Social Work Research

Editor
Gracious Thomas

School of Social Work
Indira Gandhi National Open University
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Preface

Social work is a practice based profession. In order to search answers to questions raised regarding instructions or treatment effectiveness in social work practice, research is essential. This volume comprising sixteen chapters deals with social work research. The ultimate purpose of this book is building a knowledge base for social work theory and practice. While discussing the basics of research in social work, major issues such as foundations of scientific research, research review in social work, formulation of research problem and preparing a research proposal are articulated very carefully. This book also has enumerated and explained in detail several important methods such as descriptive, exploratory, diagnostic, evaluation, action research and experimental research and qualitative research. We have also described some special research methods that are known as intervention research methods. These methods are commonly known as single-subject designs research, through which social researchers attempt to improve social functioning of individuals, groups, families and communities.

An overview of tools and methods of data collection is also presented in this volume which talks about the concept of population, sample and methods of sampling. There is also focus on various research tools like questionnaire, rating scales, attitudinal scales, interview schedule and data collection procedure. Once data are collected, the researcher turns his/her focus on scientific processing. There are some chapters that deal with the details of data processing and analysis. It also narrates how to code data, prepare master chart, re-categorize and tabulate information and make univariate, bivariate and trivariate analysis. Finally this book very exhaustively describe the use of descriptive statistics and inferential statistics before describing how to write a research report.

This first chapter “Introduction to Social Work Research” provides the foundation of research activity in social work. In this chapter extensive coverage have been given to meaning of research, scientific research, use of scientific method in social sciences and meaning of social work research. It also provides information on the nature of the social work research and scope of social work research. ‘Research Review in Social Work’ deals with review of research in social work: international perspective and national perspective; emerging trends, role of research in social work; programmes evaluation, and role of NGOs in research.

While ‘Research Process I: Formulation of Research Problem’ provides information on research process, formation of research problem, evaluation of problem importance of hypothesis and various types of hypothesis in research. ‘Research Process II: Preparing a Research Proposal’ deals with how to prepare research proposal and provides details about identification of objectives, selection of samples, methods of data collection, data analysis and the presentation of report.

In the ‘Introduction to Methods of Research’ in social Work we have included discussion on single subject design research, problem formulation, pre-intervention assessment, data analysis, test of significance, experimental research in social Work, pretest-post test control group design, quasi experimental research design and multiple time series designs. While ‘Research Methods I: ‘Descriptive, Exploratory, Diagnostic, Evaluation and Action Research’ deals with descriptive research, corelational studies, action research, diagnostic research, exploratory research, steps involved in experimental research etc. 'Research Methods II: Experimental Research' provides extensive coverage to steps involved in experimental research, pre-experimental design, true experimental design, quasi experiment design and factorial design. The chapter on 'Research Methods III: Qualitative Research' deals with the procedural uniqueness of qualitative research, main steps of qualitative method, issues regarding trustworthiness and objectivity in qualitative research, case study method, participatory research and relationship methods.

The chapter on the 'Methods of Sampling' deals with basic concept of sampling, probability sampling, systematic sampling, proportionate stratified random sampling, disproportionate stratified random sampling, non probability sampling, combination of probability sampling and non-probability sampling and characteristics of a good sample. 'Research Tools: Questionnaire, Rating Scales, Attitudinal Scales and Tests' will give you relevant information about measurement in social research, concept of measurement, levels of measurement, normal, ordinal, interval and ration level, tools of data collection, rating and attitude scale. The description given in 'Interview Observation and Document' deals with types of tools and their uses, interview, observation and documentations which are essential for empirical study in social work. The chapter on 'Data Collection' discusses about the concept of data, methods of data collection utilization of existing records and ensuring the quality of data. 'Data Processing and Analysis' is an interesting chapter that discusses the processing of quantitative data, coding of data and preparing a master chart as well as analysis of quantitative data.

'Descriptive Statistics' provides a detailed discussion on measures of central tendency, mean, median, mode, quartile deviation, mean deviation and standard deviation which are essential components of statistics. While the chapter on 'Inferential Statistics' provides information on measures of relationship, product moment, correlation, coefficient of correlation, chi-square, regression analysis, measures of differences, T-test, paired, sample, independent samples, F-test, and testing of hypothesis. This chapter on 'Reporting of Research' discribes knowledge about what, why and how of reporting a research. In this chapter we have also discussed about how to begin and write the research work, its main body, tables, figures, bibliography, references and appendices of the research.

The sixteen chapters described in this book are highly useful to social work researchers, faculty and students particularly in this fast changing society that requires intense research on emerging and re-emerging issues. The work on this book began several years ago and has the contribution of several experts and social scientists. Originally this exercise was taken up for students specializing in Open and Distance Education Programme at IGNOU. Later when the University started the Masters Programme in Rural Development, an adaptation of some of the chapters was done since research methods in social sciences do have many aspects in common among disciplines. A further adaptation was done while compiling the present volume.

Therefore the debt we own to the many experts cannot be expressed in few lines. However, we place on record our preformed gratitude to all who contributed in big and small ways who include Prof. S.K. Panda, Prof. P.R. Ramanujam, Prof. Lokesh Koul, Prof. M. Mukhopadyay, Prof. Madhu Prahar, Prof. B.N. Koul, Dr. Nita Bhatt, Prof. S.P. Malhotra, Ms. Mahashweta, Dr. Sanjaya Mishra, Prof. P.K. Sahoo, Prof. Basanti Pradhan, Prof. Sudhakar Reddy, Dr. D.K. Lal Das, Prof. J.S. Gandhi, Prof. Asok Sarkar, Mr. Gurupada Saren and Dr. Monika Jauhari. It is my firm belief that the students of social work, research scholars and faculty will immensely benefit from the contents of this book.

Prof. Gracious Thomas
Director
School of Social work
IGNOU, New Delhi

Contents

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Introduction to Social Work Research

**D.K. Lal Das*

Introduction

Research is a process by which one acquires authentic and reliable information about a phenomenon. It may be broadly defined "as a systematic inquiry towards understanding a social phenomenon". It follows the scientific approach to gain knowledge. The most important characteristic of this approach is its thrust on objectivity. To what extent is the research using scientific approach useful in studying the problems of society? How can we acquire reliable knowledge about the various aspects of human experience? To be more specific, how can the scientific approach be of value in understanding social phenomena? In this Chapter we will discuss these questions. Our approach would be first, to understand the meaning of the terms 'research' and 'scientific research' then to examine the scientific method, its application in social work, its assumptions and finally to take a close look at the approach to find out how it can help social work professionals to solve the problems they face while practicing social work.

Meaning of Research and Scientific Research

Research

When we observe certain objects or phenomena, we are often unaware of our biases, we do not question them and

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Dr. D.K. Lal Das, R.M. College of Social Work, Hyderabad so we attribute our observations entirely to the objects or phenomena being observed. In this process, it is possible to arrive at right decision on the basis of wrong reasons or vice versa. This questions the process of observation. Was the observation error-free? While observing are we aware of our limitations? Every method of knowing has certain limitations. Any study to create new knowledge or aiming to increase existing fund of knowledge – may be through observation or by some other methods, is called research if it takes into account the biases, the errors and limitations. As such, research may be described as systematic and critical investigation of phenomena toward increasing the stream of knowledge.

Scientific Research

Science aims at description, explanation and understanding of various objects or phenomena in nature. Research is a special endeavour, which involves systematic and critical investigation towards increasing the stream of knowledge. Now it is easier to define scientific research. We may define scientific research as a "systematic and critical investigation about the natural phenomena to describe, explain and finally to understand the relations among them".

Conceptual Foundations of Scientific Research

The scientific research is based on two conceptual foundations, namely, facts and theory. In the context of scientific research, fact simply means some phenomenon that has been observed. Scientific research aims at systematic description of observed facts and of their mutual relations. It also aims at understanding their nature and interprets the observed facts and relations. This involves the reduction of observed facts and their relations into a limited number of general statements that account for the observed facts and their relations. These general statements embody a theory (Mohsin 1984 p 4).

There is little agreement among social scientist's on what theory is. For example, according to Goode and Hatt (1952): A theory refers to the relationship between facts or the ordering of them in some meaningful ways, whereas to Kerlinger (1973), a theory is a set of interrelated constructs (concepts), definitions and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena.

There are many more explanations of what a theory is. Despite the disagreement, there are certain common points in almost all the explanations. Keeping this in view we can understand a theory as a systematic explanation for the observed facts and their interrelations.

Facts and Theory

Scientific research starts with facts and then moves towards theorising. To be useful, facts must be organised, and the primary purpose of the scientific method is to develop a mechanism of organising the facts as they accumulate and become meaningful from the standpoint of their objectives. Through empirical investigations, scientists gather many facts. As these facts accumulate, there is a need for integration, organisation and classification in order to make the isolated findings meaningful.

When isolated facts are put in a perspective by integrating them into a conceptual scheme, which promotes greater understanding, we approach the domain of science. Significant relationship in the data must be identified and explained. In other words, theories must be formulated.

Theory knits together the results of observations, enabling scientists to make general statements about variables and relationships among them. For example, in Boyle's Law, a familiar generalisation summarises the observed effects of change(s) in temperature on the volumes of all gases by the statements – "When pressure is held constant, as the temperature of a gas increases, its volume is increased and as temperature of a gas is decreased its volume is decreased". This statement of theory not only summarises previous information, but also predicts other phenomena by telling us what to expect of any gas under any change(s) in temperature.

Just as fact underlies theory, theories underlie facts – each raising the other like a spiral to an increasingly precise scientific formulation. Facts derive their significance from theoretical framework into which they bring facts into focus. This is well stated by Van Dalen (1973) :

> *"….there is a constant and intricate relationship between facts and theory. Facts without theory or theory without facts lack significance. Facts take their significance from the theories which define, classify and predict them. Theories possess significance when they are built upon, classified, and tested by facts. Thus, the growth of science is dependent upon the accumulation of facts and the formulation of new or broader theories."*

This is particularly true in the early stages of scientific development, since in its early stage, research must confine its efforts to seeking answers to highly specific and particularised problems. In the later stage, it tends to strive towards unity by breaking down the very barriers that had made its earlier progress possible. Scientific theories attempt to organise the tiny, rigorously defined bits of knowledge into a more meaningful and realistic structure. This is precisely the function of theory.

Purpose of Theory

There are several purposes to be served by a theory in the development of science. We shall briefly consider three of them here. First, theory summarizes and puts in order the existing knowledge in a particular area. It permits deeper understanding of data and translates empirical findings into a more easily retainable and adaptable form. The theory of oxidation for instance, places into focus many of the chemical reactions common to everyday life.

Secondly, theory provides a provisional explanation for observed events and relationships. It identifies the variables that are related and the nature of their relationships. A theory of learning, for example, could explain the relationship between the speed and efficiency of learning and such other variables as motivation, reward and practice.

Lastly, theory permits the prediction of the occurrence of phenomena and enables the investigator to postulate and, eventually, to discover hitherto unknown phenomena. At the time when the 'Periodic Table' was being completed, for instance, certain gaps were noted in the sequence of the elements. Since theory provides that, there should have been no gaps, scientists were spurred on to look for the other missing elements. In time, these were found, anticipated by theory. Theory, therefore, stimulates the development of new knowledge by providing the lead for further inquiry.

Developing a Theory

It is important to stress that good theories are not born out of imagination; they do not originate merely through arm chair reflection. A theory is built upon collected facts. The investigator then searches, makes intelligent guesses as to how the facts are ordered, adds missing ideas or links, and puts forward a hypothesis; deduces what consequence should follow from the hypothesis and looks for further facts which are consistent or otherwise with the deductions; builds a wider generalisation or conceptual framework on more facts and eventually outlines a theory.

Theories are solidly based on evidence. And they are important practical tools which enable us to advance our knowledge still further. Once a theoretical framework has been elaborated, we know what facts to look for to confirm or to deny the theory. Also, we have a conceptual framework inside with which our evidence can be tested.

Theories always involve terms that refer to matters that cannot be directly observed. For example, gravity itself cannot be directly observed, though the effects of gravity can be. Gravity and gravitation are both theoretical terms. The terms of a theory or theoretical statement are sometimes referred to as constructs. Thus, many theories of learning refer to a motivational factor in behaviour. Now motivation is not directly observable. It is a theoretical term. Or, we may say that it is a construct. The term implies that it is a construction of the scientist's imagination.

Scientific Method

It is obvious that it would be impossible to comprehend the nature and content of research without an appreciation of *method*. The method used in scientific research is usually designated as scientific method. According to George Lundberg (1946), scientific method consists of three basic steps, systematic observation, classification and interpretation of data. Through these steps, scientific method brings about not only verifiability of the facts, but also it lays the confidence in the validity of conclusions.

The definition requires some more explanations. First when Lundberg (1946) says that scientific method is systematic observation, he means, the scientific investigation is ordered. It aims at discovering facts as they actually are and not as they are desired to be and as such, the investigators can have critical confidence in their conclusions. Second, the scientific method is concerned with 'classes of objects' not 'individual objects' especially *universality* and *predictability*. The method makes it possible to predict about a phenomenon with sufficient accuracy.

The major characteristics of scientific method are:

- Objectivity,
- Verifiability.
- Replication and
- Prediction.

Let us look at these characteristics more closely:

Objectivity

The most important characteristic of scientific method is objectivity. Research is beyond the subjective bias of the researcher. The researcher makes deliberate efforts to eliminate personal bias and prejudices and resists the temptation to seek only such data that supports his/her hypothesis. The emphasis is on testing, rather than proving the hypothesis. The researcher is prohibited to make personal judgement. Instead it uses the data and logic lead to a sound conclusion. Objectivity is achieved through standardisation of research instruments and analytical tools.

Verifiability

This is another characteristic of scientific method. Research findings presented for other researchers must be verifiable. Research is a scientific endeavour and hence its findings are open to scrutiny. This characteristic of scientific method, i.e. verifiability, is related to the criteria of objectivity. That is, a study which is based on objective facts can be verified. Verifiability is achieved through two different approaches: first, analysing the same data on the same sample through alternative analytical tools (statistical methods); second, replicating the study on a different sample.

