



KING SAUD UNIVERSITY
COLLAGE OF NURSING
NURSING ADMINISTRATION & EDUCATION DEPT.

.....

NURSING RESEARCH

(NUR 412)

MODULE 6

Sampling Plan

Course Coordinator

Dr. Hanan A. Alkorashy

halkorashy@ksu.edu.sa

1437 – 1438

Module 6

Sampling Process

.....

Sampling is an important step in the research process for quantitative studies. The quantitative researchers have different approaches to sampling. They select samples that allow them to generalize their results by developing an appropriate plan before data collection begins.

Learning Outcomes:

1. Define Population and Sample
2. Distinguish Between Target and Accessible Population
3. Discuss Probability and Nonprobability Sampling Procedures
4. Compare Four Methods of Probability Sampling
5. Define Population and Sample
6. Distinguish Between Target and Accessible Population
7. Discuss Probability and Nonprobability Sampling Procedures
8. Compare Four Methods of Probability Sampling
9. Define Population and Sample
10. Distinguish Between Target and Accessible Population
11. Discuss Probability and Nonprobability Sampling Procedures
12. Compare Four Methods of Probability Sampling

Basic sampling concepts:

- **Population:** is the entire group of people (or any other elements) possess a specific attribute that a researcher is interested to study.

There are **two** types of population:

- *Target population:* It is the population under study to which the researcher wants to generalize the research findings.

- *Accessible population:* It is the part of the target population that is available to the researcher.
- *Element:* Is the single member of the population under study. It is also called subjects, respondents, or participants.
- *Sampling:* It is the process of selecting a portion of the population to obtain data regarding a research problem.
- *Sample:* A portion of the population that has been selected to represent the population of interest, and from which data will be collected.
- *Sampling frame:* It is a comprehensive list of all the sampling elements in the accessible population. The samples drawn from the sampling frame.
- *Representativeness:* It is how well the sample represents the variables of interest in the target population, as well as other demographic characteristics.
 - The sample should replicate the population in approximately the same proportions as it occurs in the target or accessible population. This is achieved by *randomization*.
- *Sampling bias:* It occurs when the researcher shows a preference in selecting one participant over another. This bias increased when random selection is not used.
- *Inclusion criteria:* The characteristics that each sample element must possess in order to be included in the sample.
- *Exclusion criteria:* The characteristics that an element may possess and could confound or contaminate the results of the study. Such elements should not be included in the sample.

- **Sampling plan:** It is a description of the strategies that will be used to obtain the sample of the study.
 - It should include the sample size, type, as well as inclusion and exclusion criteria.
 - Also, the plan should be written in details for the purpose of:
 - ⇒ Replication.
 - ⇒ Interpretation.
 - ⇒ Critique. نقد

Sampling Methods:

Generally, the elements of the study in which the sample revealed in are:

1. The problem statement.
2. Hypothesis.
3. Variables' operational definitions.
4. Research design.

There are **two** main types of sampling techniques:

- a. Probability Sampling.
- b. Non-probability Sampling.

I. Probability (random) Sampling:

▪ **Definition:**

- It is a sampling technique in which each element or member in the accessible population has an equal chance to be selected and included in the sample.
- To obtain a probability sample, the researcher has to identify every one (element) in the accessible population. That is to develop a sampling frame.

- ***Types of probability sampling:***

- 1. Simple random sampling:***

- This is the most basic probability sampling method.
- To achieve a simple random sampling:
 1. Elements of the accessible population are first identified.
 2. The elements are randomly selected from the sampling frame. This could be achieved through a variety of ways:
 - If the sampling frame is short, names are written on slips of papers, placed in a container, mixed well, and then elements are drawn one at a time until the desired sample size is reached.
 - Assigning a number to each name in the sampling frame. Numbers then are selected randomly to obtain a sample.
 - By a computer.
 - Using a table of random sampling.

- ***Advantages:***

1. It eliminates the researcher's bias.
2. It requires limited information about the population.

- ***Disadvantages:***

- A complete list of accessible population is needed, which is impossible in many situations.
- It does not guarantee high representation level with very high population size.

