UNIT-1 MEANING, DEFINITION AND CHARACTERISTICS OF HYPOTHESIS

Structure

1.1   INTRODUCTION

In social research, each researcher is to start with certain assumptions and presumptions, which the researcher's study might subsequently prove and disprove. In fact, it is the hypothesis that the researcher's research revolves around and for which data is gathered. Of course, there are obstacles in formulating a hypothesis, and a hypothesis can be derived from a variety of sources. However, in social research, it serves a specific purpose. It is very useful. It is also very significant. There is always a line of confusion among readers relating to the fundamental meaning of proposition, theory and hypothesis. It is, therefore, very essential to make a fundamental conceptual clarification with regards to these three. Thus, before describing the conceptual understanding of hypothesis, it is important to understand the difference between proposition, theory and hypothesis. A proposition basically refers to a statement about the relationships among concepts or variables. In fact, it is a generalized statement of a relationship among facts or about one or more facts or phenomena. A theory is set of assumptions. It's a set of internal propositions that explain how certain observed occurrences appear to be related. A hypothesis is a proposition that can be tested empirically. It is, in reality, a testable hypothesis that predicts a particular relationship between two or more variables. In the words of Ram Ahuja, "a hypothesis is an assumption about relations between variables. It is a tentative explanation of the research problem or a guess about the research outcome". Hypothesis basically provides guidance to the researcher. It can be argued that while in qualitative research, hypotheses emerge out of the research, in quantitative research, hypothesis acts as a step towards research.

With this introduction, this unit broadly deals with the conceptual understanding of hypothesis. While doing so, this unit describes the meaning, definition and characteristics of hypothesis.

1.2   LEARNING OBJECTIVES

The purpose of this unit is to provide you with an understanding of hypothesis with specific reference to its meaning, definition and characteristics. It also provides some of the qualities of a good hypothesis. The chapter also mentions about the significance as well as importance of hypothesis. Thus, after reading this unit, the reader should be able to understand:

- meaning of hypothesis
- definition of hypothesis
- characteristics of hypothesis
- Qualities of a good hypothesis
- significance and importance of hypothesis

1.3   MEANING OF HYPOTHESIS

In most cases, hypothesis is regarded as an important element in research. It is broadly a tentative statement about the relationship between two or more variables. In fact, a research hypothesis is relatively often a predictive statement, which is capable of being tested using scientific methods that involve an independent and some dependent variables. It is a specific, testable prediction about what you expect to happen in a study. A hypothesis is a speculative assumption that is developed with the goal of proving or disproving its logical or empirical implications. Etymologically, hypothesis is made up of two terms, "hypo" and "thesis," which mean "less than or less certain than a thesis". It's a statement of a thesis or a plausible assumption based on evidence that the researcher is aiming to prove through his research. A hypothesis is a plausible explanation that will be investigated further. A hypothesis may appear to be contradictory to reality. It may or may not turn out to be correct. Hypotheses must be exact and explicit, and they must be able to be tested. It must have a limited scope, be consistent with known or established facts, and be testable within the time range indicated. It should explain what it purports to explain and back up its claims with evidence.

A researcher's hypotheses are purposefully constructed since it is difficult to begin study without a solid foundation. As a result, the researcher establishes logical connections between or among the research variables. The associations between these

variables serve as a basis for the research because they are related to the research issue. These logical relationships or testable assumptions point the researcher in the right path to begin working on the research project. For example, a researcher researching "Discrimination Against Women in a Rural Society" might develop the following hypotheses: (i) the higher the illiteracy in society, the higher the discrimination against women; (ii) the higher patriarchy in society, the higher the discrimination against women; and (iii) the higher traditional practices in a society, the higher the discrimination against women.

In most cases, the hypothesis is thought to be the most important tool in research. A research hypothesis is frequently a prognostic statement that can be tested using scientific methods involving an independent and dependent variable. Based on a conjecture statement, a hypothesis is a statement of the relationship between two or more variables (Kerlinger, 2002). A hypothesis can be defined as a testable statement about a possible link between two or more values (McGuigan, 1998). It is a question posed to nature to be observations, and it is a presumption that serves as a tentative explanation for a researcher (Calpine, 1975). Any statement, proposition, or assumption that serves as a tentative explanation of specific facts is referred to as a hypothesis (Rebar & Rebar, 2001).

1.4   DEFINITION OF HYPOTHESIS

There are various definitions for the term hypothesis. In fact, several scholars have defined hypothesis in different ways. Some important definitions of hypothesis have been mentioned below:

George A Lumberg has defined the hypothesis as "a tentative generalization, the validity of which remains to be tested. In its most elementary stage, the hypothesis may be a guess, imaginative ideas, which become the basis for action or investigation".

According to Goode and Halt, "the formulation of a deduction however constitutes a hypothesis. If verified it becomes a part of theoretical construction".

According to Theodorson and Theodorson, "a hypothesis is a tentative statement asserting a relationship between certain facts".

According to Webster, "a hypothesis is a proposition, condition or principle which is assumed, perhaps without belief, in order to draw out its logical consequences and by this method to test its accord with facts which are known or may be determined".

According to James E. Greighton, hypothesis is a "tentative supposition or provisional guess which seems to explain the situation under observation".

According to John W. Best, "it is a shrewd guess or inference that is formulated and provisionally adopted to explain observed facts or conditions and to guide in further investigation".

George, J. Mouly defines that, "hypothesis is an assumption or proposition whose testability is to be tested on the basis of the computability of its implications with empirical evidence with previous knowledge".

According to Mcguigan (1990), hypothesis is "a testable statement of a potential relationship between two or more variables, i.e. advance as potential solution to the problem".

Kerlinger (1973) has defined the hypothesis as "a conjectural statement of the relation between two or more variables".

According to Kothari (1988), "hypothesis may be defined as a proposition or a set of propositions set forth as an explanation for the occurrence of some specified group of phenomena either asserted merely as a provisional conjecture to guide some investigation in the light of established facts".

As mentioned in above definitions, a hypothesis is a tentative answer or explanation, a guess or assumption, a proposal or a statement to the researcher's problem, based on a superficial observation of known and available data as a basis of investigation, whose validity needs to be checked or verified. The hypothesis must be written in such a way that it can be empirically tested in order to be valuable in any investigation. It is the researcher's responsibility to suggest or devise a method for testing the hypothesis against empirical facts. When a hypothesis is formulated, the investigator must decide whether the hypothesis is useful. A good research hypothesis must meet a number of criteria or qualities, which have been mentioned in the following sections. A good hypothesis is one that fits most of these criteria.

1.5 CHARACTERISTICS OF HYPOTHESIS

As previously stated, a hypothesis is a statement in a study that the study may prove or deny. A hypothesis aids a researcher in moving forward and identifying a solution to the problem he wants to investigate. Without hypothesis, it will be very difficult to

move ahead. It is only with clear hypothesis that one can properly know about the scope of the study, nature of data to be collected and the one to be discarded. Again the hypothesis helps in organizing data collected in a very systematic way. A hypothesis provides a tentative solution to the question of how and why. In a scientific enquiry no step further can be taken unless and until there are well established hypothesis. It must however, be clearly remembered and understood that there can be no readymade hypothesis, but in social science research there is no well developed theoretical system in many subjects and in many areas of study. Thus, in social science research hypothesis will first have to be developed and thereafter tested. More stress in social sciences is to be laid on formulating rather than testing of hypothesis. In social science research, hypothesis can be both beginning, joint as well as end result of research. Needless to mention that hypothesis occupy a very useful and important place in research. Without proper hypothesis much of the unimportant data might be collected and considerably useful data might be omitted. Thus, hypothesis, in some form or the other is not only essential but unavoidable. Taking into account the unavoidable character of hypothesis in social science research, the following are some of the most important characteristics of a hypothesis:

i.   It is purely conceptual. In a hypothesis, there are some conceptual elements in the framework that are involved.
ii. It is a definitive statement made verbally. It is an academic articulation of thoughts and concepts; it is not only an idea, but the notion is ready for empirical proof in its verbal form.
iii. The empirical referent is present. An empirical referent is included in a hypothesis. It denotes a shaky connection between two or more variables.
iv. It contains a reference to the future. A hypothesis is focused on the future. It has to do with future verification rather than past facts and data.
v.   It is the centre of a scientific investigation. All of the scientific endeavours are geared at confirming it.