Replication

The third characteristic of scientific method is 'replication'. Only through replication of a research study the conclusions/results can be confirmed. As such, through the use of scientific method it is possible to replicate the study and verify the results. Only if the research has been carried out by using a scientific method, it can be replicated for verification.

Prediction

Prediction is achieved through the uses of statistical methods and techniques. For example, regression analysis is the most common statistical procedure in quantitative research which predicts about the phenomena under study.

Use of Scientific Method in Social Science

Social sciences primarily deal with human behaviour, which is, by and large, complex and dynamic in nature. One cannot, therefore, investigate the human behaviour under guided conditions as in natural and physical sciences. This creates many problems for the researcher such as the problems of subjectivity and individualistic generalisations etc.

The problems arising out of the nature and content of social sciences do not seriously diminish the importance of scientific method for social scientists. Not withstanding the inherent defects of social sciences, scientific method can be acceptable with its own limitations for the study of social phenomena so far as it helps to arrive at valid generalisations.

Possibilities and Limitations of Use of Scientific Method in Social Sciences

As described above, the social sciences deal with human beings. Hence, the subject of scientific research poses much greater complexity than that in natural sciences.

Although problems of discovering principles of human behaviour are difficult, they are not impossible. Social scientists will need to carry out observations as carefully as in natural sciences. Subjective, qualitative judgements need to be supplemented by more exact, quantitative measurements which are not easy to achieve in the case of human beings.

Social sciences have not been able to establish generalisations equivalent to theories of the natural sciences or, to predict events or behaviours accurately. Perhaps, social sciences will never realise the objective of science as completely as natural sciences do. In fact, there are several limitations involved in the application of the scientific method in social sciences.

Meaning of Social Research and Social Work Research

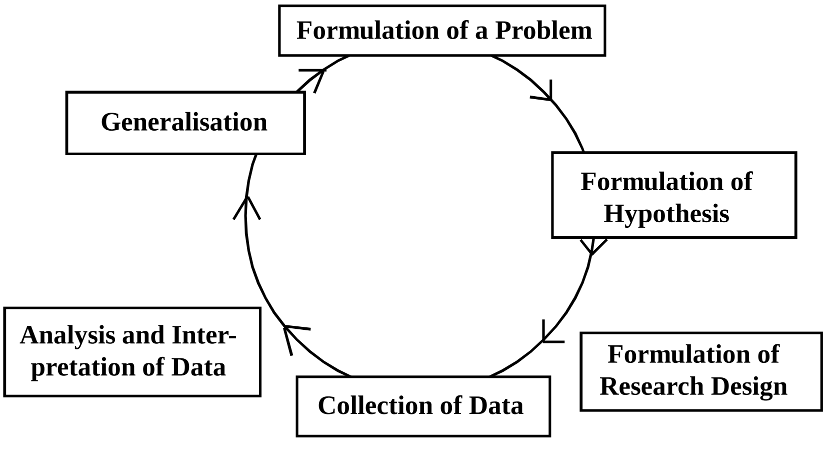
Social Research

The object of social research is clearly the discovery of causal relationships in human behaviour. It is generally acknowledged that in human behaviour, as much as in natural phenomena, a large degree of measurable and predictable sets of associations occur. Social research, then, like research in physical and natural sciences, seeks to establish, measure, analyse these associations in all their variety and intensity (Thomas, 1968, p.294). Social research, however assumes a distinct character of its own in a significant measure when it comes to the application of scientific process as in natural sciences, to social phenomena. Unlike, physical and natural sciences, in social research the objects are conscious and active human beings. The individual behaviour of the objects whether it is free or determined makes the social research really a difficult job. Further, the researcher and object being similar, the scope of an objective approach in social research is limited to a considerable extent.

Social research concerns with social data, which are much more complex than that of the physical data. The basis of all social interactions, whether it is a large complex group or a small cohesive group, is expectations of behaviour, which in turn is result of many factors. The complex nature of social data reduces the power of exact prediction in social research. Most of the subject matter of social research is qualitative and does not admit quantitative measurement. It is more so, because social phenomena are known only symbolically through concepts or terms representing such phenomena.

Social Research Process

The research process is the paradigm of research project. In a research project, there are various a scientific activity in which researcher engages him in order to produce knowledge. Although each research project is unique in some ways, all projects, regardless of the phenomenon being studied, involve, by and large, some common activities, which are interdependent. The research process is thus the system of these interrelated activities. The various activities are conveniently grouped into six stages as shown in Figure given below.



Social Work Research

Social work research is the application of research methods to the production of knowledge that social workers need to solve problems they confront in the practice of social work. The knowledge is useful in appraising the effectiveness of methods and techniques of social work. It provides information that can be taken into consideration by social workers prior to making decisions, that affect their clients, programmes or agencies such as use of alternative intervention techniques or change or modification of programme, and so forth.

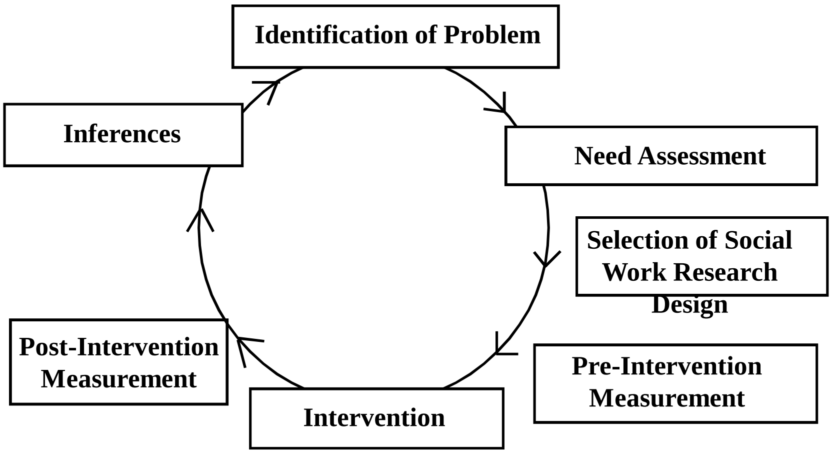
Social work research offers an opportunity for all social workers to make a difference or modification in their practice. There is no doubt about the fact that social worker will be more effective practitioner guided by the findings of social work research. Thus, social work research seeks to accomplish the same humanistic goals, as does a social work method. Social work research deals with those methods and issues, which are useful in evaluating social work programmes and practices. It explains the methodology of social research and illustrates its applications in social work settings.

Goal of Social Work Research

Social work is a *practical* profession. As such, the major objective of social work research is to search for answers to questions raised regarding interventions or treatment-effectiveness in social work practice. In other words social work research attempts to provide knowledge about what interventions or treatments really help or hinder the attainment of social work goals. In addition, it also helps in searching for answers to problems or difficulties faced by social work practitioners in the practice of their profession. Ultimately, it helps building knowledge — base for social work theory and practice.

Social Work Research Process

Social work research starts with problem identification and setting up of goals. This is followed by the process of assessment (or need assessment) of the clients problems. After the problem is identified and needs are assessed, the next step is to set up goals to be achieved. The goals are required to be specific, precisely defined and measurable in some way. The third step in the process is to have a pre-intervention measurement, that is, measurement prior to intervention. The pre-intervention measurement is used as basis from which to compare the client's condition after the intervention has been introduced.



Social Work Research Process

Next stage in the process is to introduce intervention. It is important here to note that only a single, coherent intervention be applied during any intervention phase. In the last stage, we assess the effects of intervention by comparing the two measurements, that is, pre-intervention measurement and measurements after intervention.

Nature of Social Work Research

Social work research primarily deals with problems, faced by professional social workers, social work agencies and community in its concern with social work functions. In other words, in social work research the problems to be investigated are always found in the course of doing social work or planning to do it (Dasgupta, 1968).

It is very obvious that in social work research the study of a problem is from the point of view of social work and that of professional social work. The designing of research, problems, data collection and its interpretation will have to be attempted in a manner as would be useful to professional social work which would add new knowledge to the social work theory and practice and improve the efficiency of professional social workers.

Social work research mostly draws its inferences through inductive reasoning. That is, inferring something about a whole group or a class of objects from the facts or knowledge of one or few members of that group or class. Thus, in social work research, inductive reasoning carries us from observation to theory through intervention/ assessment. Practitioners, for example, may observe that delinquents tend to come from families with low socio-economic status. Based on the assumption that the parent-child bond is weaker in low socio-economic families and that such parents, therefore, have less control over their children, the practitioners may inductively conclude that a weak parent-child bond leads to delinquency.

A substantive part of social work practice is concerned with the micro-level practice, such as working with individuals, groups, or a community. Social work research has to take into consideration the limitations of micro level design of study and techniques.

Social work research lays special emphasis on evaluation. This is one of the reasons that social work research is also understood as evaluative research. Under social work research, varieties of evaluative researches are undertaken. Some of the researches are on impacts or effects, efficacy and effectiveness. Evaluation of agencies and its projects and programmes are some of the specialized areas of social work research.

Scope of Research in Social Work

While on the theoretical side, social work research re-examines the special body of knowledge, concepts and theories and tries to evolve a systematic theory and valid concepts in the area of social work practice. Social work research may be conducted to know the efficacy of different methods of social work as to search for alternate interventions and treatments.

Identification of social work needs and resources, evaluation of programmes and services, evaluation of programmes and services of social work agencies, are some of the areas in which social work researches are undertaken.

Social work research may be conducted to know the problems faced by professional social workers in social work agencies and communities in their concern with social work functions. Thus, social work research embraces the entire gamut of social work profession: concepts, theories, methods, programmes, services and the problems faced by social workers in their practice.

Social work research typically focuses on assessment of practitioner's work with individuals, groups, families communities or appraisal of agencies or programmes that involve the continued efforts of practitioners with many clients. As such, the research design, data collection and analytic strategies in social work research vary as a function of unit of analysis and programme of agencies of social work practitioner.

It focuses on or confines itself to select aspects of behaviour and alternate modes of behaviour modifications. It helps to find ways and means to enhance social functioning at the individual, group, community and societal levels.

When the focus of research is on concepts, principles, theories underlying social work methods and skills, social work research is known as intervention research. It also involves the study of the relationship of social workers with their clients: individuals, groups or communities on various levels of interaction or therapy as well as their natural relationships and functioning within the organizational structure of social agencies.

The areas of social work research may be broadly categorized as follows:

1) Studies to establish identify and measure the need for service.
2) To measure the services offered as they relate to needs
3) To test, gauge and evaluate results of social work intervention.
4) To list the efficacy of specific techniques of offering services.
5) Studies in methodology of social work.

Social work is a diverse profession, possible broad research areas could be:

i) Community Health,
ii) Community Mental Health ,
iii) Child Welfare,

iv) Women Welfare,

v) Youth Welfare

vi) Aged Welfare,

vii) Substance Abuse,

viii) Poverty alleviation,

ix) Mental retardation,

x) Juvenile Delinquency,

xi) Crime and Corrections, etc.

The list is not exhaustive; it is only illustrative which enlists broad areas which are very frequently studied by social workers. Again, within one or more problem- areas, research might focus on individuals, families, groups, community organizations or broad social systems. It might deal with characteristics of a larger population, and the services available to them.

Conclusion

Any study to create new knowledge or aims to increase existing fund of knowledge, may it be through observation or by some other methods, is called research. Whereas scientific research is a systematic and critical investigation about the natural phenomena to describe, explain and finally to understand the relations among them.

Scientific research starts with facts and then moves towards theorising. Theory may be defined as “a set of interrelated constructs (concepts), definitions and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of predicting and explaining the phenomena.

There are several purposes to be served by a theory in the development of science. First, theory summarises and puts in order the existing knowledge in a particular area.

Secondly, theory provides a provisional explanation for observed events and relationships. Lastly, theory permits the prediction of the occurrence of phenomena and enables the investigator to postulate and eventually, to discover hitherto unknown phenomena.

Scientific method consists of three basic steps: systematic observation, classification and interpretation of data. The major characteristics of scientific method are: Objectivity, Verifiability, Replication and Prediction.

The aim of social research is to discover causal relationships in human behaviour. It is generally believed that in human behaviour, as much as in natural phenomena, a large degree of measurable and predictable sets of associations occur. Social research, then, seeks to establish, measure and analyse these associations in all their variety and intensity.

Social work research is the application of research methods to the production of knowledge that social workers need to solve problems they confront in the practice of social work. The knowledge is useful in appraising the effectiveness of methods and techniques of social work.

The major objective of social work research is to search for answers to questions raised regarding interventions or treatment—effectiveness in social work practice.

Social work research mostly draws its inferences through inductive reasoning. That is, inferring something from the facts. Thus, in social work research inductive reasoning carries us from observation to theory through intervention/ assessment. A substantive part of social work practice is concerned with the micro-level practice, such as working with individuals, groups or a community. Social work research lays special emphasis on evaluation.

Social work research typically focuses on assessment of practitioner's work with individuals, groups, families communities or appraisal of agencies or programmes that involve the continued efforts of practitioners with many clients.

The areas of social work research may be broadly categorized as : studies to identify and measure the need for service; studies to measure the services offered as they relate to needs; studies to test, gauge and evaluate results of social work intervention; studies to list the efficacy of specific techniques of offering services and studies in methodology of social work.

References

Bloom, M. "Challenges to Helping Profession and the responses of Scientific Practice", *Social Service Review,* 52, 584-595., 1978.

Dasgupta, Sugata. "Social Work Research " in *Encyclopaedia of Social Work,* India New Delhi :Govt . of India, 1977.

Epstein, I & Tripodi, T. *Research Techniques for Program Planning, Monitoring and Evaluation,* New York: Columbia University Program, 1973.

Fansel, David, "Services to and by the real people". *Social Work,* 34, 195-196, 1980.

House, E.R. *Evaluating with Validity,* Beverly Hills, California. Sage, 1980.

Herlekar, A. *Research in Social Work*, The IJSW Bombay, July 1964.