2. Stratified random sampling:

- This method is used when the researcher knows some of the characteristics of the population (variables) that are critical in achieving Representativeness.
- Here, the researcher divides the accessible population according to mutually exclusive variables.
- Mutually exclusive means that each sample element belongs to only one group or stratum.
- Then, select a sub-sample from each group or stratum randomly.
- Proportional stratified random sampling: is a method that increases Representativeness of variables in the sample. In this method, the number of elements taken from each stratum is proportional to the number of elements in the accessible population.
- For example, an accessible population of 10,000 elements, of which:
 - 7,000 are men (i.e.,70%)
 - 3,000 are women (i.e.,30%)A proportional stratified random sample, here, that include 1000 elements will include:
 - 700 men (i.e., 70%).
 - 300 women (i.e., 30%).

- ***Advantages:***

1. It ensures the representation of each sub-group in the accessible population.

- ***Disadvantages:***

1. It requires information about the population in order to stratify it accurately.
2. A complete list of accessible population is required.

3. Cluster sampling or Multi-stage random sampling:

- Here, the population to be studied is too large and/or geographically scattered over a grand space. Therefore, it is difficult and/or impossible to obtain a sampling frame for randomization.
- For example, if a study will be conducted about all hospital workers in K.S.A. For a random sample here, only the multi-stage/cluster random sampling is appropriate.

HOW?

1. Identify the population to be studied. (All hospital workers in K.S.A.).
2. Divide the kingdom to regions (i.e. sampling frames) to include: east, west, north, south and middle
3. By simple random sampling, select two regions; let us say east and middle.
4. Divide each region to cities, villages...etc. to be sampling frames.
5. By simple random sampling choose 2 cities from east, and 2 cities from middle, (i.e., select a total of 4 cities).
6. Divide the hospitals in each of the 4 cities to mutually exclusive groups:
 - Ministry of health (MOH).
 - University.
 - Military.
 - Private
7. By simple random sampling, choose one hospital from each strata in each of the 4 cities.

8. Divide hospital workers in each of the previously selected 16 hospitals to mutually exclusive groups:

- Doctors.
- Nurses.
- Pharmacists.
- Dietitians.
- Lab. Technicians.....etc.

For each group a sampling frame will be developed.

9. By simple random sampling, select a sample from each of the above mentioned groups of hospital workers in each of the 16 hospitals. This will constitute the study sample.

▪ ***Advantages:***

1. Economical.
2. Time saving.
3. No need for a sampling frame for the whole population.

▪ ***Disadvantages:***

1. Increased sampling error by several stages.

4. Systemic random sampling:

▪ Like both simple and stratified random sampling, this method requires an ordered list of all members of the accessible population, i.e.; sampling frame.

▪ It depends on the use of the equation: $K = N \div n$

Where K = Sampling interval used in the sample selection.

N = Number of the accessible population.

n = Sample size.

▪ For example,:

- A sampling frame of 500 members, which is the accessible population, If we need a sample of 50 members: $K = 500 \div 50 = 10$
- Not a probability sample unless the starting point is randomly selected
- Thus, the starting element will be randomly selected from 1 to 10.
- The researcher, then, systematically includes or selects every 10th element in the list (sampling frame).

▪ ***Advantages:***

1. Fast.
2. Easy.
3. Inexpensive, i.e.; economic.
4. Fewer tendencies for errors.

▪ ***Disadvantages:***

1. Unless the elements on the sampling frame are randomized, it will not be a probability sampling.
2. If the elements in the sampling frame are listed in some order, bias may occur.

II. Non-probability Sampling:

- Here, the random selection is not used, so each element or participant in the accessible population does not have equal chance to be included in the sample.
- Accordingly, the sample may not be representative of the population, and the study results therefore cannot be generalized to the general population.
- However, this sampling technique is less expensive and less complicated.

- This type of sampling is usually used in nursing researches because it is often not feasible (economically, timely...etc.) to collect a random sample from the population under the study.

Types of Non-probability sampling:

1. Convenience sampling:

- This technique uses participants who are easily accessible to the researcher and who meet the criteria for inclusion.
- Thus, subjects/elements are included in the study just because they are available at a certain time in certain place.
- For example:
 - "Patients who attend the clinic on a specific day".
 - "Every fifth patient who enters the clinic on a certain day".
- Snowball or network sampling: is a type of convenience sampling. It is useful when the criteria for inclusion are difficult to find by ordinary ways, so, the researcher networks with a small number of accessible elements and uses them to assist in identifying other elements with those specific criteria.
- ***Advantages:***
 - No need for a sampling frame.
 - Easy, accessible.
 - Inexpensive.
 - Requires less time.
 - Provides means to conduct studies on topics that could not be studied by using a probability sampling.
 - Provides means to acquire information in unexplored areas.