1.6   QUALITIES OF A GOOD HYPOTHESIS

The following are the main qualities of a good hypothesis:

(a) A hypothesis must be able to be tested. Many times, research programmes have become bogged down in a swamp of untestable hypotheses. The researcher may conduct some preliminary research in order to make the idea testable. A hypothesis is testable if it can lead to additional deductions, which may then be validated or refuted by observation. A good hypothesis is one that agrees with the facts.

(b) A good hypothesis is one that does not contradict any recognized natural law.

(c) The hypothesis should be explicit and clear. If the hypothesis isn't clear and exact, the conclusions formed from it can't be trusted. A good hypothesis is stated in the most straightforward manner feasible.

(d) A sound hypothesis allows for deductive reasoning to be used.

(e) The verbalization of a good hypothesis is quite obvious. It differs from what is commonly referred to as a hunch. The hypothesis should be stated in a basic manner as far possible so that everyone involved can understand it. However, it is important to realize that the simplicity of a hypothesis has nothing to do with its importance.

(f) A good hypothesis ensures that the investigator has control over the verification procedures.

(g) A sound hypothesis ensures that available tools and procedures will be put to good use in the verification process.

(h) Hypotheses should be specific and limited in scope. A researcher must keep in mind that narrower hypotheses are more testable, and the researcher should develop them. A good hypothesis takes into account the many sorts of controls that will be used to verify the hypothesis.

(i) A good hypothesis ensures that the sample can be approached quickly. If the hypothesis is a relational hypothesis, it should state the relationship between the variables.

(j) A good hypothesis clarifies the role of the many factors in the research.

(k) A good hypothesis makes a clear difference between what are known as theoretical laws, facts, assumptions, and postulates.

(l) Hypothesis must be consistent with the majority of known facts, i.e., with a large body of established facts.

(m) Hypothesis should be testable in a fair amount of time. Even the best hypothesis should not be used if it cannot be tested in a reasonable amount of time, because one cannot spend a lifetime collecting evidence to test it.

(n) Hypothesis must explain the facts that led to the demand for clarification. This means that by combining the hypothesis with other well-known and accepted generalisations, the original problem condition should be deduced. As a result,

a hypothesis must truly explain what it claims to explain, and it must be supported by empirical evidence.

1.7 SIGNIFICANCE AND IMPORTANCE OF HYPOTHESIS

Although hypotheses are an important aspect of research; they are not required in all sorts of studies. Hypotheses are not required in research that is based on fact gathering (historical or descriptive study). "When fact-finding alone is the aim of the study, a hypothesis is not required," Hillway adds. All important investigations should, whenever possible, include a hypothesis to explain observable facts, situations, or behaviour and to serve as a guide during the research process. Thus, some of the significant and important aspects of hypothesis have been mentioned below:

- Hypothesis facilitates in the expansion of knowledge in a particular field. They can examine and validated and provide tentative explanations for facts and occurrences. It makes the investigator more aware of particular features of the situations that are pertinent to the topic at hand.
- Hypotheses provide rational statements to the researcher, consisting of items articulated in a logical order of relationships, that attempt to describe or explain conditions or events that have yet to be validated by facts. The hypothesis allows the researcher to connect rationally known data to sophisticated guesses about unknown circumstances. It's a handbook for the thinking and discovering processes.
- The research is guided by the hypothesis. It establishes what is relevant and what is not. The hypothesis instructs the researcher on what he should accomplish and learn during his research. As a result, it prevents the examination of irrelevant material and serves as a foundation for selecting the sample and research procedure for the study.
- The statistical methodologies required in data analysis, as well as the link between the variables to be investigated, are referred to as hypotheses. It also aids in limiting the scope of his research so that it does not become too vast or burdensome.
- The hypothesis serves as the foundation for describing the study's findings. It acts as a foundation for drawing conclusions. To put it another way, it lays out the framework for reaching significant conclusions.

1.8   LET US SUM UP

A hypothesis is a tentative solution or educated assumption regarding a research subject under investigation. It's not just a guess; it's based on previous study, in which the researcher assembles data to support a postulated relationship between variables. As a result, it is a conjecture statement regarding a problem's solution that the researcher then verifies using relevant data. Various sources, such as experience, creativity, background information, scientific ideas, and so on, are significant factors that aid in the formulation of a hypothesis.

Following the formulation of the hypothesis, it is put to the test. Some theories are straightforward and may be tested immediately. However, in most cases, they are complex and cannot be thoroughly tested. They're put to the test in terms of the conclusions they've drawn. A good hypothesis is one that can be tested and expresses the predicted relationship among variables. It is stated simply and precisely. The expected link between the variables should be stated in a good hypothesis. It has a limited scope and should adhere to the most widely accepted facts.

As a result, the hypothesis serves as the study's central axis. The entire investigation will be out of focus without a well-formulated hypothesis, making it difficult to make suitable conclusions. In fact, hypothesis serves as a vital link between theory and investigation, resulting in the addition of new knowledge to the body of knowledge. The greatest advantage is that hypothesis not only guide in goals of research but help in concentrating on the important aspects of the research topic by avoiding less significant issues.

1.9   MODEL QUESTIONS

Some of the questions for practice have been mentioned in the following sections.

Long Answer Questions
- Define hypothesis. Explain features of hypothesis.
- What is hypothesis? Discuss features of a good hypothesis.
- Discuss the significance and importance of hypothesis in social research.

Short Answer Questions
- Meaning of hypothesis
- Define hypothesis.
- Characterize hypothesis.

- Qualities of good hypothesis.
- Importance of hypothesis.

1.10   SUGGESTED READINGS

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UNIT-2 TYPES OF AND SOURCE OF HYPOTHESIS

Structure

2.1   INTRODUCTION

A hypothesis is an assumption made after careful consideration of the facts. The translation of the research questions into a forecast is the initial step in every investigation. Variables, population, and their relationships are all included. A research hypothesis is a hypothesis that is evaluated to discover if there is a relationship between two or more variables. A hypothesis is a purely hypothetical assertion about the relationship between two or more variables. This can be used as a jumping off point for additional research into the idea using the scientific method. The variable in this case could be either an independent or a dependent variable. An independent variable exists independently of other variables and is unaffected by them. Other factors influence the dependent variable. An independent variable is the presumed cause of the dependent variable, the presumed effect. The independent

variable is one which explains or accounts for variations in the dependent variable. A dependent variable is one which changes in relationship to changes in another variable. It's a specific, testable hypothesis about what you think will happen in a study. A hypothesis can be designed to investigate a study entitled "sleep-deprived persons will do worse on a test than individuals who are not sleep-deprived". This, for example, might be the hypothesis for a study looking into the relationship between sleep deprivation and test performance.