Jacob, K.K. *Methods and Fields of Social Work in India*, Bombay: Asia Publishing, 1965.

Khinduka, S.K. *Social Work in India,* Allahabad: Kitab Mahal, 1965.

Lal Das, D. K. *Practice of Social Research : Social Work Perspectives* : Jaipur : Rawat Publications, 2000

Lal Das, D. K. *Designs of Social Research* : Jaipur : Rawat Publications, 2005

Levin . M.H. *Cost Effectiveness: A Primer* New Delhi : Sage, 1985.

Lynn. Lvons. V. and Morris (ed.) *Programme Evaluation,* London : Sage, 1978.

Micheal . J. and Associates, *Evaluating Your Agency's Programme,* London: Sage, 1982.

Mishan. E. J. *Cost-Benefit Analysis: An Informal Introduction,* London : George Allen and Unwin Ltd., 1971.

Monette, Duane R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Posova, E.J. & Carey R.G., *Programme Evaluation Methods and Case Studies* NJ: Englewood Cliffs Prentice Hall, 1985.

Polansky, N.A. (ed.) *Social Work Research,* Chicago: The University of Chicago Press, 1975.

Reid, W. "The Social Agency as a Research Machine", *Journal of Service Research,* 2, 11-23., 1978.

Rubin, Allen & Babbie E. *Research Methodology for Social Work,* Belmont, California, Wadsworth, 1989.

Rossi. H.P. and Williams. W. (ed.) *Evaluating Social Programs. Theory. Practice and Politics,* New York: Seminar Press, 1972.

Ramachandran. P. “Social Work Research and Statistics” in *History & Philosophy of Social Work in India*, Bombay : Allied Publishers, 1968.

Ramchandran, P. “Research in Social Work “ in A.B. Bose (ed.) *Encyclopaedia of Social Work in India,* New Delhi: Government of India , p. 386, 1987.

Reid , William J. “Research in Social Work “ in *Encyclopaedia of Social Work*, Silver Spring, Maryland , 1987.

Rossi, P. & H. Freeman, *Evaluation: A Systematic Approach*, Beverly Hills, Sage, 1982.

Schneirer, M.A. *Programme Evaluation The Organizational Context,* Beverly Hills, California, Sage, 1979.

Thomas, E.J. “The BBESDAS Model for Effective Practice”, *Social Work Research and Abstract,* 13, 12-16, 1977.

Thomas , P.T. “Social Research “ in M.S. Gore (ed.) *Encyclopaedia of Social Work in India*, New Delhi : Government of India , p.204, 1968.

Van Maanen. John, *Varieties of Qualitative Research,* New Delhi : Sage, 1982.

Wienback, R.W. and Rubin, A. (Ed) *Teaching Social Work Research: Alternative Programs and Strategies,* New York: Council on Social Work Education, 1980.

Weiss, Carol. *Evaluation Research Englewood Cliffs,* N.J. Prentice Hall, 1972.

Werner, W.B. *Objectives of Social Curriculum of the Future,* New York: Council of Social Work Education, 1959.

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Research Review in Social Work

**D.K. Lal Das*

Introduction

Social work is a *practice* profession. As such, the major objective of social work research is to search for answers to questions raised regarding interventions or treatment effectiveness in social work practice. In other words social work research attempts to provide knowledge about what interventions or treatments really help or hinder the attainment of social work goals. In addition, it also helps in searching for answers to problems or difficulties faced by social work practitioners in the practice of their profession. Ultimately it helps building knowledge base for social work theory and practice.

Social work encompasses a broad spectrum of subjects related with both theory and practice. Most probably, this is the reason research studies available on these areas have yet to be compiled in an exhaustive manner. We can, however, group the areas of research in social work as follows.

1) Studies to establish identify and measure the need for service.
2) To measure the services offered as they relate to needs
3) To test, gauge and evaluate results of social work intervention.
4) To list the efficacy of specific techniques of offering services.

Dr. D.K. Lal Das, R.M. College of Social Work, Hyderabad

In this Chapter, an attempt has been made to introduce you to different areas of research on social work. Under each area, a synoptic view of research studies has been projected covering objectives, methodology and findings of the studies.

Research Review in Social Work: International Perspectives

Research articles pertaining to social work published in various international journals of interest to professional social workers can be broadly classified into four categories: (a) evaluation research; (b) refinement in measuring techniques; (c) practitioner-researcher integration; (d) use of research techniques by practitioners in monitoring their intervention activities (Abstract, NASW).

A review of the state of art of research in social work in the western world reveals that there is no single 'composite' western picture or profile. Hence, first we scan the scene in the English speaking world based on the availability of literature from these countries.

Till 1960, in the western world, social work research was in an underdeveloped state even in the US, where the profession of social work has a much longer tradition than elsewhere.

Most of the researches in social work employed survey research designs and were concerned with description of different social problems using basic statistical methods. Only a few of these researches used experimental research designs and were concerned about research methodologies, causal and diagnostic analyses through correlations and path analyses. Obviously, these researches followed hypothetico-deductive model of social science research.

But one is pleasantly surprised at the change that has taken place in this situation during the later part of last century or so, because of the changes in emphasis on researches in social work practice areas.

For example, shift of emphasis from just description of social problems to problems of psychic imbalances and familial disturbances is noteworthy. Correspondingly, research concerning social work intervention through case-work method assumed greater importance in affluent countries. Almost simultaneously, research in social work intervention through group work, community organisation and administration of welfare services, received recognition in the field of social work research.

A cursory glance at researches undertaken during the 90's of the last century in this part of the globe shows that a substantive part of social work research is concerned with the micro-level practice, such as working with individuals, groups, or a community.

As a sequel to this shift in the nature of research and problems attended to, increasing emphasis was placed on a variety of evaluation studies and involvement of (non-social worker) practitioners in multidisciplinary researches (Abstract, NASW).

Demand for higher standards of social work services and accountability of professional social workers paved the way for use of computer technology in social work research. Computer assistance was in demand to reduce non- or Para –social work activities in order to minimize undue-utilization or wastage of social work skills (Abstract, NASW).

In fact, the most encouraging trend was the use of computer softwares related with research techniques by practitioners. It was realized that so long as social work practitioners do not make use of computers as a part of their functions neither practice nor research can develop substantially. Essentially then, practitioners had to evaluate their interventions with clients by using systematic research techniques with the help of computers.

Thus social work research practitioners were helped to, empirically, describe what they are doing with their clients and why they are following a particular course of treatment as well as monitor the effect of their interventions. Correspondingly, there was a sharp decline in survey research pertaining to description of different social problems, causal and diagnostic analyses in the areas of social work.

This shift in research emphasis might have occurred because traditional researchable issues had by then been exhaustively studied and/or had established comprehensive patterns or trends. Another probable reason for the movement away from traditional researches could be consistent demand for higher standards of social services.

It might be also due to the increasing demands of accountability of professional social workers, as Brenner (1976) says, “The current crisis in accountability has illuminated the failure of traditional researches to provide sufficiently relevant, effective and efficient modes of inquiry into social services.” Burk (1975) and Peterson point out that “more traditional kind of researches *per se* is not needed.......need is for more evaluation of ongoing counselling programme and efforts”.

Currently, in western world, Social Work research methodology links social work knowledge and practice. The Task Force on Social Work Research sponsored by the National Institute of Mental Health, recently completed a three-year study in which it examined the current status of research in social work, one of the key professions that employs social and psychological interventions for the purpose of helping people solve problems of growth and adaptation (Austin et. al.1991).

Among the chief observations made by the task force are : more researchers are required to do research that informs social work practice; and there are deficits in the structural arrangements of research, i.e., a paucity of structures to facilitate collaborative efforts between universities and social agencies. It is further noted that the Council on social Work Education has reaffirmed its position that schools of social work, to be accredited, must provide instruction that teaches students how to evaluate the effectiveness of their practice.

With respect to these considerations and in reference to the state of the art of research in the social work professions, the three emerging issues are : conceptualization of intervention research, so that it allows social work theoreticians and researchers to distinguish intervention research, from other modalities; a new model of research on the design and development of intervention; and guidelines for conducting intervention research in direct practice with individuals and families, as well as in community organizations.

Intervention research, which is focused on the development of knowledge about interventions, as being comprised of Intervention Knowledge Development, Intervention Knowledge Utilization, and Intervention Design and Development. Intervention Knowledge Development employs conventional social research strategies to produce knowledge from the social and behavioral science that can be applied to social work practice; and Intervention Knowledge Utilization employs a variety of procedures, such as meta-analysis, marketing strategies, and demonstrations, to package and disseminate knowledge about innovative interventions. Intervention Design and

Development is the heart of intervention research because it focuses on the development of new interventions as well as on the requirements for adapting previously used interventions to changing conditions such as population demographics, new social problems, reduced resources, etc. it is the methodology and practice of Intervention Design and Development that provides the uniqueness of intervention research. Paradoxically, the design and development of interventions that are effective has long been a favourite rallying cry for human service practitioners seeking relevant knowledge yet, it is that research that has been most neglected (Thomas, 1984; Rothman, 1980).

The model of Intervention in Design and Development that combines and integrates the essential features of two pioneering efforts in the field; social R and D and Research and Development in the Human Service. This integrated model is comprised of six phases; problem analysis and project planning; information gathering and synthesis; design early development and pilot testing; evaluation and advanced development; and dissemination. The research focuses on various aspect of these phases and provide a clear view of the creativity that is necessary to develop relevant interventions that achieve practice goals. One may form an impression that design and development can be time-consuming and complex, and so become disinclined to engage in this type of research. This would be a serious mistake and would reinforce the observation of the Task Force on social Work Research that research directly related to social work practice is often neglected. Authors further suggest that intervention-oriented researchers must conceive of research on serious social problems as involving possibly more than research by one individual i.e. research may be programmatic, involving inter-as well as intra-disciplinary efforts by teams of researchers. The conception is useful for either individual or team research. In addition, researchers can carry out research on various aspects of the model as applied to the development of particular intervention (Rothman, 1980; Thomas, 1984).

There is no particular trend in research technique that is employed in Intervention Design and Development. Both quantitative and qualitative research modalities are used in relation to a particular type of intervention that is being produced. The research experiences that are described help the reader to develop a conceptual and methodological stance for conducting various aspects of intervention research. In addition, they provide a useful frame of reference for theoretician's instructors, supervisors and practitioners. It helps in comprehending the very meaning of interventions and in their development, prior to testing for their effectiveness.

Steven (1994) emphasizes that meta-analyses should be conducted by those who are familiar with the literature that is being synthesized. One should not simply combine and summarize effect sizes without understanding the details of the studies that are summarized. James K. Whittaker and Elizabeth M. Tracy (1994) show how research can be focused on the design of practice guidelines for the use of network interventions with high risk youth and families. They illustrate the importance of designing interventions that are compatible with the philosophy, values, and goals of community agencies and social programs; and they demonstrate the value of their research, nothing that it is time consuming (Forness, 1994).

Reid (1994) develops a strategy for the research development of a single intervention, the family problem-solving sequence. His strategy involves the initial development, modification of intervention through single case studies; the aggregation and further analysis of those studies; and the construction of a more rigorous design.

This strategy promises to be especially useful in clinical research efforts.

William J. Intervention Research needs to be conducted in practice settings. A researcher may be engaged in a design and development project in which he or she creates the practice environment in a laboratory-type situation; for example research sponsored by a federal agency, such as that described by Edwin J. Thomas (1994) in evaluating and further developing a unilateral family therapy approach with spouses of alcoholics. Or, the research may be conducted by outside researchers who use the social agency as a laboratory, as in the illustration of the research by James K. Whittaker (1994) and Elizabeth M. Tracy (1994). Or, further still, the research may be reflective of collaborative efforts by university researchers and agency personnel. Currently, there is increased federal funding available for collaboration in the areas of mental health and child welfare. Of particular importance is the discussion by Yeheskel Hasenfeld and Walter M.. Furman (1994) who analyze three collaborative researches and development projects from the perspective of inter-organizational exchange, and offer guidelines for facilitating inter organizational collaboration. Employing concepts such as power balance, structural centrality, stability, linkages, and motivational compatibility, the authors provide many useful insights and ideas.

Ronald H. Rooney (1994) discusses strategies for enhancing professional education. He believes the model of intervention research could be disaggregated so that relevant research could be performed within various phases of the model; and among his suggestions, he advocates more instruction about intervention research in graduate courses and more use of the practice of intervention research in doctoral education. This is very timely because the introduction of intervention research methodologies and issues in doctoral education most clearly should be given the highest priority.

In summation, current researches provide a wealth of ideas about Intervention Design and Development. They offer conceptual schemes, results from recent design and development studies, guidelines, strategies, and methodologies. There is important material in each research , which should be read by students, scholars, practice theoreticians, and researchers in the social work professions and related disciplines. The contents are provocative and should lead to discussion and further research that will inform practitioners about effective practice innovations at the individual and system levels.

Research Review in Social Work: National Perspectives

From all available information it seems that until about fifties, student research was almost the only research activity in the schools of social work in India. The change in the number and nature of social work research took place as a result of the impetus given to social research in general by the Planning Commission, Government of India. Since research was implied in planning, the Planning Commission set up a Research Programmes Committee whose function , inter alia, was to farm out studies in different fields and aspects to different research agencies and institutions in order to obtain base-line data for planning purposes. The Research Programmes Committee was followed by the Central Social Welfare Board which sponsored a few field studies in the area of social welfare undertaken by schools of social work because they were assumed to be the repositories of social work knowledge and research expertise and hence the appropriate media through which to bring forth meaningful action related research findings.

As a sequel to this development, a number of research studies were undertaken by schools of social work covering a wide range of research areas like :

i) Community Health,
ii) Community Mental Health,
iii) Child Welfare,
iv) Women Welfare,
v) Youth Welfare
vi) Aged Welfare,
vii) Substance Abuse,
viii) Poverty Alleviation,
ix) Mental Retardation,
x) Juvenile Delinquency,
xi) Crime and Corrections, etc.