- ***Disadvantages:***

- Sample does not represent the population; therefore, results cannot be generalized.
- The sample may be biased.

2. Quota Sampling:

- This method is similar to the stratified random sampling in that the participants are divided into strata based on specified characteristics to provide Representativeness of different groups within the accessible population.
- Yet, this differs from stratified random sampling in that the elements are not randomly selected from each group/strata.
- The researcher first determines which strata are to be studied. A stratum can be age group, sex, educational level, diagnosis....etc.
- Then, he calculates/computes the quota (or number) of participants needed for each strata. This quota can be computed proportionally to the population.
- Members then are selected from each quota conveniently and not randomly.

3. Purposive sampling or Judgmental sampling:

- Here, the researcher (based on his knowledge and/or experience) selects the elements of the study sample.
- According to the researcher, the chosen elements are thought to best represent the phenomenon being studied.
- This sampling technique is usually used in qualitative researches.

▪ ***Advantages:***

- It allows the researcher to handpick, so it is easy, simple, and may be time saving.

▪ ***Disadvantages:***

- Sample bias is very probable.
- Lack of population representation is also probable.
- The generalizability of the research findings is very limited.

Sampling Plan (or procedures):

It includes 8 main steps that should be conducted in a sequential order as follow:

1. Identify the target population.

- From:
- a. research problem.
 - b. Literature review.
 - c. Purpose of the study.
 - d. Research proposal whether a question or hypothesis.

2. Determine the accessible population:

- Here, feasibility is questioned; where availability and accessibility of subjects are considered.
- Also, time, money, equipment and material, location, and willingness to cooperate are considered.

3. Detailing the inclusion and exclusion criteria:

- ***Inclusion criteria:*** are the characteristics that each member in the accessible population must possess in order to be included in the study sample.

- **Exclusion criteria:** are characteristics that a participant may possess and could confound or contaminate the result of the study, thus, he may not be included in the sample.

4. *Preparing a sampling frame:*

- A list of accessible population or units or groups ...etc.

5. *Choosing the sampling technique:*

- Whether a random or probability sampling. Also, type of sampling technique to be used.

6. *Determining the sample size:*

- The size of the sample for any study depends on several factors:

a. Purpose of the study: - Describe an attitude → Large.

- ✓ Survey → Large.
- ✓ Quantitative → Large.
- ✓ Experimental → Small.
- ✓ Qualitative → Small.

b. Nature of the population: - Homogenous → Small.

- Heterogeneous → Large.

c. Number of variables: As the number of variables in the study increases, the needed sample size may increase, and vice versa.

d. Measurement tool sensitivity: well developed instruments measure phenomena with precision like B.P. apparatus or a thermometer. While tools measuring variables as anxiety, satisfaction tend to be less precise and needs larger sample size.

e. Response and attrition rates:

- ✓ **Response rate:** is the ratio of completed instruments as compared to the number of instruments sent out in questionnaires for example.
- ✓ **Attrition:** is a reduction in the sample size caused by the failure of participants to complete the study after sample selection and recruitment.
- ✓ Therefore, the sample size should go larger with increased attrition rate and decreased response rate (if expected).

f. Sampling procedure:

- ✓ Probability procedures require a smaller sample.
- ✓ Both stratified and multi-stage sampling require large sample.

g. Statistical tests: The type of statistical tests that are chosen for data analysis may also influence/specify the sample size.

7. Recruiting subjects:

- The initial approach to a potential sample member usually strongly affects his/her decision about participation in the study.
- Therefore, the approach needs to be both pleasant and positive.

8. Retaining subjects:

- Subjects' loss cannot be avoided in most cases; however, the researcher could minimize subjects' loss through:
 - a. Obtaining each subject's name, address, and phone number (after their consent).

- b. A bonus payment or gift may be bestowed after completion of each phase of the study.
- c. Greeting cards on occasions may help in maintaining contact with them.

Evaluation of the sample plan:

This is done through answering the following questions:

1. Are the target, accessible population and sample described?
2. Are the inclusion and exclusion criteria included?
3. Is the type of the sample technique mentioned and described?
4. Is the sample size mentioned and rationalized?

.....