The term hypothesis, in its most basic sense, refers to a preliminary assertion of a link between two or more facts. It's a hypothesis about the link between two or more variables. According to J.S. Mill, hypothesis refers to "any supposition which we make in order to endeavour to deduce conclusions in accordance with facts which are known to be real under the idea that if the conclusions to which the hypothesis leads are known truths, the hypothesis itself either must be or at least likely to be true". According to Barr and Scates, "a hypothesis is a statement temporarily accepted as true in the light of what is, at the time, known about a phenomenon, and it is employed as a basis for action in the search for new, truth, when the hypothesis is fully established, it may take the form of facts, principles and theories". According to John W Best, "it is a shrewd guess or inference that is formulated and provisionally adopted to explain observed facts or conditions and to guide in further investigation". As a result, a hypothesis can be thought of as a formal statement of the relationship between two or more variables.

2.2   LEARNING OBJECTIVES

The purpose of this unit is to provide you with an understanding of hypothesis with specific reference to its types and sources. It also provides some of the basic criteria of a good hypothesis. Thus, after reading this unit, the reader should be able to understand:

- Meaning of hypothesis
- Criteria of a good hypothesis
- Types of hypothesis
- Sources of hypothesis

2.3   CRITERIA OF A GOOD HYPOTHESIS

In social research, a hypothesis is used to explain a phenomenon or forecast a relationship among variables. A hypothesis must, in general, meet four evaluation criteria (Allen, 2017). First, an expected relationship between variables must be stated.

Second, it must be testable and falsifiable, which means that researchers must be able to determine whether a hypothesis is true/correct or false/incorrect. Third, it should be in accordance with existing stock of knowledge. Finally, it should be conveyed in the most straightforward and concise manner possible. The dominant criteria of good hypothesis are mentioned below:

i. **Hypothesis should be testable:** The formulated hypothesis should be testable. It is clear by the statement mentioned by McGuigan (1990), "If it is possible to determine that the hypothesis, stated as a proposition, is true or false, then the hypothesis is testable. If it is not possible to determine that the proposition is either true or false, then the hypothesis is not testable and should be discarded as worthless to the science".

ii. **Formulated Hypothesis should be in general harmony to the other hypotheses of the field:** The proposed hypothesis should be in general agreement with the other hypotheses in the field, but some of them may be contradictory. However, the contradicting hypothesis is not seen as a viable option.

iii. **Hypothesis should be parsimonious:** One of the most crucial requirements of a good hypothesis is that it saves time, labour, and money.

iv. **Hypothesis should have the trait of logical unity and comprehensiveness:** The hypotheses or hypotheses that are proposed should be logical and complete. When creating a single comprehensive hypothesis is challenging, sub-hypotheses should be introduced.

v. **Hypothesis should be related to the existing body of theory and facts:** A good hypothesis should be connected to existing knowledge and facts. Some researchers come up with some fascinating hypotheses, but if they aren't based on existing theories and data, they aren't considered good scientific hypotheses.

vi. **Hypothesis should provide maximum deductions or consequences and it should be general in scope:** A good hypothesis should have a broad scope in order to allow for a large number of deductions or consequences. A good hypothesis should not be either too narrow or too broad. As said by McGuigan (1990), "in general, the hypothesis that leads to the larger number of important deductions will be more fruitful hypothesis".

vii. **Hypothesis should be related to available scientific tests and apparatuses***:* The proposed hypothesis or hypotheses should also be related to the scientific tests and instruments that are already accessible. Otherwise, testing the variables is quite tough.

viii. **Hypothesis should be conceptually clear:** The concepts in the hypothesis should be clearly stated and objectively specified.

2.4 TYPES OF HYPOTHESIS

A hypothesis is a statement that introduces a research topic and predicts a likely outcome. It is a foundation for scientific experiments and is an important part of the scientific method. As a result, you must be cautious and thorough when building the hypothesis. As mentioned below, research hypotheses can be divided into seven categories:

    i.   Simple Hypothesis
    ii. Complex Hypothesis
    iii. Working or Research Hypothesis
    iv. Null Hypothesis
    v. Alternative Hypothesis
    vi. Logical Hypothesis
    vii. Statistical Hypothesis

2.4.1 Simple Hypothesis

A simple hypothesis is one that expresses a link between two variables: independent and dependent. It's also known as a fundamental hypothesis. It depicts the link between two variables, one of which is referred to as the independent variable or 'cause,' and the other as the dependent variable or 'effect.' In fact, it predicts a single dependent variable's connection with a single independent variable. Some of the examples of simple hypothesis are: (i) higher the rate of unemployment, higher would be the rate of crime in society; (ii) lower the use of fertilizers, lower would be the agricultural productivity; (iii) smoking cigarettes daily leads to lung cancer; (4) global warming causes icebergs to melt; and (v) higher the poverty in a society, higher would be the rate of crime.

2.4.2 Complex Hypothesis

A complex hypothesis is one that indicates a link between multiple variables. A complex hypothesis is a hypothesis that describes a link between two or more variables. It is, however, a relationship between two or more independent and two or more dependent variables. In fact, it forecasts the interaction of two or more independent and dependent variables. Some of the examples of complex hypothesis are: (i) global warming causes icebergs to melt which in turn causes major changes in weather patterns; (ii) higher the poverty and higher the illiteracy in society, higher will be the rate of crime; (iii) higher the use of fertilizers, improved seeds, and modern equipment, higher would be the agricultural productivity; (iv) higher the illiteracy in a

society, higher will be the situation of poverty and crime. There is a line of difference between a simple hypothesis and a complex hypothesis. A complex hypothesis is based on many factors, whereas a simple hypothesis is based on two variables.

2.4.3 Working Hypothesis

A working hypothesis is a hypothesis that has been accepted to test and use in the process of investigation. It is a hypothesis that is thought to be appropriate for explaining specific facts and phenomenon relationships. It is expected that this hypothesis will result in a useful theory, and it has been approved for testing and inquiry. It can simply be any hypothesis that is approved for investigation at the outset. In other words, the empirical hypothesis is the working hypothesis. The working hypothesis is used to guide a researcher through the investigation of a subject by explaining the relationship between some observable data. For example, cotton clothes are better for summer than velvet clothes.

2.4.4 Alternative Hypothesis

If the working hypothesis is found to be incorrect or rejected, an alternative hypothesis (to replace the working hypothesis) is developed and tested to investigate the desired feature of the research. As the name implies, it's an alternative assumption (or relationship) that's used when the working hypothesis fails to provide the desired theory. H_1 stands for alternative hypothesis. The plant's growth, for example, was improved when it was given vitamin-rich water rather than distilled water. In order to prove that there is no relationship; researchers will couple the alternative hypothesis with the null hypothesis. The alternative hypothesis will be accepted if the null hypothesis is disproven. The alternative hypothesis will not be accepted if the null hypothesis is not rejected. It claims that there is a link between the study's two variables and that the findings are relevant to the research question.

2.4.5 Null Hypothesis

A null hypothesis expresses the absence of a link between variables. It disproves the existence of a link between variables. A null hypothesis is one that the researcher creates with the purpose of disproving, rejecting, or nullifying the null hypothesis and thereby confirming a relationship between the variables. In order to validate that there is a relationship between the variables, a null hypothesis is frequently created as a reverse tactic to prove it untrue. H_0 stands for the null hypothesis. It makes a negative statement to support the researcher's conclusion that two variables have no relationship. Some of the examples of null hypothesis are: (i) poverty has nothing to do with the rate of crime in a society; (2) illiteracy has nothing to do with the rate of

unemployment in society; (3) water does not affect the growth of a plant. As a result, a null hypothesis is a statistical hypothesis that claims there is no difference between specific characteristics of a population. It's worth noting that we're putting the null hypothesis to the test because there is an element of doubt about its validity.