A review of these studies shows that most of the researches employed survey research designs and were concerned with description of different social problems using basic statistical methods. Only a few of these researches used research designs for causal and diagnostic analyses. Obviously, these researches followed hypothetico-deductive model of social science research.

An overall review of the state of the art of social work research would reveal that for quite a few reasons there has been little growth and practically no developments in the social work research in India. This is evident from observation made by social work education at different points of time in India – 1961, 1972, and 1977. These show that there has been serious stagnation or at least very poor growth in social work research in India. Given the fact that social work education was introduced in India in 1938, Saiyid Zafar Hasan pointed out in 1961 that 'very little has been done which is really worth'. In 1972, Ranade lamented that "social worker is far from impressive from either the qualitative or the quantitative angle".

As the Committee on Social Science Research observed, "Much of the research in social work cannot meet the standards of rigorous social work research and there is conspicuous absence of competent criticism which would ensure minimum standard of quality. There has also been an obvious fragmentation of research in this field and unrelated studies on different problems. Even where a number of studies have been done on the same problem these are invariably non-comparable because the methodological tools differ, the basic concepts vary and the very presentation of findings is divergent. The sporadic nature of research in social work and related fields in India has, to a large degree , contributed to the poor quality in terms of initial preparation of design of the study, reliability and accuracy of data, strength of evidence to justify conclusions and lucidity of presentation" (Planning Commission, 1968).

This may be due to the fact that researchers have been following hypothetico-deductive model of social research. This dominant paradigm mainly focuses on quantitative measurement, experimental design, and probability sampling and multivariate parametric statistical analysis. The research based on this model has hardly any relevance to social work practice.

Research curriculum in social work education has traditionally been modelled on social science research. This is most probably the reason why research in social work in India is in no way different from the social science researches. As such, social work researchers, largely, view the culmination of research as the drawing of conclusions from the research findings through the process of deductive reasoning. These conclusions, obviously, contribute neither to knowledge base of social work nor to the social work practice. Seldom do they try to test the interventions or evaluate the outcome of their interventions. The research findings have hardly any relevance to social work practice. As a consequence, social work researchers and social work practitioners as well fail to see the link between social work research and social work practice. Most of them develop a notion that they have nothing to do with research.

The Emerging Trend

Social work research needs to emerge from a shadowy existence and occupy an equal place with other methods of social work. Research and practice should be perceived as allied aspects of social work and bound by the common goal of advancing and consolidating the theory and practice of social work. Common areas need to be identified to merge research with theory and practice emphasizing on combining research training with field work (Monette, 1986). It is evident from the above discussion that social work research needs change in its focus, especially in the areas of research design, measurement, and sampling so that the research findings become relevant and useful for social work profession and thereby demonstrate the accountability of social work interventions.

Stimulating Research in Social Work

Social workers have to realize that it is on them that the primary responsibility of expanding the horizons of social work devolves. The present dependence on social science research model must be dispensed with and appropriate social work research evolved to enable social work professionals to relate research with social work practice.

The perspectives and methods of science can provide a framework for social work research. Most of the knowledge used by social work researchers lacks a strong empirical basis - an unavoidable limitation of profession that deals with the elusive complexities of psychological and social phenomena. Social work educators can make use of scientific orientation in motivating social work doctoral research students to go for empirical testing of the various knowledge bases of social work - theories, principles and concepts taught in the theory classes. Research will provide empirically grounded knowledge, which in turn can make a significant change in the attitude of the students and educators towards the profession.

In most of the research studies conclusions are based on percentage analysis of data. Statistical tests are indispensable in research to analyze and interpret the data. Most social work researchers approach the subject with nervous anxiety. They feel themselves incapable of understanding statistics for the reason that they do not have good mathematical background. This negative attitude to statistics has led social work researchers to a position where theoretical explanations or simple reasoning appear to be more highly valued than statistical ascertained relationships. Social workers, in order to advance their professional standard and accountability of their interventions must work through such irrational attitudes towards empirical knowledge, which complements and interacts with theory and practice.

The rationale to motivate social work researchers to apply statistics lies in that there has been very rapid growth in the field of social work profession in the recent years and growing recognition of the need for research and statistics to enhance practice. It is for this reason that social work researchers must be well versed with the use of statistical methods and tools.

In most of the doctoral research dissertations in social work, research scholars have used survey research designs. Further, a good number of these researches were confirmatory researches. It is imperative for social work researchers, to realize that social work research is a problem solving method and it seeks to accomplish the same humanistic goals as does social work practice. For this, social work researchers have to use appropriate social work research designs to study specific topics from the field work experiences related to social work. The areas of social work research may be broadly categorized as follows:

1) Studies to establish, identify and measure the need for service.
2) To measure the services offered as they relate to needs
3) To test, gauge and evaluate results of social work intervention.
4) To list the efficacy of specific techniques of offering services.
5) Studies in methodology of social work.

It is very obvious that in social work research the study of a problem is from the point of view of social work and more so from the pespective of professional social work. The designing of research problems, data collection and its interpretation will have to be attempted in a manner as would be useful to professional social work which would add new knowledge to the social work theory and practice and improve the efficiency of professional social workers.

The greatest drawback of social work research has been the lack of fit between research and practice. Practice of social work draws more from practice wisdom than from research, while research studies are not necessarily practice-oriented. Consequently, practice and research are treated independently at the training level and the approach, therefore, continues in the post-training careers of social workers. The gulf between researchers and practitioners over the years has widened. Researchers frequently complain that practitioners ignore their pertinent and important findings. Practitioners consider much of the university-stimulated research irrelevant and express their inability to use it. Such gaps have been widened by the belief that the same persons cannot be both a good researcher and a practitioner (Fansel, 1980). Such beliefs have been substantiated by the facts that social work researchers hardly find time to practice

Conversely, the practitioners, due to their preoccupation with service delivery systems are least concerned about research. Both the contentions underscore the need to solidify the relationship between schools and agencies by integrating research and practice (Ried, 1978).

Thus, as research and practice have existed as parallel to each other, most of the time research is not practice-oriented and as such the findings do not affect social work knowledge and practice.

Role of Research in Social Work

Social work research has a challenging task ahead of it to meet the growing demands of higher professional standards and accountability. The demands for accountability on the part of social work profession - empirical evidences showing what kind of relationship would enhance the achievement of clients' goal- are becoming louder and broader in scope (Monette, et. al.1986). In a sense, the profession has to prepare itself to accept the clients rights to demand that social workers justify their actions and recommendations on specific and demonstrable grounds.

Another development in social work research has been the demand for higher professional standards. This motivated many professionals to begin defining social work as a scientific discipline and social work practice as a 'scientific practice' or 'data-guided practice' (Thomas, 1971: Bloom, 1978). This calls for improving the empirical knowledge base for social work education and practice, and delivering more effective services to the clients (Hopps, 1989). To meet the growing demands of higher professional standards and accountability, research has to play multifaceted roles. For this, conscious efforts have to be made to restructure the social work research curriculum and integrate research into theory and practice.

This is a challenging task for social work researchers. The challenge is also to recognize the ways in which *research, theory* and *practical* can be linked by incorporating research into practice settings and by shaping practice settings into research opportunities (Reid, 1978).

Programme Evaluation Research

Although non-governmental organisations (NGOs) have increased in number and financial clout, there have been very few systematic evaluation researches of their effectiveness (UNDP, 1993). To contribute effectively to sustainable human development, NGOs as well as donor/funding agencies have to recognize the significance of social work research.

Thus evaluation research can play multifarious roles to make services more effective (Monette, 1986). In order to enhance programme effectiveness, evaluators have assessed problems and needs of a programme/target population. They have assessed the extent and location of the problems, the programme as well as the target population's characteristics, problems, expressed needs and desires (Monette, 1986). This information has been used to guide programme planning and implementation concerning such issues as the type of services to offer, how to maximize service utilization by targeted sub-groups, where to locate services, and so on (Jain, 1992).

Role of NGOs in Research

In the recent past the amount of public and private funds for social welfare programmes has grown manifolds. As funding has increased, those providing the funds have sought valid and reliable evidence regarding whether programmes achieve their goals.

Although, project executors should welcome evaluation of their projects but in reality, there appears to be some kind of hesitation and resistance against the use of systematic evaluation. This reaction and resistance on the part of project executors escalate when external experts or agencies undertake the evaluation on behalf of the funding agencies.

By and large, a researcher is considered an outsider to a project and his knowledge and competence in drawing conclusions on the success or failure of a project is always questioned and challenged. Nevertheless, adopting scientific methods and techniques of evaluation research has given a positive image to the evaluator, which marks him as a "partner in progress". The researcher/evaluator is now being accepted as an expert who can provide very useful feedback to the project being evaluated. Hence, he is not only accepted but is sought after.

The prevailing approach to evaluation has to be replaced by systematic project/programme evaluation consisting of need assessment, process and outcome evaluation, interventions effectiveness etc. And finally, projects/

programmes have to be modified through the feedback received by systematic evaluation.

Evaluation researches, despite claims of having led to improvements in the execution of programmes, have also brought to the light, the fact that there are "very few successes worth to be put on record, especially in terms of post intervention sustainability" (Glaser, 1979). The poor virtually in every country on the planet are reaping fewer rewards of development than those in high income groups. The net outcome is that poor people, even when helped by successful projects still remain poor.

Programme Evaluation: The Approach

NGO performance and outcome need to be examined from the perspective of their effectiveness. So far, systematic evaluation of performance and the net outcome of NGOs have not been given proper attention either by the NGOs themselves or by the funding organizations (Bloom, 1995). Most of the NGOs do not undertake evaluation research to assess their performance or outcome. Instead, they present individual "success stories" to justify their performance and while assessing the outcome they present data without giving reference to the baseline.

The donor/funding agencies, on the other hand, largely depend on annual progress reports, which are again "success stories". They do send evaluators/experts teams for assessment of the performance and outcome of the NGOs activities (Freeman, 1985). The assessment of NGOs by the team is by and large based again on annual reports submitted by the NGOs and on partial evidences collected during their field visits. Hence, it is difficult to judge how effective NGOs performance and their outcome are.

Donor/funding agencies and NGOs have to realize that evaluation research is an integral part of the project/ programmes. They have to establish a system of evaluation.

Donor/funding agencies that have been able to respond sensitively and flexibly to the “success stories” may have to think whether funding of projects, which are not systematically evaluated, is justifiable.

Criteria for Measuring Success — Role of Vested Interests

Evaluation research in most cases has been taken up for funding of the organisation. This lead to the choice of dependent variables the criterion for evaluating a programme make evaluation researchers task more difficult. In whose interest is the research? It is not sufficient to say “in the interests of science” because the outcome will affect vested interests more than science, in the criteria chosen for success. The evaluation research affected some people’s jobs, education, or health, and the results were in the interests of some and perhaps to the detriment of others.

For instance, in the mid day meals programme for primary school children, the primary criterion (dependent variable) for evaluating the effect of the programme was whether or not there was a decline in school drop out rate. The people and agencies that implemented and evaluated the drop out were concerned that the children who received mid-day meals do not stop attending school as a result. They judged the programme success on the basis of the number of children attending the school. The same programmes could have been evaluated on a number of other criteria, the health of the children and their increased enjoyment of leisure time activities, their self-esteem, their participation in school activities or their satisfaction with school life. These other criteria were either ignored or de-emphasized. Drop-out rate is a relevant criterion, as nonetheless, the other criteria could also have been used to judge the programme’s success or failure.

The scientific selection of dependent variables has become a question of politics in evaluation research. Whose criteria will prevail? It is not always clear that one set of criteria is “better” than another. All evaluation research must address the question of whose values, whose criteria for success or failure, will prevail in judging the outcome of a programme. Different parties or participants in the research programme have different perspectives and different goals. Evaluation researchers, therefore, even more than basic researchers, must ask themselves “Whose side are we on? (Becker, 1967).

Recent Trends in Social Work Research

Evaluative research is being undertaken under a variety of captions, the simplest and commonly known is the follow-up studies. Studies on implications or efforts, efficacy and effectiveness, measurement of effects, durability of effects are also need to be added to the list.

Different client levels are covered for evaluation. At the individual level, for instance, Single Subject Design (N=1), subject as his- own control- research are some of the research studies reported recently.

Lal Das, *et. al.* studied “Effect of Social Work Intervention on Attempted Suicide using *multiple component single subject design* and reported that cognitive therapy appeared to be most effective in reducing the suicidal ideation and depression in the client. The article reports the results of a study evaluating the effectiveness of an intervention package on a male young adult who attempted suicide. Data indicate that cognitive therapy was found to be the most effective in the intervention package consisting of crisis intervention, cognitive therapy and developing problem-solving skills.

Effectiveness of social work intervention in case of psychosomatic pain disorder was evaluated employing *AB Single Subject Design Research*. The research study reports that client showed a considerable improvement. It is clear from the findings that cognitive behavioural approach coupled with problem-solving skills and applied in systems perspective is the effective programme to deal with psycho-somatic pain disorder. The findings also reflects that to get the effective results, we need to focus our intervention at different levels, where problematic elements were observed e.g. in the present case inervention was directed at client-level, family-level and also at peers-level.However, the findings of the study need to be considered in context of several methodological limitations. The study being a *single subject research design* has limited generalizability. But this is true that it will be of great help for practitioners to apply the same intervention package with other such cases. It will also help practitioners to maintain data to evaluate practice with each client.

True experimental research design was used for testing causal relationships that Value Clarification causes change in orientation towards vision and values by comparing a group of students who have been exposed to values clarification process with one that has not been exposed. The researcher attempted to assess the impact of value-clarification as a process to enhance the level of orientation towards vision and values amongst students of management. The findings indicate significant changes in the experimental group in orientation towards vision and values.

Using quasi-experimental research design, Mary Venus Joseph evaluated the effectiveness of an intervention strategy in the training of school teachers in child mental health. The researcher concludes that there is need for extensive intervention programmes for reorienting the teachers.

