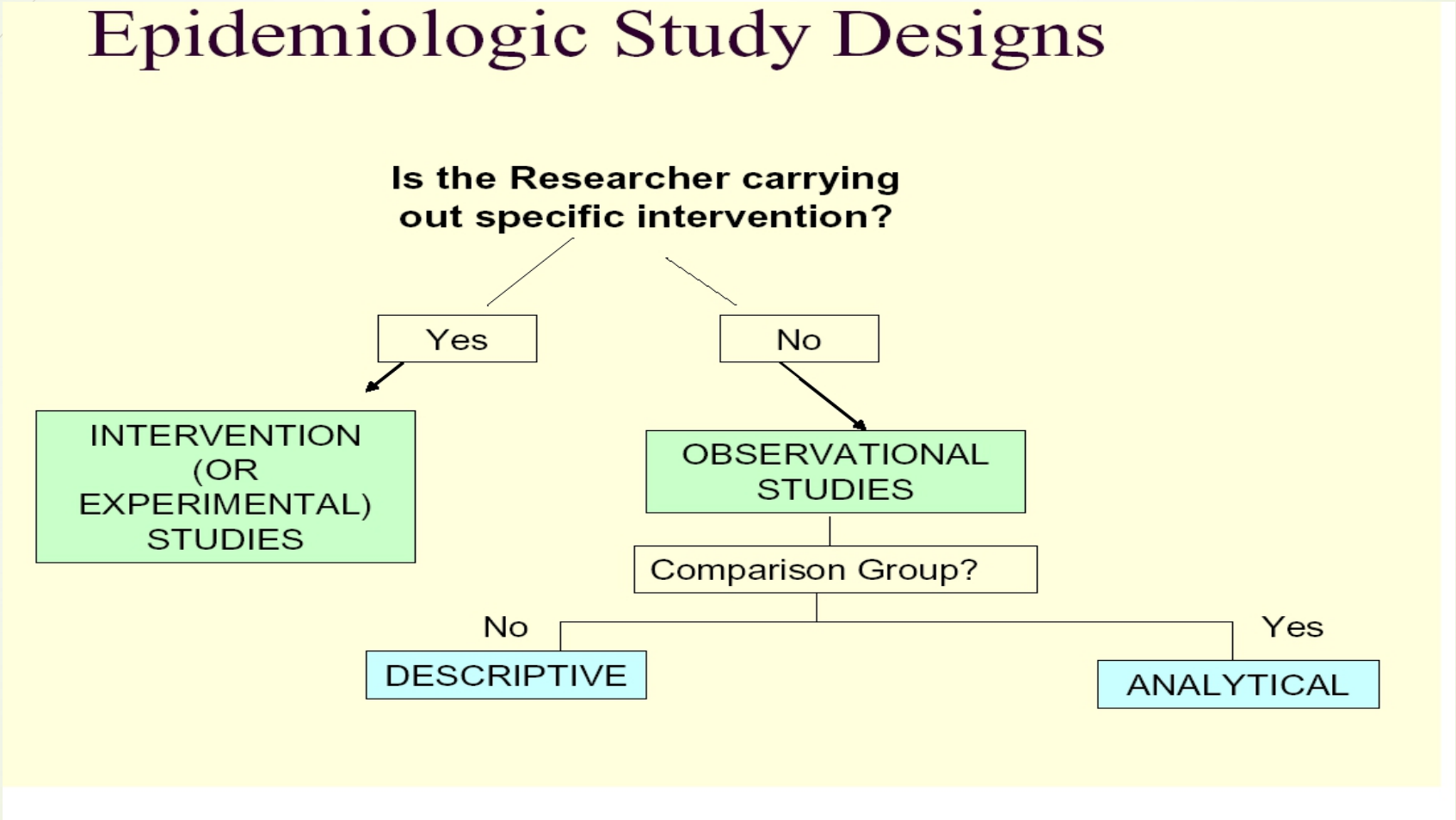
A systematic step-by-step procedure following a logical process of reasoning is called:

A. Experiment
B. Observation
C. Deduction
D. Scientific method
E. Analysis

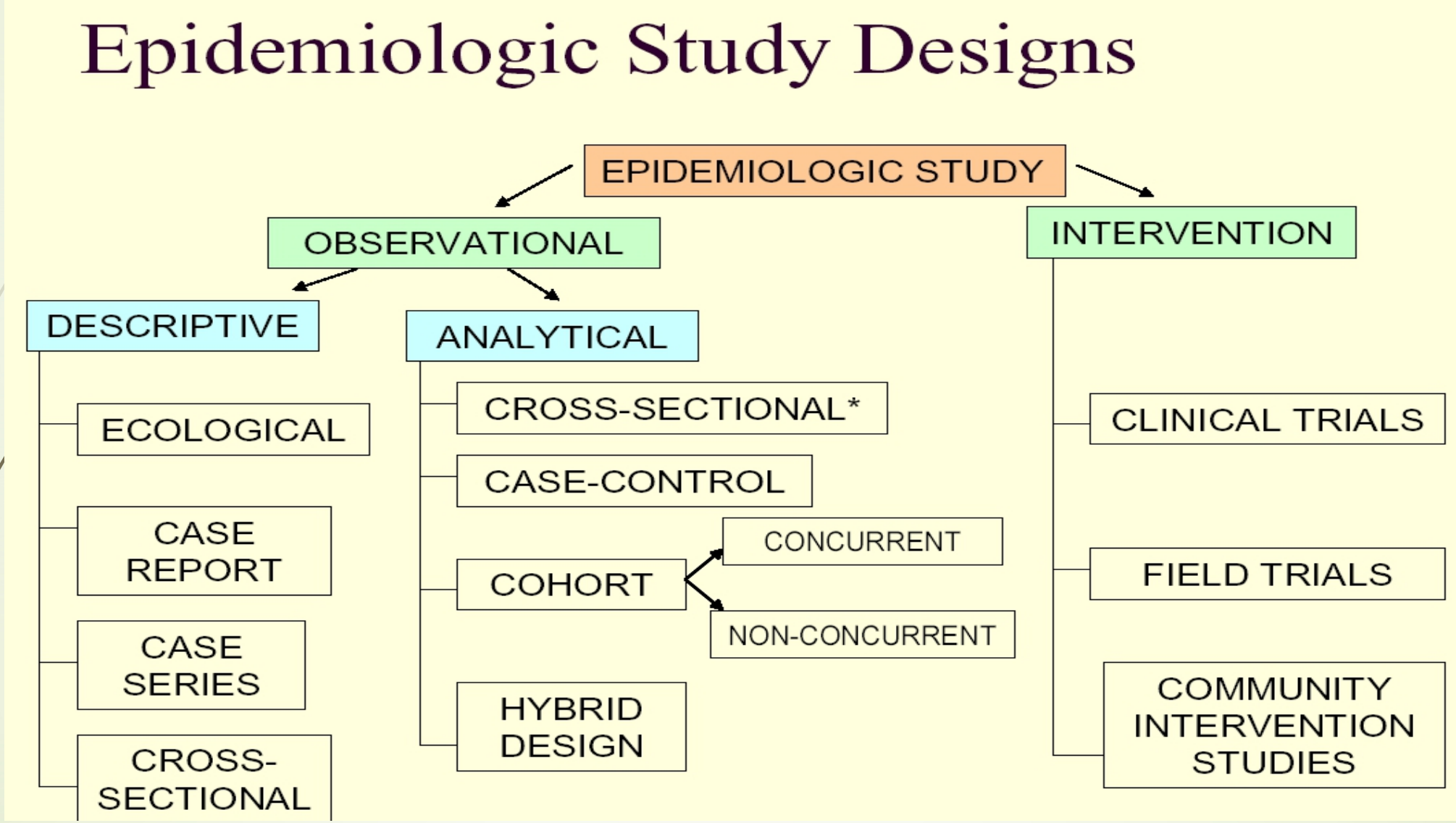
Key: D

Epidemiology is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems.

CLASSIFICATION



CLASSIFICATION(CONT.)



OBSERVATIONAL STUDIES
Allow nature to take its course; the investigator measures but does not intervene

- Descriptive study: focuses on the description of the occurrence of a disease or health related event in a population

- Analytical study: analyses relationships between health status and other variables. Search for causes and effects, or the why and the how.

Experimental Studies

- Experimental Studies involve some action, intervention or manipulation such as deliberate application or withdrawal of the suspected cause or changing one variable in the causative chain in the experimental group while making no change in the control group & observing & comparing the outcome of the experiment in both the groups.

- In *observational* studies, the researcher observes and systematically collects information, but does not try to change the people (or animals, or reagents) being observed.

- In an *experiment*, by contrast, the researcher intervenes to change something (e.g., gives some patients a drug) and then observes what happens.

Examples of observational studies:

- A survey of smoking habits or cell phone usage among students;

- A researcher who joins a biker gang to study their lifestyle

- Taking blood samples to measure blood alcohol levels during Monday morning lectures

Examples of experiments:

- plying a law student with beer to see whether lawyers argue better when drunk;

- Prophylaxis with drugs in preventing disease (i.e., penicillin to prevent rheumatic fever)

When do you do an observational study?

- When you merely want to collect descriptive information: *"Is the incidence of diabetes rising?"*
- When you want to report on the causes of a problem without disturbing the natural setting *"I want to find out why students do not attend lectures"*
- When you can't do an experiment: *"How fast does the earth move around the sun?"*
- When it's not acceptable to do an experiment: *"How much does not wearing a condom increase the likelihood of HIV infection?"*

References

- https://www.slideshare.net/vaisalik/types-of-research
- https://www.who.int/topics/epidemiology/en/
- Gordis L. *Epidemiology*. 5th Edition. Canada: Elsevier Saunders; 2014.
- https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/section7.html