2.4.6 Statistical Hypothesis

Statistical hypothesis is a hypothesis that can be tested statistically. It can be any hypothesis with the ability to be statistically validated. It can be tested by using quantitative procedures. A statistical hypothesis' variables can also be stated to be quantifiable or transformable into quantifiable indications for statistical testing. It doesn't matter if the statement is reasonable or illogical; if a statistic supports it, it becomes a statistical hypothesis. Vitamin C is beneficial to the skin. To be sure, you'd have to put this idea to the test on a group of people. This is a statistical approach of confirming the statement.

2.4.7 Logical Hypothesis

A logical hypothesis is a hypothesis that can be proven rationally. It's a hypothesis that expresses a relationship whose interconnections can be linked using logical explanations to verify it. It can be proven with the use of logical proof. It doesn't mean that statistical approaches can't be used to verify a logical hypothesis. It may or may not be statistically verifiable, but in light of the logical justifications, it appears so plausible that these logical arguments are sufficient to verify it. A logical hypothesis is a proposed explanation based on minimal evidence. In general, you aim to turn a logical hypothesis into an empirical hypothesis by testing your hypotheses or postulations. You can, however, build a hypothesis based on the existing data and come to a logical conclusion. It is logically validated, as the name implies. Agreement, disagreement, and differences of opinion are all part of the verification process. An animal, for example, cannot live without water. This is true because water is required by all living things.

2.5 SOURCES OF HYPOTHESIS

Following sources have been categorized in order to establish hypothesis:

2.5.1 Previous Study

Previous research can also be used to establish a definite hypothesis. If a researcher applies past knowledge of a phenomenon to a specific location, another researcher

adopts his methods and develops his own. Increased fertilizer and irrigation use, for example, leads to increased agricultural production in a particular district. Now another researcher can conduct a study by applying the previous study. Such hypothesis could be used either to replicate past studies or reverse the hypotheses that the alleged correlation does not exist.

2.5.2 Culture

People's thinking processes are influenced by cultural patterns, and a hypothesis may be developed to examine one or more of these notions. Research interests are guided by cultural beliefs. The role of culture has had a significant role in the advancement of science today. In the words of Goode and Hatt, "to say that the hypotheses are the product of the cultural values does not make them scientifically less important than others, but it does at least indicate that attention has been called to them by the culture itself". In Western society, for example, race is regarded to be a significant influence of human behaviour. A hypothesis can be formulated using such a proposition. We might also blame metaphysical bias and Indian culture's metaphysical concepts for the development of certain assumptions. It means that cultural materials that share a common cultural pattern can be used to generate hypotheses. Thus, culture is the collection of different ways of behaving and adopting them in a specific place and time. Culture should be considered while developing a hypothesis for an issue. If we wish to investigate trends in female education in a specific location, we will look into its traditions, family structure, Norms, Values, region, and educational system.

2.5.3 Scientific Theory

Theory is a key source of hypothesis. By positing a consistent and lawful link among a collection of general concepts reflecting those facts, a theory binds a big body of facts. On the basis of theoretical knowledge, more generalizations are generated. Theoretical corollaries are derived from the theories. Theory has the ability to explain all of the facts around the situation. Scientific theory is a great place to start forming hypotheses. Because theory explains existing facts, the theory utilized by a researcher may satisfy the needs of making it.

The hypothesis includes these generalizations or corollaries. Because theories deal with abstractions that cannot be directly observed and must be thought about, a scientific hypothesis involving observable facts and observable relationships between facts can only be used to select some of the facts as concrete examples of the concepts and to make a tentative statement about the existence of a relation among the selected facts in order to subject the relation to an empirical test. As a result of the deduction from theory, a hypothesis emerges. As a result, assumptions are transformed into

theoretical functioning tools. Every worthwhile theory allows for the development of new hypotheses. The hypothesis is the foundation of all scientific theory development; without it, it would be impossible to confirm or reject hypotheses. When tested, hypotheses are either proved or rejected, constituting subsequent tests of the original theory. As a result, the hypothetical sort of verbal statement connects empirical propositions or facts to theories. Only scientific predictions or experimental hypothesis can be used to test a theory's validity.

2.5.4 Analogies

Analogies are often a source of useful hypothesis. Julian Huxley makes us believe that causal observations in nature or in the framework of another science may be fertile source of hypothesis. The hypothesis that similar human types or activities may be found occupying the same territory came from the plant ecology and was an analogy. The observation that the behavior of human groups seems to exhibit some of the same patterns as found in gravitational and electrical fields led to the basic hypothesis of what is called social physics and is again based on an analogy. Although structural similarities to other well-established theories are not often examined at the time of hypothesis creation, they are generally satisfactory. But the use of analogy as a source of hypothesis needs some care. It will be dangerous to assume that natural areas in human society are a product of symbiosis as in true biology. There is also no empirical method of applying the concept to human beings. Goode and Hatt have rather rightly pointed out that analogy may be very suggestive, but care must be taken not to accept models for sociology from other disciplines without careful examination of the concepts which make up the methods. The formulation of an analogous hypothesis is regarded as a triumph because it facilitates its interpretation.

2.5.5 Personal and Idiosyncratic Experiences

Hypotheses are also the consequence of personal, idiosyncratic experience. The individual experience of the scientist contributes to the type and form of the questions he asks. Some persons might perceive from what might merely seem a jumble of facts to another. History is a witness that many important discoveries were made because right individuals could make right observations at appropriate times. Discoveries of Newton and Darwin can safely be placed in this category and so is the work of Thorstein Veblen.

2.5.6 Folk Wisdom

Another dominant source of hypothesis is folk wisdom. Both the problems and the hypotheses to be explored and developed are suggested by current popular beliefs and

habits. As a result, it is often viable to build hypotheses using folk wisdom rather than highly refined scientific understanding and language.

In fact, all these sources combined together provide the basis for hypothesis.

2.6   LET US SUM UP

A hypothesis is a tentative solution or intelligent assumption regarding a research subject under investigation. It's not just a guess; it's based on previous study, in which the researcher assembles data to support a postulated relationship between variables. As a result, it is a conjecture statement regarding a problem's solution that the researcher then verifies using relevant data. There are broadly seven types of hypothesis. These are: simple hypothesis, complex hypothesis, working or research hypothesis, null hypothesis, alternative hypothesis, logical hypothesis, and statistical hypothesis.

A good hypothesis is one that can be tested and expresses the predicted relationship among variables. It is stated simply and precisely. The expected link between the variables should be stated in a good hypothesis. It has a limited scope and should adhere to the most widely accepted facts. There are different sources in order to formulate research hypothesis. These sources are: previous study, cultural pattern of a society, scientific theory, analogies, personal and idiosyncratic experiences and fold wisdom. It has a tremendous significance in social research. While formulating a good hypothesis, the researcher should follow appropriate criteria.

2.8   MODEL QUESTIONS

Some of the questions for practice have been mentioned in the following sections.
Long Answer Questions
- Define hypothesis. Discuss dominant criteria of a good hypothesis.
- What is hypothesis? Explain several types of hypothesis.
- Elucidate different sources of formulating hypothesis in social research.