Social work is a practice profession. As such, the major objective of social work research is to search for answers to questions raised regarding interventions or treatment effectiveness in social work practice. In other words, social work research attempts to provide knowledge about what interventions or treatments really help or hinder the attainment of social work goals. In addition, it also helps in searching for answers to problems or difficulties faced by social work practitioners in the practice of their profession. Ultimately it helps building knowledge base for social work theory and practice.

Social work needs to develop a research paradigm that emphasizes a combination of qualitative and quantitative measurements, quasi-experimental design, non-probability sampling and multivariate non-parametric statistical analysis.

Social work research offers an opportunity for social workers to significantly improve their professional standards and accountability towards their interventions. Research has a multifaceted role to play in this direction. Steps like redesigning the research curriculum for social work, integration of research, theory and practice, stimulating research in social work and emphasis on need-based research methodology have to be taken to demonstrate the role of research in social work education.

Conclusion

Till 1960, most of the researches in social work in west employed survey research designs and were concerned with description of different social problems using basic statistical methods. Only a few of these researches used experimental research designs and were concerned about research methodologies, causal and diagnostic analyses through correlations and path analyses. Obviously, these researches followed hypothetico-deductive model of social science research.

Significant change took place in this situation during the later part of last century because of the changes in emphasis on researches in social work practice areas. For example, shift of emphasis from just description of social problems to problems of psychic imbalances and familial disturbances is noteworthy.

Researches undertaken during the 90's of last century in this part of the globe shows that a substantive part of social work research is concerned with the micro-level practice, such as working with individuals, groups or members of a community.

Demand for higher standards of social work services and accountability of professional social workers paved the way for use of computer technology in social work research. Computer assistance was in demand to reduce non- or para –social work activities in order to minimize undue utilization or wastage of social work skills.

The most encouraging trend was the use of computer softwares related with research techniques by practitioners. It was realized that so long as social work practitioners do not make use of computers as a part of their functions neither practice nor research can develop substantially. Essentially then, practitioners had to evaluate their interventions with clients by using systematic research techniques with the help of computers.

This shift in research emphasis might have occurred because traditional researchable issues had by then been exhaustively studied and/or had established comprehensive patterns or trends. Another probable reason for the movement away from traditional researches could be consistent demand for higher standards of social services. It might be also due to the increasing demands of accountability of professional social workers.

Currently, in western world social work research methodology links social work knowledge and practice.

Until about fifties, student research was almost the only research activity in the schools of social work in India.

The change in the number and nature of social work research took place as a result of the impetus given to social research in general by the Planning Commission, Government of India.

As a sequel to this development, a number of research studies were undertaken by schools of social work covering a wide range of research areas in social work.

Most of these researches employed survey research designs and were concerned with description of different social problems using basic statistical methods. Only a few of these researches used research designs for causal and diagnostic analyses. Obviously, these researches followed hypothetico-deductive model of social science research.

Review of the state of the art of social work research would reveal that for quite a few reasons, there has been little growth and practically no developments in the social work research in India.

References

Abstract for Social Workers, National Association of Social Workers, 12, 13 and 14

Austin, David, et. al., *Building Social Work Knowledge for Effective Services and Policies: A Plan for Research*

Development, Report of the Task Force on Social Work Research, National Institute of Mental Health, November, 1991.

Bloom, M. "Challenges to Helping Profession and the responses of Scientific Practice", *Social Service Review,* 52, 584-595., 1978.

Brenner,M.N. "The Quest for Viable Research in Social Services: Development of the Mini Study", *Social Service Review,* 50 (3), 1976 pp. 426-44 quoted from Abstract for Social workers, NASW, V12, No.4, 1976

Burk, H.D. and Peterson, G.W. " Needed more Evaluation not Research" Personnel and Guidance Journal55 (8)1975 p563-69

Dasgupta, Sugata. "Social Work Research " in *Encyclopaedia of Social Work,* India, New Delhi :Govt. of India, 1977.

Epstein, I & Tripodi, T. *Research Techniques for Program Planning, Monitoring and Evaluation,* New York: Columbia University Program, 1973.

Fansel, David, "Services to and by the real people". *Social Work,* 34, 195-196, 1980.

Hasan, Saiyid Zafar "Relation of the Social Sciences and Social Research for Social Work Training", paper submitted at a meeting of schools of social work in India, 13 May 1961, p7, 8, 10 (mimeo).

House, E.R. *Evaluating with Validity,* Beverly Hills, California. Sage, 1980.

Herlekar, A. *Research in Social Work*, The IJSW Bombay, July 1964.

Jack, Rthman, and Thomas, Edwin J. (eds). *Intervention Research : Design and Development for Human Service,* New York : The Haworth Press, 1994.

Jacob, K.K. *Methods and Fields of Social Work in India*, Bombay: Asia Publishing, 1965.

James K. Whittaker (1994)and Elizabeth M. Tracy (1994) et. al. "Intervention Design for Practice – Enhancing Social Support" in Rthman, and Thomas, Edwin J. (eds). Intervention Research : Design and Development for Human Service, New York : The Haworth Press, 1994.

Khinduka, S.K. *Social Work in India,* Allahabad: Kitab Mahal, 1965.

Levin . M.H. *Cost-effectiveness: A Primer New* Delhi : Sage, 1985.

Lynn. Lvons. V. and Morris (ed.) *Programme Evaluation,* London : Sage, 1978.

Micheal . J. and Associates, *Evaluating Your Agency's Programme,* London: Sage, 1982.

Mishan. E. J. *Cost-Benefit Analysis: An Informal Introduction,* London : George Allen and Unwin Ltd., 1971.

Monette, Duane R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Monette, D.R. (et.al), Applied *Social Research: Tool for the Human Services* Chicago: Holt, 1986.

Planning Commission, Government of India, *Report of the Committee on Social Science Research*, 1968 p. 23

Posova, E.J. & Carey R.G., *Programme Evaluation Methods and Case Studies* NJ: Englewood Cliffs Prentice Hall, 1985.

Polansky, N.A. (ed.) *Social Work Research*, Chicago: The University of Chicago Press, 1975.

Reid, W. "The Social Agency as a Research Machine", *Journal of Service Research,* 2, 11-23., 1978.

Rothman, Jack, *Social R and D : Research and Development in the Human Services* ,CA : Sage Publications, 1980.

Rubin, Allen & Babbie E. *Research Methodology for Social Work*, Belmont, California, Wadsworth, 1989.

Rossi. H.P. and Williams. W. (ed.) *Evaluating Social Programs. Theory. Practice and Politics,* New York: Seminar Press, 1972.

Ramachandran. P. "Social Work Research and Statistics" in *History & Philosophy of Social Work in India*, Bombay : Allied Publishers, 1968.

Ramchandran, P. "Research in Social Work " in A.B. Bose (ed.) *Encyclopaedia of Social Work in India,* New Delhi : Govt of India , p. 386., 1987.

Ramchandran, P., Proceedings of the Seminar on Social Work Research: A Resume". *Indian Journal of Social Work* , 24 (3).

Ranade,S.N. *Social Work Research in India*, ICSSR, New Delhi, 1972

Reid, William J. "Field Testing and Data Gathering" in Jack, Rthman, and Thomas, Edwin J. (eds). *Intervention Research : Design and Development for Human Service*, New York : The Haworth Press, 1994.

Reid, William J. "Research in Social Work "in *Encyclopaedia of Social Work*, Silver Spring, Maryland, 1987.

Thomas, Edwin J. *Designing Interventions for the Helping Professions,* CA: Sage Publications 1984.

Rooney, Ronald H. "Disseminating Intervention Research in Academic Setting" in Jack, Rthman, and Thomas, Edwin J. (eds). Intervention Research : Design and Development for Human Service, New York : The Haworth Press, 1994.

Rossi, P. & H. Freeman, *Evaluation: A Systematic Approach*, Beverly Hills, Sage, 1982.

Rthman, and Thomas, Edwin J. (eds). *Intervention Research : Design and Development for Human Service*, New York : The Haworth Press, 1994.

Schneirer, M.A. *Programme Evaluation : The Organizational Context* Beverly Hills, California, Sage, 1979.

Steven R.Forness, Meta-Analysis in Intervention Research-Methods and Implications in Jack, Rthman, and Thomas, Edwin J. (eds). *Intervention Research : Design and Development* for *Human Service*, New York : The Haworth Press, 1994.

Thomas, E.J. "The BBESDAS Model for Effective Practice", *Social Work Research and Abstract,* 13, 12-16, 1977.

Thomas , P.T. "Social Research " in M.S. Gore (ed.) *Encyclopaedia of Social Work in India*, New Delhi : Govt of India , p.204, 1968.

Van Maanen. John *Varieties of Qualitative Research,* New Delhi : Sage, 1982.

Wienback, R.W. and Rubin, A. (Ed) *Teaching Social Work Research: Alternative Programs and Strategies,* New York: Council on Social Work Education, 1980.

Weiss, Carol. *Evaluation Research Englewood Cliffs* N.J. Prentice Hall, 1972.

Werner, W.B. *Objectives of Social Curriculum of the Future,* New York : Council of Social Work Education, 1959.

Yeheskel Hasenfeld and Walter m. Furman, "Intervention Research as an Interorganisational Exchange" in (1994) Rthman, and Thomas, Edwin J. (eds). *Intervention Research : Design and Development for Human Service*, New York: The Haworth Press, 1994.

3

Research Process I: Formulation of Research Problem

Introduction

To claim knowledge as a scientific knowledge it is essential that it can be proved by reason and experience (observation). The claim is evaluated on two criteria, viz., *logical validity* and *empirical verification*. These two criteria are translated into various activities of researchers through the research process. Chapter 3 and Chapter 4 intend to describe the research process in detail.

Formulation of research problem, the first step in the research process, is considered the most important phase of a research project. This step starts with the selection of a suitable problem from the field chosen by the researcher. In the area of social work, several problems exist which may have reference to pure, applied, or action research. The choice and formulation of a suitable problem is one of the most difficult tasks for a researcher, especially if he/she is a beginner. There are many sources which a researcher may consult in order to formulate a suitable research problem, or from which he/she may develop a sense of problem awareness. This chapter is devoted to describe the various activities involved in the process of problem formulation, such as defining the problem, statement of the problem, operationalisation of the variables, evaluation of the problem, formulation of the hypothesis etc.

The Research Process

The research process is the paradigm of research project. In a research project, researcher engages himself/herself in various scientific activities in order to produce knowledge. Although each research project is unique in some ways, all projects, regardless of the phenomenon being studied, involve, by and large, some common activities. All these activities are interdependent. The research process is a system of these interrelated activities. The various activities are conveniently grouped into six stages as shown below:

Stage I : Selection and Formulation of a Problem

Stage II : Formulation of Hypothesis

Stage III : Formulation of Research Design

Stage IV : Collection of Data

Stage V : Analysis and Interpretation of Data

Stage VI : Generalizations.

The stages of research are interdependent. The researcher usually enters the research process at stage I. However, when one enters second stage, one has to draw on past studies to formulate his/her hypothesis. Similarly, to select a research design the researcher has to keep in mind the problem and the hypothesis. A researcher, who has no knowledge of how to collect and analyse data, may find himself / herself unable to formulate a testable hypothesis, or formulate the research design. This brief discussion on the research process makes it very clear that each of these six stages of research process is dependent upon others.

The research process is also cyclic in nature (as shown in Figure). In fact, the research process is not complete even at the stage VI i.e. “Generalization”. The process leads to two situations: The first situation may be that the data did not support or only partially support the hypothesis. In this situation the researcher must return to the stage I. He/she, then, may decide to reformulate the problem and also hypothesis and then list it exactly as before. In the second situation, that is, even if the research is successful and the findings of stage VI confirm the hypothesis of stage II, it is advisable to repeat the study preferably with a different sample with a view to reconfirm the findings. This will also support the contention that the hypothesis cannot be rejected. The exact repetition of a study is called replication.

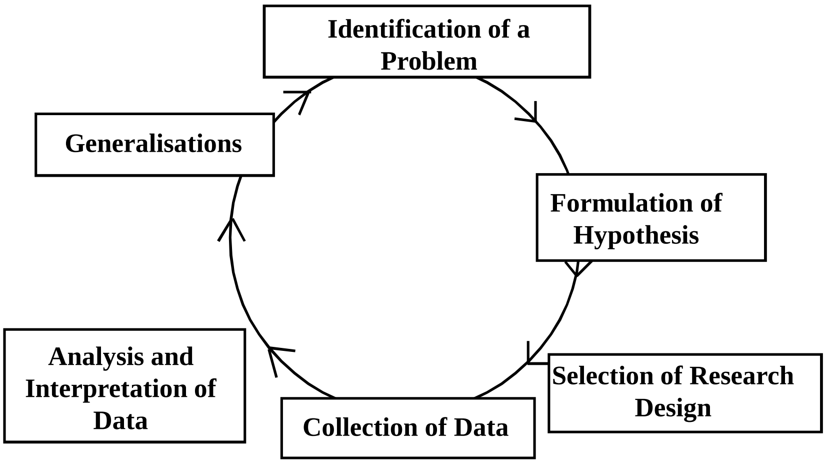


Figure : Stages of the Research Process

Another characteristic feature of the research process is 'self correction'. In a situation, when the data does support or only partially support the hypothesis and the researcher has sufficient reasons to believe that the hypothesis is adequate then he/she may decide that the failure to confirm the hypothesis is due to error in selecting a sampling design or in the measurement of the key concepts or in analysis of data. In these situations, the researcher may decide to repeat the study beginning with the faulty stage after rectifying the faults. Finally, the six stages of the research process make the study potentially replicable. The researcher designs his/her study in such a way that either the researcher or others can replicate it. The replication of study substantiates the fact further that the findings are not due to mere coincidence.

Formulation of Research Problem

Formulation of research problem constitutes the first stage in the research process. Essentially, two issues are involved in formulation of research problem viz., understanding the problem thoroughly and rephrasing the same into meaningful terms from an analytical point of view.

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the subject. In an academic institution, the researcher can seek the help from a teacher who is usually an experienced person. Often the teacher puts forth the problem in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms. In governmental or non-governmental organisations, the problem is usually earmarked by the administrative heads with whom the researcher can discuss as to how the problem originally came about and what considerations are involved in its possible solutions.

