**Data Collection & Experimental Design**

The aim of each statistical study is to collect data and then use the data for making a decision.   
The efficiency of the statistical results depends on the efficiency of the process through which the data was collected.

A statistical study can usually be categorized as an observational study or an experiment.

* **observational study:** research processes where individuals or organizations examine something without manipulating it.

Example: 1) studying the behavior of Animals in their natural environment.

2) Natural disasters such as tornadoes, hurricanes or tsunamis.

3) Humans using technology

* **Experiment :** a researcher deliberately applies a treatment before observing the responses.

The studied sample is divided into two groups The control group, which is not subject to any experiments. The treatment group is the subject of the experiment. The researcher compares the results between the two groups to decide if there was any effect of the experiment that he carried out.

Example: A simple example of an experimental study is a clinical trial, where research participants are placed into control and treatment groups in order to determine the degree to which an intervention in the treatment group is effective.

**two methods of data collection.**

* **Simulation:** is the use of a mathematical or physical model to reproduce the conditions of a situation or process.

Example: automobile manufacturers use simulations with dummies to study the effects of crashes on humans.

* **Survey:** the collection of information from a sample of individuals through their responses to questions.

Example: A study of the US residents' approval rating of the president.

**EXPERIMENTAL DESIGN:**

Because experimental results can be ruined by a variety of factors, being able to control these influential factors is important.

* **Control**
* **Randomization**
* **replication.**
* *Control:* A confounding variable occurs When the experimenter cannot distinguish between influences and factors on a variable.

Example: A coffee shop owner wanted to change the design of the coffee shop, and at the same time a shop was opened next to her, so sales increased, and she could not determine whether the reason was the change of design or the opening of the shop.

placebo effect occurs when a subject reacts favorably to a placebo when in fact the subject has been given a fake treatment

**Blinding** is a technique where the subjects do not know whether they are receiving a treatment or a placebo

**double-blind** experiment, neither the experimenter nor the subjects know if the subjects are receiving a treatment or a placebo