Short Answer Questions
- Meaning of hypothesis
- Criteria of good hypothesis
- Null hypothesis
- Statistical hypothesis
- Scientific theory as a source of hypothesis
- Folk wisdom as a source of hypothesis

2.9 SUGGESTED READINGS

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UNIT – 3   SAMPLING: MEANING AND CHARACTERISTICS

Structure

3.1   INTRODUCTION

In order to investigate a social problem, it is always difficult to study the entire universe. It is because, it is very costly and time consuming. In fact, it is increasingly felt that social researchers have neither sufficient time nor money and energy or resources to study the entire population which is connected or proposed to be covered in a study. In other words, census method of study is proving more and more costly and time consuming. It is therefore convenient to select a sample out of the universe proposed to be covered by the researcher. Thus, it is felt that a representative sample should be picked up and conclusions drawn should be supposed to represent the whole population. But while selecting the sample, it needs to be selected carefully. According to P V Young, "a statistical sample is miniature picture or cross section of the entire group or aggregate from which the sample is taken. The entire group from which a sample is chosen is known as 'the population', 'the universe' or 'supply'". According to Goode and Hatt, "at present, sampling is so essential part of research procedure that every sociologist, though not required to be a sampling expert, must at least be thoroughly familiar with its logic and with some of its basic techniques." It should be representative and picked up in a manner that it represents the universe as a whole. Thus, the coverage or the population of the research or survey is always central to social research.

3.2   LEARNING OBJECTIVES

The purpose of this unit is to provide you with an understanding on sampling method with specific reference to its meaning and characteristics. The chapter also provides reasons and purposes of using sampling. It also discusses the basis of sampling method. The chapter also portrays the functions of sampling method. It also describes the advantages and disadvantages of sampling method. Thus, after reading this unit, the reader should be able to understand:

- Meaning of sampling
- Definitions of sampling
- Characteristics of sampling
- Reasons and purposes of sampling
- Basis of sampling
- Functions of sampling
- Advantages of sampling
- Disadvantages of sampling

3.3   MEANING OF SAMPLE OR SAMPLING AND POPULATION

A sample is a portion of people drawn from a large population. It will be representative of the population only if it has same basic characteristics of the population from which it is drawn. Thus, in the words of Ram Ahuja, "our concern in sampling is not about what types of units (persons) will be interviewed/observed but with how many units of what particular description and by what method should be chosen". According to Manheim", "a sample is a part of the population which is studied in order to make inferences about the whole population".

The methodological problems of research broadly fall on three broad areas: from whom to collect the information, what methods to use for collecting it, and how to process, analyze and interpret it. This chapter focuses on the first of these, namely the coverage of survey or research.

The first step always is to define the population to be covered, a task that is never as easy as it sounds. Here it is useful to distinguish between the population for which the results are required, the target population, and the population actually covered, the survey population. Ideally the two will be the same, but for practical reasons there will usually be some differences between them. In statistical enquiry covering a large

population it is not always feasible to enumerate all the units of the population because of time and resources constraints. Hence, there is a need to develop some sampling techniques to select a representative sample from the whole population of study.

One of the most problems in social research is the problem of sampling. A survey may be conducted by either of the two methods; (i) Census method, (ii) Sampling method. When the whole area or population of persons is contacted the method is known as census method. On the other hand, when a small group is selected as representative of the whole it is known as sampling method. For example, if a study of high school students of the city are contacted and studied, the method of study will be known as census method. If on the other hand, a few hundred students are selected from amongst them, the method used will be known as sampling method.

A population in sampling theory is defined as aggregate of units. These units may be animate or inanimate objects. Population does not mean only human beings and we may talk of population of plants, households, schools, colleges, institutes, factories, cattle cities, towns, villages etc. and also artificial population generated through simulation. Population may be classified into two types: finite population and infinite population. In finite population, the units are finite or countable such as number of persons, cities, households, animals, etc. The term "infinite population" refers to a group of things or humans with no bounds or who cannot be counted such as the amount of red blood cells in a person's body, or the population of stars in space.

Thus, as explained above, when a small group is taken as the representative of the whole, the study is called sampling study. The whole group from which the sample has been drawn is technically known as universe or population and the group actually selected for study is known as sample. According to Prof. Calvin F. Schmid, "a statistical population or universe may consist of attributes, qualities or behaviour of people, the behaviour of inanimate objects such as dice or cities or city blocks, households or dwelling structures, the day's output of a factory or opinions of the electorate of an entire nation". Thus, A sample is a subset of the population, but in statistical study we regard a sample as a representative part of the population. Let's focus on some of the terms we use in sampling. The process of selecting a sample is termed as sampling or sample design. In addition, any statistical enquiry based on sampling from a finite population is called sampling enquiry or sample survey. The units of the population which are liable to be sampled are called sampling unit. If every unit of the population is sampled, the result is complete enumeration of the population or census study.

3.4   REASONS AND PURPOSES FOR SAMPLING METHOD

A large population cannot be studied in its totality for reasons of size, time, cost or inaccessibility. Limited time, lack of fund, scattered nature of the population in a huge geographical area often make sampling imperative. As a result, in social research the census method is replaced by the sampling method. Another important objective of sampling is to draw inference about the universe which is unknown from the unit which is observed or measured. Two other important purposes of sampling are: seeking representativeness and thereby studying a small population instead of very large population; and analyzing data where cross tabulation is required, certain variables are to be controlled, and phenomenon is to be observed under certain specific conditions. There are various reasons for the use of this method which have been mentioned in the following points:

   i.   It is a method in which a lot of time, money and energy are saved. As we know that in census method there is wide coverage and a lot of time, money and energy are consumed. In this method, since only a sample is picked up and studied, therefore much of resources, human labour and finance are saved.

   ii.   More attention is paid to the problem to be studied. Since human energies and resources are limited, therefore when these are concentrated on a sample obviously more attention is paid and more interest is taken, as compared with a situation where the universe is wide and practically unmanageable.

  iii.   With the help of this method, more coverage is possible and that too within less time. A few areas can be picked up for study. In this way, it becomes possible to cover wide areas and to manage that within reasonably short time.

   iv.   It offers a high degree of accuracy because it deals with a small number of persons.

   v.   In short period of time valid and comparable results can be obtained. A lengthy period of data collection generally renders some data obsolete by the time the information is completely in hands.

   vi.   Sampling is less demanding in terms of requirements of investigators since it requires a small portion of the target population.

  vii.   It is economical since it contains fewer people. Large population would involve employing a large number of interviewers which will increase the total cost of the survey.

 viii.   Many research projects, particularly those in quality control testing, require the destruction of the items being tested.

3.5   BASIS OF SAMPLING

Of course sampling method for social research is imperative. It helps in saving time, money and energy and at the same time it can be managed and controlled within the limited time. But a question arises pertaining to what should be the basis of sampling. The choice of a sample as representative of the whole is based upon following assumptions:

i. **Underlying homogeneity amidst complexity:** Although things especially social phenomena, appear to be very complex in nature, so that no two things appear alike. Apparently, every student may appear to be different. There is difference of health, body, habits, personality etc. It is the possibility of such representative types in the whole population that makes sampling possible.

ii. **Possibility of representative selection:** The second assumption is that it is possible to draw a representative sample. It has been proved that if a certain number of units will have chance of being included and the sample so selected will certain all types of units, so that it may be representative of the whole group.

iii. **Absolute accuracy not essential:** The third basic factor is the fact that absolute accuracy is not essential in case of mass study. In large scale studies we have to depend upon averages which are considered fairly significant in any type of enquiry. Thus it is not the absolute accuracy, but relative or significant accuracy that is need in case of large scale observation, and the results of sampling studies although not hundred percent accurate are nevertheless sufficiently accurate to permit valid generalization.