The researcher must at the same time examine all available literature to get himself/herself acquainted with the selected problem. He/she may review the literature concerning the concepts and theories and also the empirical literature consisting of studies made earlier which are similar to the one proposed. The basic outcome of this review will be the knowledge as to what research questions have been explored and what the findings were. This will enable the researcher to specify his/her own research problem in a meaningful context. After this, the researcher rephrases the problem into analytical or operational terms i.e., state the problem in as specific terms as possible. This task of defining a research problem is a step of greatest importance in the entire research process. The problem to be investigated must be defined unambiguously, for that will help discriminating relevant data from irrelevant ones. Care must, however, be taken to verify the authenticity and validity of the facts concerning the problem. The statement of the problem determines the data which are to be collected, the characteristics of the data which are relevant, relations between variables which are to be examined, and the choice of the method and techniques to be used in these investigations. If there are certain pertinent terms, the same should be clearly defined along with the task of formulating the problem. In fact, formulation of the problem often follows a sequential pattern where a number of formulations are set up, each formulation more specific than the preceding one, each one phrased in more analytical terms, and each more realistic in terms of the available data and resources.

Definition of the Problem

Once a research problem has been identified, it needs to be defined. The definition of a problem amounts to specifying it in detail and narrowing it down to workable size. Each question and subordinate question to be answered is specified at this stage and the scope and limits of investigation are determined. In this stage of research the overall plan for the research project must be set out in logical order to see if it makes sense. The research topic should be defined in such a way that it is clearly understood. If you are studying, for example, alcoholism; you need to put your research question into a framework which suggests that you are very clear and specific about the problem of alcohol consumption and abuse. In short, topics of research must be grounded in some already-known factual information which is used to introduce the topic and from which the research questions will emerge. Usually, it is necessary to review previous studies in order to determine just what is to be done. While defining the problem, it is necessary to formulate the point of view on which the research study is to be based. In case certain assumptions are made, they must be explicitly stated.

Statement of the Problem

A good statement of a problem must clarify exactly what is to be determined or solved or what is the research question. It must restrict the scope of the study to specific and workable research questions. So, you are required to describe the background of the study, its theoretical basis and underlying assumptions, and specify the issues in terms of concrete, specific, and workable questions. All questions raised must be related to the problem. Each major issue or element should be separated into subsidiary or secondary elements, and these should be arranged in a logical order under the major divisions.

Operationalisation of Variables

In stating a problem, the researcher should make sure that it is neither stated in terms so general as to make it vague nor specified so narrowly as to make it insignificant and trivial. The most important step in this direction is to specify the variables involved in the problem and define them in operational terms. To illustrate, suppose you state that you want to study the "Effectiveness of Self-help Groups on the Empowerment of Rural women". This statement is broad and it communicates in a general way what you want to do. But it is necessary to specify the problem with much greater precision. For this the first step is to specify the variables involved in the problem and define them in operational terms.

The variables involved in the problem are "effectiveness" and "empowerment". Please note that these expressions are to be understood beyond their dictionary meanings. For example, the dictionary meaning of "effectiveness" is "producing the desired effect". This meaning is not sufficient for research purposes. It is important for you to specify exactly what indicators of effectiveness you will use or what you will do to measure the presence or absence of the phenomenon denoted by the term "effectiveness". Similarly, you have to define the other variable "empowerment" also in terms of the operations or processes that will be used to measure them. In this study, you might choose to define "effectiveness" as the improvement made by the rural women in scores on a standardised scale. The term 'empowerment' might refer to the scores on the achievement test in empowerment.

It is worth noting that the problem should be stated in a way that it indicates a relationship between two or more variables. It should involve neither philosophical issues, values nor questions of judgement that cannot be answered by scientific investigations. For example, should television be more effective in increasing performance level of students? Such value questions cannot be answered through research. Similarly, the question "what is there in television teaching that enhance performances" is a philosophical question which cannot be probed easily.

Evaluation of the Problem

You, as a researcher, should evaluate a proposed problem in the light of your competence and professional experience, possible difficulties in the availability of data, the financial and field constraints, and limitations of time. After evaluating a broad research problem you have to narrow it down to a highly specific research problem. You formulate the problem by stating specific questions for which you would seek answers through the application of scientific method.

It is worthwhile for you to ask yourself a series of questions before you undertake the research. The questions should be helpful in the evaluation of the problem on various criteria. All such questions must be answered affirmatively before the study is undertaken. What are the questions that we should ask?

i) **Is the problem researchable?**

There are certain problems that cannot be effectively researched through the process of research. A researchable problem is always concerned with the relationship existing between two or more variables that can be defined and measured. The problem should be capable of being stated in the form of workable research question that can be answered empirically.

ii) **Is the problem new?**

There is no use in studying a problem which has already been adequately investigated by other researchers. To avoid such duplication, it is essential to examine very carefully the literature available in the field concerned. The problem should be selected only when you are convinced that it is really a new problem which has never before been investigated successfully. However, it must be noted that a researcher may repeat a study when he/she wants to verify its conclusions or to extend the validity of its findings to a situation entirely different from the previous one.

iii) **Is the problem significant?**

The problem should be such that it is likely to fill the gaps in the existing knowledge, to help to solve some of the inconsistencies in the previous research findings, or to help in the interpretation of the known facts. The results or findings of a study should either become a basis for a theory, generalisations or principles. Besides, they should lead to new problem for further research or have some useful practical applications.

iv) **Is the problem feasible for the particular researcher?**

a) **Research competencies**

The problem should be in an area in which the researcher is qualified and competent. He/She must possess the necessary skills and competencies that may be needed to develop and administer the data-gathering tools and interpret the data available for analysis. The researcher should also have the necessary knowledge of research design, qualitative and quantitative techniques of data analysis etc. that may be required to carry out the research to its completion.

b) **Interest and enthusiasm**

The researcher should be genuinely interested in and enthusiastic about the problem he/she wants to undertake for research.

c) **Financial considerations and feasibility**

The problem should be financially feasible. The researcher should ascertain whether he/she has the necessary financial and temporal resources to carry out the study. The cost is an important element in feasibility. It is important to estimate the cost of the project and assess the availability of funds. This will determine whether the project can be actually executed.

d) **Administrative considerations**

In addition to personal limitations, financial and time constraints, the researcher should also consider the nature of data, equipment, specialised personnel, and administrative facilities that are needed to complete the study successfully. He/she should check whether he/she is able to get the co-operation from various administrative authorities for collecting various types of data.

e) **Time**

Projects are a time-bound exercise. Most of you, if not all, are already engaged in more than one activity in office, at home and/or in some social organizations. It is important to assess the time required to complete a study, besides the assessment of total period, it is necessary to identify the particular span of the year in relation to the nature of the study.

Hypothesis

After the selection and formulation of research problem, the formulation of hypothesis(es) is the next important step in the research process. A hypothesis is defined as "A tentative proposition" suggested as a solution to a problem or as an explanation of some phenomenon (Ary et. al. 1985). This step establishes the problem and the logic underlying the research study. Questions which the researcher has designed to answer are usually framed as hypothesis to be tested on the basis of evidence. The formulation of the hypothesis(es) is typically determined with the help of the implications of the related literature and the deductive logic of the problem under investigation.

Importance of Hypothesis

It may be mentioned here that hypotheses are not essential to all researches, particularly, in the early stages of exploration of a problem. And it should not be assumed that failure to develop a hypothesis is necessarily a sign of lack of scientific orientation. However, a hypothesis may be conceived as an assumption which merits consideration and needs to be tested against the available empirical evidence. That is why it is suggested that a hypothesis is to be used as a pivot around which the investigation revolves, limiting thereby the field of investigation to a definite target and also determining the observations to be made and the ones to ignore.

A good hypothesis has several basic characteristics. We discuss some of them as follows:

i) **Providing direction:** Hypotheses provide direction to research and prevent review of irrelevant literature and collection of useless or excessive data. They enable you to classify the information from the standpoint of both 'relevance' and 'organisation'. This is necessary because, a given fact may be relevant with respect to one hypothesis and irrelevant with respect to another, or it may belong to one classification with regard to first hypothesis or to an entirely different classification with regard to the second. Thus, hypotheses ensure the collection of relevant data necessary to answer questions arising from the statement of the problem. For example, in a research problem, "Impact of Development and Levels of Living among Scheduled Castes and Tribes", the researcher may frame the hypothesis – higher the development, higher will be the level of living among the Scheduled Castes and Tribes. The researcher will collect data about the indicators of development and living standards of Scheduled Castes and Tribes.

ii) **Hypothesis should be testable:** Hypotheses should be stated in such a way as to indicate an expected difference or an expected relationship between the measures used in the research. The researcher should not state any hypothesis that she/he does not have reason to believe that it can be tested or evaluated by some objective means. Hypotheses are the propositions about the relationships between variables. These can be tested empirically.

iii) **Hypothesis should be brief and clear:** Hypothesis should be stated clearly and briefly. It makes problem easier for the reader to understand and also for the researcher to test. The statement should be a concise statement of the relationship expected.

Characteristics of a Good Hypothesis

There are some important aspects to be looked into to judge the worth of a hypothesis in research. A good hypothesis must be:

i) consistent with known facts and theories, and might be even expected to predict or anticipate previously unknown data,

ii) able to explain the data in simpler terms,

iii) stated in the simplest possible terms, depending upon the complexity of the concepts involved in the research problem, and

iv) stated in a way that it can be tested for its being probably true or false, in order to arrive at conclusion in the form of an empirical or operational statement.

Formulation and Testing of Hypothesis

Hypotheses are formulated to explain observed facts, conditions, or behaviours and to serve as a guide in the research process. The statements or tentative generalisations which constitute hypotheses are partly based on facts and explanations, and are partly conceptual. Hence, there are certain necessary conditions that are conducive to the formulation of hypothesis. These are:

i) **Deducing a hypothesis inductively:** You may deduce a hypothesis inductively after making observations of behaviour, noticing trends or probable relationships. For example, as a social worker you observe community leaders' behaviour in the village. On the basis of your experience, you may attempt to relate community leaders behaviour with their personal characteristics such as their level of education, castes, socio-economic status, and so on. On the basis of these observations, you may be able to formulate a hypothesis that attempts to explain these behavioural relationships in a community setting.

ii) **Limiting the problem:** Here we need to state that the basic understanding of the literature pertaining to the problem under investigation also becomes essential in view of the fact that the already existing corpus of knowledge on the particular problem is too detailed to be incorporated in the process of hypothesis formulation. Hence, the researcher must have the ability to comprehend the available evidence in support or against the expected relationships so as to remain within the limits of the problem while formulating the hypothesis.

iii) **Deriving a hypothesis deductively:** Hypotheses are also derived deductively from the theory. Such types of hypothesis, called "deductive hypotheses" are formulated by studying a particular theory in the area of one's interest and deducting hypothesis from this theory through logic. This is possible when a researcher has a versatile intellect and can make use of it for restructuring his/her experiences in research. Creative approach to problem solving so badly needed by a researcher, is the product of sound attitude, and agile intellect. This view is more relevant to descriptive and historical research in which the abundance of literature with a number of contradictory/

supplementary theories may divert the researcher from the right path. Therefore, you have to exercise great restraint and display considerable patience to keep yourself on the right path. You have to develop certain habits and attitudes, besides saturating yourself with all the possible information about the problem and also think open-mindedly about it before proceeding further in the conduct of the study.

iv) **Hypothesis from analogies, conversations, etc.:** Analogies also lead a researcher to clues that may prove to be useful in the formulation of hypotheses and for finding solutions to problems. For example, a new social situation resembles an old one with respect to a particular set of factors. If the researcher knows that the factors correlate in a particular fashion in the old situation, he/she may hypothesize in terms of trends in the relationship to be expected in the new social situation. However, it is to be mentioned here that use of analogies must be made cautiously as there are not fool-proof tools for finding solutions to problems.

Sometimes, especially the inter-disciplinary research conversations and consultations with experts are also found to be useful in the formulation of hypotheses. To study the relationship of increasing literacy rate in the rural population with the changing pattern of social development requires consultation with experts while formulating hypotheses. However, formulating hypothesis on the basis of analogies, anecdotes and conversations should be done rarely, only as exceptions.

Forms of Hypothesis

To arrive at some conclusions pertaining to a particular research problem, a hypothesis is generally stated in testable form for its proper testing. It may be stated either in **declarative** form, the **null** form or the **question** form. What do these three forms mean?

Declarative hypothesis

When a researcher makes a positive statement about the outcome of the study, we get a declarative hypothesis. For example, the hypothesis "**The performance of the creative persons' on problem solving tasks is significantly higher than that of the non-creative ones'** is stated in the declarative form. Here the researcher makes an attempt to predict the future outcome. This prediction is based on the theoretical formulation of what should happen in a particular situation if the explanations of the behaviour (performance on problem solving tasks) which the researcher has given in his/her theory are correct.

Null hypothesis

A null hypothesis is a non-directional hypothesis that proposes difference or relationship. The usual form of such hypothesis is: **"There is no significant difference between the performance of two groups of social workers, one having generic background and the second having some specific specialization."** Since a null hypothesis can be statistically tested, it is also known as "statistical hypothesis" or "testing hypothesis". The proponents of null hypothesis emphasise that the researcher must remain unbiased throughout his/her research efforts. This view is defended on the basis of the fact that in this case the researcher neither predicts a result nor indicates a preconceived attitude that may influence his/her behaviour during the conduct of the study. On the other hand, those who criticize the use of null hypothesis argue that the researcher should indicate the direction of the outcomes of the study, wherever possible. It is further argued that predicting the results of a study is less awkward in phrasing a relationship, than in using the ‘no difference’ phrase that is usual in the null form.