3.6   IMPORTANCE OF SAMPLING IN SOCIAL RESEARCH

Sampling studies are becoming more and more popular in all types of mass studies, but they are especially important in case of social surveys. In modern times researchers in social sciences have assumed increasing importance due to complexities in social environment, social behaviour and social interactions spreading over both developing and developed economics. Because of largeness of population, varied subjects to be covered and requirement of depth in analysis, it is natural and convenient to select a representative sample from the population to give justice to the problem with available limited resources. The vastness of the population, the difficulties of contacting people, high refusal rates, and difficulties of ascertaining the universe make sampling the best alternative in case of social studies.

The use of sampling allows more adequate scientific work by bringing into account the time factor at the disposal of scientific worker. Instead of spending much time in analyzing vast mass of data, he may use a smaller amount on many counts for a more intensive analysis of fewer cases. It saves time and thus makes investigation possible within a stipulated period. Recent developments in sampling techniques have made this method more reliable and valid. The results of sampling have attained a sufficiently high standard of accuracy.

3.7   ADVANTAGES OF SAMPLING

Sampling method has certain definite advantages over the census method. The major advantages are as follows:

i.   **Saving time:** Comparatively smaller numbers of units are studied in sampling method and naturally it requires much less time than census method. In certain types of social surveys, time is the most important factor and the result of the study has to be declared quite early to be of any use at all. In all survey sampling is the only method which can ne used.

ii.   **Saving money:** survey of smaller number of cases not only requires less time, but also requires less money, and the study can be financed with much less resources.

iii.   **Detailed study:** when the number of units is large, detailed study is not is not possible. The smaller number of cases in the sample permits a more minute observations and detailed study. In social research sometimes a thorough and prolonged study has to be undertaken. This is only possible when the number of cases to be studied is small.

iv.   **Accuracy of result:** The result drawn by sampling techniques are more reliable than results from census method. If the sample has been properly selected the results are within a very close range of accuracy. Techniques have been successfully evolved to calculate the sampling error by means of statistical methods.

v.   **Administrative convenience:** A small sample is usually more convenient from administrative point of view. In social research we have to deal with human beings who cannot be made to work according to our own will. A small sample is, therefore, more manageable especially in social research.

vi.   **Impossibility of the use of census method:** In social research the use of census method sometimes becomes impossible. It is because the universe is too vast and geographically scattered, so that every unit cannot be contacted. In such case it is impossible to know all users of the product, and the only method that can be used is the sample method.

3.8   DISADVANTAGES OF SAMPLING

Followings are the major disadvantages of sampling method:

i.   **Chances of biases:** The most common argument against the sampling method is the fact that it may lead to biased selection and thereby lead us to draw false generalizations. A bias in the sample may be caused either by faulty method of sampling or the nature of the phenomena itself.

ii.   **Difficulties of a representative sample:** The results of sampling are accurate and usable only when the sample is representative of the whole group. Selection of a completely representative sample is very difficult particularly when the phenomena under study are of a complex nature as in case of social research.

iii.   **Need for specialized knowledge:** The use of sampling method cannot be made by everybody and anybody. It requires a specialized knowledge in sampling technique, statistical analysis and calculation of probable error due to use of sampling method. In the absence of such knowledge the researcher may commit untold blunders and entire findings may be reduced to useless scrap.

iv.   **Difficulties in sticking to sample:** Although the number of units in the sample is small, it is not always easy to stick to it, especially in case of social research. The cases of sample may be widely dispersed. Some of them may refuse to co-operate with the researcher, other may be inaccessible. Because of these difficulties complete cases can never be taken up. Sometimes they have to be replaced by other cases. All this causes a bias in the studies.

v.   **Impossibility of sampling:** Sometime the universe is too small or too big heterogeneous so that it is impossible to draw a representative sample. In those cases, where a very big high standard of accuracy has to be maintained the sampling method is unsuitable, because even in the most accurate method of sampling, there are always some chances of error.

3.9   LET US SUM UP

The sample method involves taking a representative selection of the population and using the data collected as research information. A sample is a 'subgroup' of a population. It has also been described as a representative 'taste' of a group. The sample should representative in the sense that each unit will represent the characteristics of a known number of units in the population. All disciplines conduct research using sampling of the population as a method, and the definition is standard across the discipline. We cannot study entire populations because of feasibility and cost constraints, and hence, we must select a representative sample from the

population of interest for observation and analysis. It is extremely important to choose a sample can be generalized back to the population of interest. Improper and biased sampling is the primary reason for not selection of representative sample. The wide use of sampling method is very important for conducting a good quality research in social sciences.

3.10 MODEL QUESTIONS

Some of the questions for practice have been mentioned in the following sections.

Long questions
1. Define sampling. Explain features of sampling method.
2. Explain advantages and disadvantages of sampling.
3. Describe the reasons and purposes of sampling.
4. What are the bases of sampling method? Explain the functions of sampling method.

Short questions

1. Define sampling
2. Importance of sampling method in social research
3. Population and sampling
4. Bases of sampling method
5. Purposes of sampling method
6. Advantages of sampling method
7. disadvantages of sampling method

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UNIT – 4   TYPES OF SAMPLING

Structure

4.1   INTRODUCTION

Sampling is an indispensable aspect in social science research. In fact, it is regarded as an important dimension in social science research. A research may be conducted by either of two broad methods: census method or sampling method. When the whole area or population is contacted the method is known as census method. On the other hand, when a small group is selected as representative of the whole mass it is known as sampling method. In social science research, it is very difficult to conduct research based on census method. Therefore, sampling is very much necessary in social science research. There are different types of sampling: probability and non-probability. The present chapter broadly describes different types of sampling. However, before that it also discusses the procedures adopted behind selecting sample and factors affecting size of the sample.

4.2   LEARNING OBJECTIVES

The purpose of this unit is to provide you with an understanding on sampling method with specific reference to its different types. While doing so, it has discussed both probability and non-probability sample. The chapter also provides procures adopted behind selecting sample. It also discusses the factors affecting size of the sample. It also describes the advantages and disadvantages of different types of sampling method. Thus, after reading this unit, the reader should be able to understand:
- Procures adopted behind selecting sample
- Factors affecting size of the sample

- Probability sampling
- Non-probability sampling

4.3   PROCEDURE BEHIND SELECTING A SAMPLE

A procedure of selecting a sample differs according to the type of sample selected. Following steps are generally taken in selecting the sample.

i.   **Defining universe:** The whole group from which the sample is to be selected is technically called universe ot population. Thus in order to draw the sample we must first of all have a clear idea of the universe from which the sample is to be drawn. In some cases, the universe has the geographical limits and then it is very easy to locate it. But if the universe depends upon some quality or attribute, the definition of the universe becomes rather difficult. There are different types of universe which are classified into following categories:

   a.   **Definite and Indefinite universe***:* when the number of units failing within the universe can be definitely ascertained it is known as definite universe like city or a locality or students of a college or university etc. when this number and the exact units cannot be ascertained we call it as indefinite universe. A universe may be indefinite because of its constantly changing nature. It may be indefinite when the cases cannot be located like the users of a particular product, listeners of a particular radio program.

   b.   **Real and Hypothetical universe:** The universe may be real or simply hypothetical. Hypothetical universe is not used in case of surveys, but it has great utility in statistical analysis. Most of the statistical generalizations are made from a purely hypothetical universe. If the total population of a place falling within a similar class is given to us, we can form a theoretical frequency distribution of various age groups and thus determine the number of units to be drawn from each group. This type of universe will be known as hypothetical universe.

ii.   **Sampling unit:** Before drawing a sample we have to decide the unit of a sample. What shall we select – a house, a family, an individual or a group. The main types of sampling unite are:

   (a) Geographical units like state, city, ward, region, locality
   (b) Structured units like a house, a flat
   (c) Social group units like family, a school, a club, a church

(d) Individuals

While selecting the sample certain qualities should keep in the mind of a researcher like:

(a) The unit should be clear, unambiguous and definite. It should be capable of being objectively ascertained and easily located

(b) The unit of sample should be standardized. If an entirely new unit has been used, its meaning and significance should be explained clearly.