A null hypothesis challenges the assertion of a declarative hypothesis and also denies it altogether. It says even where it seems to hold good, it is so due to mere coincidence. It is for the researcher to reject the null hypothesis by showing that the outcome mentioned in the declarative hypothesis does occur and the quantum thereof is so significant that it cannot easily be said to have occurred by chance. The reasons for rejecting the null hypothesis may differ. Sometimes the null hypothesis is rejected only when the probability of its having occurred by a mere chance is: 1 out of 100 or .01. In such cases, we consider the probability of its having occurred by chance to be too little to be considered, and we reject the chance component of the null hypothesis and take the occurrence to be due to a genuine tendency.

Hypothesis in question form

In the question-form hypothesis, instead of stating what outcome is expected, a question is asked as to what the outcome will be. For example, if you are interested to find out whether instructions through video programmes have any positive effect on the pregnant women, the question form of the hypothesis will be: ‘Will instruction on health practices through video programmes affect the health of pregnant women?’ This statement shows that instructions through video programmes may or may not be related to health practices of pregnant women.

It is easier to state a hypothesis in question form because it appears to be quite useful to write down all the questions that one wants to answer in a particular research study. On the other hand, a researcher faces difficulties in predicting the outcome of the study and stating the hypothesis in declarative form. But it is worth noting that the question form is less powerful than the declarative or null form as a tool for obtaining valid information, and it is generally advisable to state a hypothesis in directional i.e., declarative form to arrive at valid conclusions and generalisations. However, this last statement should not be taken as if it were a law in the practice and theory of research.

Let us examine and compare the three forms of hypothesis in "Effect of video programmes on health practices of pregnant women ".

Declarative	Instruction through video programmes will improve the health status of pregnant women in comparison with those who do not have such provision.
Null	There will be no difference in health status of the two groups of pregnant women, one following instructions through video programmes and the other having no such facility.
Question	Will instructions through video programmes affect the health status of pregnant women?

Testing of Hypothesis

Testing hypothesis is an important activity in the research process. As a researcher you should know the important steps in testing a hypothesis. The steps are:

1) State the research hypothesis (H_1)
2) Formulate the null hypothesis (H_0)
3) Choose a statistical test

4) Specify a significance level
5) Compute the statistical test
6) Reject/accept the H_0
7) Draw the inference i.e. accept/reject H_1

Step 1: State the Research Hypothesis

H_1 There is a significant difference between undergraduate and post-graduate students with regard to their reading habits.

Step 2: Formulate the Null Hypothesis (H_0)

H_0 There is no significant difference between undergraduate and post-graduate students with regard to their reading habits.

Step 3: Choose a statistical test

Let us suppose that we have decided to use Chi-Square statistic (X^2) to test the relationship between the variables considered in the research hypothesis.

Step 4: Specify a significance level

Further we suppose that we would like to test our hypothesis at .05 level of significance.

Step 5: Compute the statistical test

In this step the researcher has to cross-tabulate his/her data and compute Chi-square test (see Block 4, Unit 3) . On computation of the test, let us say that the test yielded a value of 6.78, df = 1.

Step 6: Reject/accept the H_0

Since the calculated value of Chi-square is more than the critical value we reject the null hypothesis.

Step 7: Draw the inference i.e. accept/reject H_1

We accept the research hypothesis because the null hypothesis has been rejected. Hence, we can infer that there is a significant difference between undergraduate and post-graduate students with regard to their reading habits.

Type I and Type II Errors

Unlike physical sciences, in social sciences we do not find propositions that indicate certainty. In real world, almost all the propositions, generally, indicate some sort of probabilities. Thus, instead of stating that if A is true, B must follow, we say only if A is true, B will probably also be true.

We thus admit the possibility that B may be false even if A is true. Thus, if we reject A whenever B is false, we also run the risk of making error that of rejecting a true research hypothesis (H_1). We refer to this kind of error as type I Error or ? - error

Otherwise, if we fail to reject (accept) A when B is true we again run the risk of making an error, since A may actually be false. Accepting a false research hypothesis (H_1) is referred to as type II error or b - error.

Example

1) Most members will conform to societal norm (A).
2) It is a norm of society not to steal.
3) B is a member of society.

Inferences

i) B will probably not steal. Therefore, if A is true (1) B will probably also be true. But if B does steal we reject A with some risk of Type I error (since A may be true, B being one of the few dishonest members).

ii) If we fail to reject A when B is true, we run a risk of making an error since A may actually be false, i.e. failing to reject a false H_1, is referred to as a type II error or β error.

In social research inferences drawn from the sample are applied to the population from which the sample is drawn. The following statements help us to understand Type I and Type II Errors with reference to the sample and population.

Type I error: Populations differ when in fact they are alike.

Type II error: Two populations are alike when in fact they differ.

Type I and Type II Errors are shown diagrammatically as below:

Population Realities

	Difference	**No Difference**
Research Conclusions (Drawn on the basis of sample) → Reject Ho (There is no difference)	**CORRECT DECISION**	**TYPE I ERROR**
Accept Ho → (There is no difference)	**TYPE II ERROR**	**CORRECT DECISION**

While we test hypothesis we do not study the entire population; instead, we study a part of it. As such, we can never prove if the null hypothesis is true or false. What we try to prove is whether the sample results are sufficiently likely or unlikely to justify the decision to accept or to reject the null hypothesis.

The null hypothesis can be either true or false. A researcher has a choice of either rejecting or accepting the hypothesis. Hence, there are four possibilities as presented below:

Case 1. The null hypothesis is true and it is rejected

Case 2. The null hypothesis is true and it is accepted

Case 3. The null hypothesis is false and is rejected

Case 4. The null hypothesis is false and is accepted

In first case, a null hypothesis is rejected when it is true. This decision is an error. This error – the rejection of true hypothesis is termed as a type I error. In the second case there is no error because the researcher accepts a hypothesis which is true. The same is with the third case, there is no error in decision because a hypothesis is false and it is rejected. But the decision in the fourth case is an error. That is, a false hypothesis is accepted. Accepting false hypothesis is known as a type II error.

Hypothesis in Various Types of Research

There is no rigid rule about the choice of the form of hypothesis. You can choose any form which your research problems warrant. However, there are various conventions followed in selecting the form of hypothesis in relation to various types of research such as experimental and descriptive research etc. In this section we shall discuss how hypotheses are usually formulated in experimental research and descriptive research.

Hypothesis in Experimental Research

In experimental research a hypothesis states that the antecedent condition or phenomenon (independent variable) is related in cause and effect relationship to the occurrence of another condition, phenomenon, event or effect (dependent variable) in a particular setting. To test a hypothesis, the researcher attempts to control all the conditions except the independent variable which he/she manipulates. Then he/she observes the effect on the dependent variable presumably because of the exposure to the independent variable.

In view of the intricacy of causal effect of the independent variable, it is advisable for the researcher to give sufficient attention to the formulation of hypothesis alongwith the experimental plans and statistical procedures. The experimental plans and statistical procedures merely help the researcher in testing the hypothesis and contribute little to the development of theories for the advancement of knowledge.

It may be mentioned here that the hypotheses derived or developed from existing theories contribute to the development of new theories and knowledge only through the method of experimentation.

Hypothesis in Descriptive Research

Different types of hypotheses have been in use in descriptive research. For example, to study the effectiveness of self-help groups it may be hypothesized that 'The sex discrimination among women at work has decreased over the period 1990-2000 with the increase in number of self-help groups'. Also public opinion surveys require hypotheses to study the opinion of people with regard to various women's issues. For example, to study the popularity of a scheme of income generation, it may be hypothesised that 'The scheme of income generation is preferred more by the urban women than the rural women'. Some studies require not only testing but also tracing relationship between serious facts to have a deeper insight into the phenomenon. For example, a researcher wants to study the relationship of socio-economic status and achievement-motivation with the enrolment of rural women in self-help groups. This requires the hypothesis: 'There is a significant relationship between socio-economic status and participation in self-help groups of women from rural area as compared to that of their urban counterparts'.

Similarly some researchers are concerned with developmental studies, especially in the identification of trends and predicting what is likely to happen in the near future. To illustrate, the researcher may be interested in the study of opening of non-formal education centers in a changing social order. He/She may hypothesise, 'The new colonies in the industrial townships require more non-formal education centres than the rural areas'.

Conclusion

In this Chapter, we have discussed the issues related to the research process; selection, definition, statement and evaluation of research problems along with hypothesis-formulation in various types of research.

A hypothesis can be derived either inductively or deductively or through analogies, consultations, etc. A good hypothesis must be simple and clear; it must state the expected relationship between variables and thus make a prediction.

A hypothesis can be stated in a declarative form, null form or question form. Hypotheses are formulated and stated differently depending upon the requirements of various types of research such as experimental research and descriptive research.

References

Bloom, M. "Challenges to Helping Profession and the responses of Scientific Practice", *Social Service Review,* 52, 584-595., 1978.

Dasgupta, Sugata. "Social Work Research " in *Encyclopaedia of Social Work,* India New Delhi :Govt . of India, 1977.

Epstein, I & Tripodi, T. *Research Techniques for Program Planning, Monitoring and Evaluation*, New York: Columbia University Program, 1973.

Fansel, David, "Services to and by the real people". *Social Work,* 34, 195-196, 1980.

House, E.R. *Evaluating with Validity,* Beverly Hills, California. Sage, 1980.

Herlekar, A. *Research in Social Work*, The IJSW Bombay, July 1964.

Jacob, K.K. *Methods and Fields of Social Work in India*, Bombay: Asia Publishing, 1965.

Khinduka, S.K. *Social Work in India,* Allahabad: Kitab Mahal, 1965.

Lal Das, D. K. *Practice of Social Research : Social Work Perspectives* : Jaipur : Rawat Publications, 2000

Lal Das, D. K. *Designs of Social Research* : Jaipur : Rawat Publications, 2005

Levin . M.H. *Cost-effectiveness: A Primer* New Delhi : Sage, 1985.

Lynn. Lvons. V. and Morris (ed.) *Programme Evaluation,* London : Sage, 1978.

Micheal . J. and Associates *Evaluating Your Agency's Programme,* London: Sage, 1982.

Mishan. E. J. *Cost-Benefit Analysis: An Informal Introduction,* London : George Allen and Unwin Ltd., 1971.

Monette, Duane R. *et. al. Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Posova, E.J. & Carey R.G., *Programme Evaluation Methods and Case Studies* NJ: Englewood Cliffs Prentice Hall, 1985.

Polansky, N.A. (ed.) *Social Work Research*, Chicago: The University of Chicago Press, 1975.

Reid, W. "The Social Agency as a Research Machine", *Journal of Service Research,* 2, 11-23., 1978.

Rubin, Allen & Babbie E. *Research Methodology for Social Work*, Belmont, California, Wadsworth, 1989.

Rossi. H.P. and Williams. W. (ed.) *Evaluating Social Programs. Theory. Practice and Politics,* New York: Seminar Press, 1972.

Ramachandran. P. "Social Work Research and Statistics" in *History & Philosophy of Social Work in India*, Bombay : Allied Publishers, 1968.

Ramchandran, P. "Research in Social Work " in A.B. Bose (ed.) *Encyclopaedia of Social Work in India,* New Delhi: Government of India , p. 386, 1987.

Reid , William J. "Research in Social Work " in *Encyclopaedia of Social Work*, Silver Spring, Maryland , 1987.

Rossi, P. & H. Freeman, *Evaluation: A Systematic Approach*, Beverly Hills, Sage, 1982.

Schneirer, M.A. Programme Evaluation The Organizational Context Beverly Hills,California, Sage, 1979.

Thomas, E.J. “The BBESDAS Model for Effective Practice”, *Social Work Research and Abstract,* 13, 12-16, 1977.

Thomas , P.T. “Social Research “ in M.S. Gore (ed.) *Encyclopaedia of Social Work in India,* New Delhi : Government of India, p. 204, 1968.

Van Maanen. John, *Varieties of Qualitative Research,* New Delhi : Sage, 1982.

Wienback, R.W. and Rubin, A. (Ed) *Teaching Social Work Research: Alternative Programs and Strategies,* New York: Council on Social Work Education, 1980.

Weiss, Carol. *Evaluation Research Englewood Cliffs’* N.J. Prentice Hall, 1972.

Werner, W.B. *Objectives of Social Curriculum of the Future,* New York: Council of Social Work Education, 1959.

4

Research Process II: Preparing A Research Proposal

Introduction

In the previous Chapter you have learnt about the process of research. You have also learnt about formulation of a problem and hypothesis in detail. In this Unit we will learn about how to prepare a research proposal. The research proposal consists of every details of a research project. It helps a researcher in many ways. Firstly, it gives the researcher a complete picture of the whole research project. Secondly, a well-prepared research proposal helps to make time and budget estimate. Lastly, a research proposal enables a researcher to monitor his/her research project. Sometimes, the purpose of developing a research proposal is also to try to obtain a grant to cover the expenses of the research project.

The research proposal consists of details about various interrelated research activities, which overlap continuously rather than following a strictly prescribed sequence. At times, the first activity determines the nature of the last activity to be undertaken. If subsequent activities have not been taken into account in the early stages, serious difficulties may arise which may even prevent the completion of the study. One should remember that the various activities involved in a research project are not mutually exclusive, nor are they separate or distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating, at each step in the research project, the requirements of the subsequent steps. However, the following order concerning various steps provides a useful procedural guideline regarding the research project:

1) Identification/Formulation of the Research Problem,
2) Review of Literature,
3) Identifications of Objectives of the Study,
4) Formulation of Hypothesis (if any),
5) Operationalisation of Concepts,
6) Preparation of Research Design,
7) Selection of Sample,
8) Selection of Method and Tools of Data Collection,
9) Collection of Data,
10) Processing and Analysis of Data,
11) Analysis and Interpretation of the Data,
12) Presentation of the Research Report,
13) Budget Estimate, and
14) Time Estimate.

Preparing Research Proposal

Identification and Formulation of a Research Problem

A thorough understanding of known facts and ideas in the broad area of research constitute the first and the most important step in identification and selection of a problem for your study. A thorough knowledge of the research studies conducted in the field provides you with details about the problems which have remained unresolved. A list of suggestions for further research given at the end of research reports and reviews of research would help you to get an idea about the gaps which exist in the knowledge pertaining to your field of research. Periodicals and bibliographies of research are helpful in keeping you informed about the research going on in the field in which you are interested and show competence. The various sources through which a researcher can identify a suitable and significant problem have been already discussed in chapter 3.