(c) The unit of sample should be suitable for the problem under study.

(d) The unit should be easily ascertained

iii. **Source list:** The list which contains the names of the units of universe from which the sample is to be selected is technically known as source list. A source list may be already in existence or it may have to be prepared. Sometimes the list may be available in parts and may have to be consolidated. At other times the list may be exhaustive and relevant universe may have to be sorted. For maintaining a good quality of source list, the following criteria may be included:

(a) The list should be exhaustive. The entire universe to be studied must be contained in the source list.

(b) The list should be up to date and valid. It should not contain dead names and must include the latest addition to the list.

(c) The list should contain full information about the units.

(d) The names should not be repeated in the list.

(e) The source list should be suitable for the unit of study. it will contain in detail about the individual names, house number etc.

(f) Source list must be reliable. It must be maintained by an authority that can be relied upon.

(g) Source list must be within reach of the researcher.

4.4   FACTORS AFFECTING THE SIZE OF THE SAMPLE

The size of the sample is an important problem to be decided in case of sampling. This is because the size has a direct bearing upon accuracy, time, cost and administration of the survey. Large samples are generally hard to manage and are unfit for detailed study, but that may be essential for representativeness. The size of the sample depends upon a number of factors. Following are some of the factors affecting size of the sample.

i. **Homogeneity and heterogeneity of universe:** If the universe is comparatively homogeneous a smaller size of the sample may be sufficient.

If all the units were exactly alike one single unit could serve as sample, but of the universe is heterogeneous so that very few units are similar, the sample has to be essentially larger in size.

ii. **Number of classes proposed:** If a larger number of classes are to be formed the sample must be large enough so that every class may be of a proper size. If the size of the sample is small there may be some classes which may contain one or two units only. Some may remain totally unrepresented. Thus larger number of classes proposed greater will be the size of the sample.

iii. **Nature of study:** The size of sample will also depend upon the nature of study. if an intensive study is to be made continuing for a pretty long time, large sample is unfit for the purpose, as it will require very large finance and other resources.

iv. **Practical consideration:** Practical considerations as availability of finance, time at our disposal, number of trained field workers etc. may also be taken as important factor in deciding the size of the sample. The limitations of these resources necessarily limit the size of the sample. Although these practical considerations do weigh heavily in determining the size of the sample it should never be done at the cost of accuracy.

v. **Standard of accuracy:** it is generally considered that larger the size of the sample greater of accuracy or representativeness. Although this is not true in all cases, as mere largeness of size is no guarantee for representativeness. A small but well selected sample may give better results than a larger and thoughtlessly selected sample. As the technique of sampling is becoming more and more scientific and refined better standards of accuracy has been possible to be achieved by comparatively smaller samples.

vi. **Size of the questionnaire or schedule:** The size of the questionnaire and the nature of questions to be asked is also a limiting factor for the size of the sample. Larger the size of schedule, more complicated the questions to be asked, smaller is to be the size for proper administration.

vii. **Nature of cases to be contacted:** The nature of cases to be contacted plays its own part in deciding the size of the sample. If the cases are geographically scattered a small sample is more suitable.

viii. **Type of sampling used:** If absolute random sampling has been used a much larger sample is required. Random sample is reliable only when sufficiently large number of units has been selected. On the other hand, if stratified sample has been selected reliability can be achieved in a much smaller size.

There are basically two types of sampling: Probability sampling and Non-probability sampling. Probability sampling is one in which every unit of the population has an equal probability of being selected for the sample. It offers a high degree of representativeness. However, this method is expensive, time-consuming and relatively complicated since it requires a large sample size and the units selected are usually widely scattered. Non-probability sampling makes no claim for representativeness as every unit does not get the chance of being selected. It is the researcher who decides which sample units should be chosen.

4.5.1   Probability sampling

The sampling process where the sampling units from the population are selected following laws of chance or probability is termed as probability sampling. In this type of sampling every unit of the population has definite and calculable probability of being selected. In simple words, probability sampling is one in which every unit of the population has an equal probability of being selected for the sample. It offers a high degree of representativeness. According to Black and Champion (1976:266) the probability sampling requires following conditions to be satisfied: (i) complete list of subjects to be studied is available, (ii) size of the universe must be known, (iii) desired sample size must be specified, and (iv) each element must have an equal chance of being selected. If this probability is same for all the units of population such sampling is termed as equal probability sampling or most popularly simple random sampling.

The six forms of probability sampling are; simple random, stratified random, systematic (or interval), cluster, multi-stage and multi-phase.

(a) Simple-random sampling: blind folded, Tippet's table, computer, persona; identification number (PIN) or by first letter. A simple random sample is a subset of a statistical population in which each member of the subset has an equal probability of being chosen. A simple random sample is meant to be an unbiased representation of a group. A simple random sample takes a small, random portion of the entire population to represent the entire data set, where each member has an equal probability of being chosen. In this sampling, the sample units are selected by means of a number of method like, Lottery method, Pricking

      (i)   Lottery method involves three steps. First step is constructing the sampling frame, i.e., a list of the units of the target population, e.g. students' list, in alphabetical order. Second step is writing numbers

listed in sampling frame on small pieces of paper and placing these papers in some vessels/jar. Third step is mixing all papers well and taking out one piece of paper from jar.

(ii) Tippet's table or random numbers method Tippet has prepared a table of random numbers (of one to five digits each). These numbers are available in various forms, sizes and number of combination of texts.

The advantages of simple random sampling are: all elements have equal chance of being included; it is the simplest of all sampling methods and easiest to conduct; this method can be used in conjunction with other methods in probability sampling; researcher does not need to know the true composition of the population beforehand; degree of sampling error is low; and most statistical textbooks have easy to use tables for drawing a random sample (Black and Champion, 1976). The disadvantages of simple random sampling are: it does not make use of knowledge of population which researcher may have; it produces greater errors in the results than do other sampling methods; and it cannot be used if the researcher wants to break respondents into subgroups or strata for comparison purposes.

(b) Stratified random sampling: This is the form of sampling in which the population is divided into a number of stratas or sub-groups and a sample is drawn from each stratum. Stratified random sampling is a sampling method in which a population is divided into smaller groupings called strata. The members of the group are arranged into groups or strata based on shared qualities or attributes. Stratified random sampling is a sampling technique that involves gathering samples from a population separated into strata. Random samples from stratified groups in proportion to the population are taken using stratified random sampling. The division of the population into homogeneous stratas is based on one or more criteria, e.g., sex, age, class, educational level, family type, religion, occupation and so on. There are two types of stratified sampling: proportionate and disproportionate. The former is one in which the sample unit is proportionate to the size of the sampling unit, while the latter is one in which the sample unit is not related to the units of the target population. The advantage of the stratified random sampling is that sample chosen can represent various groups and patterns of characteristics in the desired proportions. In fact, it can be used for comparing subgroups. One of the disadvantages of this method is that it is somewhat complex method of determining sample.

(c) Systematic (Interval) sampling: This sampling is obtaining a collection of elements by drawing every n[th] person from a pre-determined list of persons. In simple words, it is randomly selecting the first respondents and then every n[th] person after that, 'n' is a number termed as sampling interval. Systematic sampling

is a sort of probability sampling in which individuals of a bigger population are chosen at random from a larger population but at a fixed, periodic interval. This interval, also known as the sampling interval, is computed by dividing the population size by the sample size desired. The dominant advantage of the systematic sampling is that it is rapid method and eliminates several steps otherwise taken in probability sampling. The disadvantage of this type of sampling is that since each element has no chance of being selected, it is not probability random sampling.

(d) Cluster sampling: This sampling implies dividing population into clusters and drawing random sample either from all clusters or selected clusters. This method is used when (a) cluster criteria are significant for the study and (b) economic considerations are significant. Thus, as mentioned, another sort of sampling is cluster sampling. When there are multiple subgroups of groups in a larger population, this strategy is utilised. Clusters are the names given to these groups. Cluster sampling consists of two steps. To begin, the complete population is chosen and divided into various clusters. The subgroups are then divided into random samples. The second phase entails interviewing a random sample of those stores' customers. The difference between cluster sampling and stratified sampling is that in the former, homogeneous group is classified into heterogeneous units, while in the latter, heterogeneous group is stratified into homogeneous units. The dominant advantage of this sampling is that it is much easier to apply this sample when large populations are studied or when large geographical area is studied. The disadvantage of this sampling is that sampling error may be greater in this type of sampling.

(e) Multi-stage sampling: In this method, sampling is selected in various stages but only the last sample of subjects is studied. Sampling in each stage will be random but it can also be deliberate or purposive. Thus, multi-stage sampling according to Ackoff (1961:102), can be combination of (i) simple+simple sampling, (ii) simple+systematic (interval) sampling, and (iii) systematic+systematic sampling. It is often mentioned that multistage sampling is frequently thought of as a more advanced variation of cluster sampling. In multistage sampling, the population is divided into clusters, and some clusters are chosen in the first stage. You divide those selected clusters into smaller clusters at each successive level, and repeat the procedure until you reach the final phase. Only a few members of each cluster are chosen for your sample in the final stage. The main advantage in this sampling will be that it will be more representative.

(f) Multi-phase sampling: The process in this type of sampling is same as in multi-stage sampling, i.e., primary selection, secondary selection and so on. However, in a multi-phase sampling procedure, each sample is adequately studied before another sample is drawn from it. Consequently, while in multi-stage sampling, only the final sample is studied, in multi-phase sampling all samples are researched. This offers an advantage over other methods because the information gathered at each phase helps the researchers to choose a more relevant and more representative sample. Thus, multi-phase sampling is a sampling design in which required data is taken from a large sample of units, and additional data is obtained from sub-samples of the entire sample either at the same time or at a later stage.

4.5.2 Non-probability sampling

In many research situations, particularly those where there is no list of persons to be studied, probability sampling is difficult and inappropriate to use. In such researches, non-probability sampling is the most appropriate one. This sampling method do not employ the rules probability theory, do not claim representativeness, and this is mostly used for qualitative exploratory analysis. There are mainly five types of non-probability sampling discussed in below:

(a) Convenience sampling: it is generally known as unsystematic, careless, accidental or opportunistic sampling. According to this system a sample is selected according to convenience of the researcher. This convenience may be in respect of availability of the units etc. Although the method is most unscientific, yet quite a large number of samples are selected according to this method. This sampling may be used in anyone or more of the following cases:

    (i)   When the universe is not clearly defined

    (ii)   Sampling unit is not clear

    (iii)   A complete source list is not available

The selection of names from telephone directory, contacting anyone who may chance to be easily available will come under this type of sampling. The dominant advantage of this sampling is that it is very economical. It is best utilized for exploratory research.

(b) Purposive sampling: When the researcher deliberately or purposively selects certain units for study from the universe it is known as purposive sampling. It is otherwise known as judgmental sampling. The purposive sample, often known as a judgemental or expert sample is a part of non-probability sample. A purposive sample's principal goal is to generate a sample that may be assumed to be representative of the population. This is frequently accomplished by using expert

knowledge about the population to select a sample of elements that represents a cross-section of the population in a nonrandom manner. The aim of purposive selection is to gain as representative a sample as possible. In order to achieve the representativeness the selector must possess a complete idea of the nature of universe and various statistical measurements about it. The researcher should also be completely forming any kind of biasness, prejudices about the selection of the universe/sample.

(c) Quota sampling: This is special from of stratified sampling. According to the method the universe is first divided into different stratas. Then the number to be selected from each stratum is decided. This number is known as quota. The researchers are generally asked to select the quota from the stratum according to their will. Quota sampling is a non-probability sampling technique in which researchers create a sample of people who represent a population. These people were chosen by the researchers based on specific characteristics or features. Quota can also be fixed according to their proportion in the entire population. The advantages of quota sampling are: (i) it is less costly than other techniques, (ii) it does not require sampling frames, (iii) it is relatively effective, and (iv) it can be completed in a very short period of time. The disadvantages of this type of sampling are: (i) it is not representative, (ii) it has interviewer's bias in the selection, (iii) estimating sampling error is not possible, and (iv) strict control of field work is difficult.

(d) **Snowball sampling:** In this technique, the researcher begins the research with the few respondents who are known and available to him. Subsequently, these respondents give other names who meet the criteria of research, who in turn give more new names. This process is continued until 'adequate' numbers of persons are interviewed or until no more respondents are discovered. Snowball sampling, also known as chain-referral sampling, is a non-probability sampling approach in which the samples have hard-to-find characteristics. This is a technique for recruiting samples for a research project in which existing individuals refer new subjects. Reduced samples sizes and costs are a clear advantage of snowball sampling.

(e) **Volunteer sampling:** This is the technique in which the respondent himself volunteers to give information he hold. The cost of selection of these samples is very low. The degree of use of these also biasness in the selection of sample which is a major disadvantage of this sampling method. Thus, volunteer sampling or a voluntary response sample is a sort of sample made up of people who opted to participate on their own. These individuals volunteer to take part in various

research studies in order to express their thoughts on topics that they are interested in.

4.6 LET US SUM UP

The use of sampling methods has been very old in social research. Since the time, there has been constant improvement in the sampling technique, methods of calculating the probable errors etc. More and more use has been made of the sampling technique in social researches, surveys etc. In fact social research has been possible only through sampling method. Sampling is very imperative in social science research. In this chapter, a detailed discussion on types of sampling has been made. As part of probability sampling, the focus has been given (i) simple random sampling, (ii) stratified random sampling, (iii) systematic (or interval) sampling, (iv) cluster sampling, (v) multi-stage sampling, and (vi) multi-phase sampling have been discussed. As part of the non-probability sampling, discussion has been made on (i) convenience sampling, (ii) purposive sampling, (iii) quota sampling, (iv) snowball sampling, and (v) volunteer sampling.

4.7 MODEL QUESTIONS

Some of the questions for practice have been mentioned in the following sections.

Long questions
1. Describe procures adopted behind selecting sample.
2. Explain factors affecting size of the sample.
3. Critically explicate with examples different types of sampling.
4. Explain the types of probability sampling.
5. Explain the types of non-probability sampling.

Short questions

1. Procedures behind selecting sample
2. Factors affecting size of the sample
3. Probability sampling
4. Non-probability sampling

4.8 SUGGESTED READINGS

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