At the very out set of the research project, the researcher has to decide the broad area that he/she would like to inquire into. In Unit 1 you have read some of the broad areas of social work, such as: (i) Community Health, (ii) Community Mental Health, (iii) Child Welfare, (iv) Women Welfare, (v) Youth Welfare, (vi) Aged Welfare, (vii) Substance Abuse, (viii) Mental retardation, etc. In each broad area innumerable problems exists. As a researcher first you are required to single out the broad area you wish to study. Once you decide the broad area for your research study, you need to evaluate the proposed area in the light of your competence, possible difficulties, in terms of availability of literature, the financial and field constraints, limitations of time etc. After evaluating the broad area you have to choose a specific subject for the study. Let us assume that you have chosen the broad area of aged welfare. The broad area of aged welfare consists of a number of subjects such as, aged care and services, life satisfaction of aged, elderly abuse etc. Within each of these broad areas of aged welfare, there is a range of issues that can be studied, for example, quality of aged care and services, determinants of life satisfaction, social support and aged care etc. People associated with non-governmental organisations, who are routinely involved with many of these areas/issues, can find opportunities for research that are directly related to their professional activities. To undertake a research study, now you have to think of a specific subject, say for example, you may wish to study a subject like 'Determinants of Life Satisfaction among Elderly'.

Review of Literature

The beginning of this section has suggested you to get literature relevant to the topic before you want to study it. Social research topics are usually embedded in so many different kinds of literature that the researcher must be careful in selecting the best literature to examine. While many researchers collect every material which has some linkages with the topic, you need to keep the central theme of your topic in mind to guide you through your search of the literature in the field. It is also important to examine different types of literature where relevant inferences are drawn from scientific data. It would be very useful if research findings from studies using various methods are critically examined.

While presenting review of research literature, a researcher should touch upon the introduction justifying the research, methodological details and findings and their implications. But most researchers present only findings. Very few researchers look into findings as well as research methodology in their reviews. From the perspectives of findings, major objectives of a review are to: (a) find gaps in research, (b) identify the areas of overlap, and (c) identify contradictions.

For preparing a research proposal, you should refer to the gaps in research, the areas of overlap, contradictions and significant findings you have noted through review of literature. This will help you to raise questions or which will guide you to decide the subsequent steps of the research process such as identification of objectives, formulation of hypothesis (if any), determination of research design and sample for your study. You must be able to draw out findings from the studies and summarize them in such a way that someone unfamiliar with study can easily grasp their meaning and importance. To help you to do this, you should look at the background literature and review sections which generally come at the beginning of published research articles. Most of these reviews are very condensed; they extract a few salient points from numerous studies, summarizing them in a way that is relevant to the study in question.

Identification of Objectives of the Study

Once the problem, the theoretical background, and the concepts have been explained, it is time to address the aim and objectives of the study. At this stage you are required to present the aim and the objectives of the study in brief to justify your study in terms of both its rationale and the implications that it might raise.

It is important to examine whether the researcher has raised very clearly the questions to which he/she is looking for a solution. These questions should be explicit – the researcher should categorically put down the questions on paper. This set of questions can be converted into objectives. Objectives are the foundations of a research project. Eventually, the objectives guide the entire process of research. The major attributes of well-written objectives are:

Clarity of expression and direction

The objectives must have been stated clearly enough to indicate what the researcher is trying to investigate. It is equally important to avoid overlaps in stating objectives.

Measurability

The objectives must be stated in a manner that they are measurable; in case of qualitative research it should be possible to at least codify the data and information so that assessment can be made whether the objectives have been achieved or not.

Comprehensiveness

The objectives provide the guiding framework for a research project. Hence, the statement of objectives should be comprehensive enough to cover each and every aspect of the research study. Stating differently, as far as possible nothing should be left outside the purview of the stated objectives.

Judiciousness

Another important attribute is the judiciousness in and justifiability of choosing and stating objectives. For example, many young scholars, in their postgraduate dissertations and doctoral theses mention "recommending future research" as one of the objectives. In all fairness, this is not feasible. Similarly, in a short time-bound project, a research objective that actually calls for sustained and long-term study becomes less feasible.

Here it is important to note that rationale for doing the project will be accomplished only if the study is done well. Preparing a proposal of your study will show that you have devised a plan to study your problem that seems feasible, you reinforce the sense that the aims and objectives of the study will be achieved. The value of the study lies not only in what it alone will produce, but also in how it may add to or challenge other research in the area.

Formulation of Hypothesis

A common strategy in scientific study is to move from a general theory to a specific researchable problem. A part of this exercise is to develop hypotheses, which are testable statements of presumed relationships between two or more phenomena. In other words, hypothesis is tentative assumption made in order to draw out and test its logical and/or empirical consequences. Hypothesis states what we expect to find rather than what has already been found to exist. After extensive survey of literature and statement of objectives, researcher should state the hypothesis in clear terms.

It may be noted here that we do not need to propose hypothesis in the case of exploratory or formulative researches.

Operationalization of Concepts

Once you are settled with the hypotheses for your study, you need to operationalise the concepts so that you can develop your measuring instruments such as questionnaire.

In a study, a set of concepts is used to explain the phenomenon. These concepts need clarifications with reference to the particular topic. Through the clarifications and discussion of the concepts a research model is developed at this stage. Precision in conceptualization is critical in the social sciences, and it is not easy to achieve. Concepts like 'exploitation', 'discrimination', and 'oppression' may all seem to be familiar terms. Yet they may prove extremely vague when one tries to measure them in relation therefore, the precise meanings you attach to these concepts must be defined and clarified, and then an appropriate way found to measure them.

In the research proposal, a clear definition of the main concept or concepts is most essential. It is also essential to discuss the process of measurement of the concepts. In the research proposal you should also touch upon the potential problems in measuring the concepts. These include two critical issues: *validity*, that is, whether the measurement of a concept in fact produces a result that truly represents what the concept is supposed to mean, and *reliability,* that is, whether the measurement would lead to same results, whenever it is repeated and that one could have some confidence in the results.

In a survey, the questionnaire is nothing but concepts in operational form. In an experiment, the operationalisation of the independent variable (concept) is the actual stimulus. In field studies, this process of operationalization occurs in a very different manner. It is often carried out after the field notes have been collected. After that the researcher may find evidence that suggests certain meanings, at which time the process of conceptualization is carried out. To test whether you are correct, you may go back to the field to see if another instance of this operationalised concept occurs. It is always advisable to use more than one indicator for better measurement of the concept. This will strengthen your study.

Research Design

After the research problem and its aims and objectives are stated and hypotheses are formulated in clear cut terms, the researcher is required to prepare a research design, i.e., he/she will have to state the conceptual framework within which research would be conducted. The preparation of such a research design facilitates researcher to complete his/her research project as proposed. In other words, the function of research design is to provide for the completion of the research project with minimum effort, time and money. But how all these can be achieved depends mainly on the research purpose. Research purpose may be grouped into four categories, viz., (i) Exploration, (ii) Description, (iii) Diagnosis, and (iv) Experimentation. A flexible research design, which provides opportunity for considering many different aspects of a problem, is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimizes bias and maximizes the reliability of the data collected and analysed.

There are several research designs, out of which the researcher must select one for his/her own project. The preparation of the research design (you will know about research designs in detail in Block 2), appropriate for a particular research problem, depends usually on its objectives and hypotheses, the sample, the type of data to be collected, time available for research; and the finance available for the purpose.

However, it is important that the chosen research design is competent to respond to the research objectives and questions laid down. For example, if the objective is to test the impact of a broad treatment to a group of clients, it has to follow an experimental design. Similarly, if the objective is to assess the status of certain psychosocial variables in a given sample of population, it would require survey designs. Within survey designs, if the purpose is simply to describe the status of the psychological variables and not to compare them with any standard norm or not even develop a norm, the design can be descriptive.

Hence, while preparing a research proposal it is necessary to check the choice of appropriate research design against the objectives. Another means of evaluating the applicability and appropriateness of the research design is to check it against the hypothesis. If the hypothesis to be tested is formulated in terms of relationships, the study has to adopt a survey design, by which relationships can be tested. Compared to it, if the hypothesis is to test the performance of two different groups against a particular type of treatment, the research design has to provide for that opportunity by adopting an experimental design. Depending on the nature of the groups, the treatment, the size of the sample and also the nature of that experiment, one would adopt a pre-experimental, quasi-experimental or true experimental design.

Thus as a researcher you need to examine the appropriateness of the choice of research design vis-à-vis the research objectives. The details of the design, e.g. type of experimental design etc. too have to be evaluated. Equally important is the argument put forward by the researcher in deciding the research design.

Choice of Variables

Choice of variables is an important step in a research project. There can be at least three sets of variables, namely, independent, dependent and intervening variables. There are also other ways of classifying variables like socio-economic, demographic, psychological, organisational, etc. The later classification is relevant with regard to basic content of research whereas the former is directly linked to research data.

Here, we shall concentrate on the first set. The important point in selecting the variables is the formulation of the dependent variables. This is particularly important in experimental research where the impact of other variables on the dependent variable is assessed.

In order that the research makes a meaningful contribution, it is important to choose the independent variables as meticulously as possible. The choice of independent variables depends upon more than one consideration. Of the various considerations the important one is the existing knowledge on the basis of previous research which shows that certain types of variables are indeed related to and predict the variation of the criterion variable. The second important consideration is the assumption of the researcher – that there are particular sets of variables that are likely to be related to the dependent variables.

The third set of variables is the intervening variables. These are often ignored in research, although these actually intervene and influence the relationship between the independent and the dependent variables. On the basis of the research literature, the researcher is expected to identify such variables as are likely to influence the relationship under test.

Besides the identification and classification of the variables, it is important that variables are measurable. Further, all variables may not have standard definitions. In such a case, it is expected that the researcher shall provide operational definitions and also indications of their measurability.

Hence, an important consideration in proposing a research project is how meticulously the variables have been identified and classified under the three categories mentioned above. The second important consideration in this case is whether the researcher has provided operational definitions of at least such variables as do not have a standard meaning in the literature. The third important consideration is whether there are clear indications of the measurability of variables.

Selection of Sample

At this stage the researcher is required to decide the sample design of his/her study i.e. the way of selecting a sample. In other words, a sample design is a plan decided before any data are actually collected.

The selection of the sample for the study depends on many factors. Some of these factors affect the selection of the sample to a great extent. We will discuss a few of them. The homogeneity or heterogeneity of the universe is one such factor which affects the sample selection procedure to a great extent. For example, if you are interested in studying medical students, which is a very homogeneous group, even a very small sample will be representative of the universe whereas if you plan to study a college having arts, science and commerce faculties you may have to choose a very large sample and even then you may not have confidence to say that your sample is representative.

Other important issues with regard to selection of sample that need to be considered are: sample size, sampling technique and type of the sample. The size of the sample depends on the nature of objectives of a research project and the research design. For example, in case of rigorous experimentation, it is difficult to handle large samples; also, it is not necessary. Similarly, for surveys and such other status studies, samples have to be large. The main consideration here is that there has to be an optimum size of sample beyond which it is waste of research resources. What is to be considered is whether the sample size is large enough for the study and the sample size has been determined scientifically.

You may be interested in generalising your findings to others beyond those studied. When probability samples are used, it is possible to determine how representative your sample is of the population which might be the overall universe of your study. Sampling plans may be very simple or complex. When the rules of probability are not followed and you merely select a sample of subjects who seem to fulfill the needs of your study, you have a non-probability sample. For many studies, such a sample is sufficient; and for some, it is the best that can be achieved. Whatever the design of your sample, it needs to be explained in detail in your research proposal. It should be so precise that someone else could generate a similar sample by following your procedures. Remember that even if you select a representative sample you have to be very careful in making generalisations. (For details about the methods of sampling see chapter 9.

Selection of Method and Tools of Data Collection

There are three primary methods of data collection, namely, observation, interview and questionnaire. Under these three methods are included several research instruments such as, psychological test, achievement tests, interview schedules, etc. You will learn about these methods in chapters 10,11,12. In these chapters the methods are explained in details so that you can use them to design and carry out a study based on questionnaires or interviews, and in field studies using different types of observation techniques. It also describes different forms of what might be called data collection procedures for using secondary data.

It is important to note that the research instruments are for the measurement of variables. Every variable has certain attributes of its own, amenable to measurement by different types of scaling, namely, nominal, ordinal, ratio and interval. Similarly, these are variables which are amenable only to rigorous standardised tests, like those of intelligence, reasoning ability, etc. There are others which can be measured through inventories or questionnaires. Then there are variables which necessitate the use of interviews with probing questions to be able to go into the details of a process. The common mistake in this area is the use of incompatible instruments vis-à-vis the variables being measured; for example, researchers may use a questionnaire to measure attitude. Similarly, in the name of a questionnaire, researchers may actually frame an opinionnaire. Sometimes researchers use questionnaires for conducting interviews as if a questionnaire is no different from an interview schedule. More often than not, interviewing is called for when a lead question to 'Yes' and/or 'If no' kind of situation.

The points to be borne in mind while preparing a research proposal are the following:

1) Whether the researcher has chosen a tool of data collection that can actually measure the variables.
2) Whether the tool of data collection has been picked up from an existing stock or has been constructed by the researcher. In case of the former, whether the researcher has checked its validity, and reliability. In case the researcher has used the tool of data collection on his/her own, has care been taken to check the attributes of the tool, a dependable tool of data collection, be it a questionnaire, inventory or an interview schedule.
3) Whether the researcher has tested the feasibility of the use of the tool of data collection.

While preparing the research proposal you are also required to describe how you will collect primary data. In case you are planning to use secondary data you must mention which sources of available data you will actually use. You may also very briefly discuss about issues of access to the data. It is important for a researcher to see that, he/she must be able to get the data he/she proposes. If you anticipate problems in securing the proposed data, these problems should be discussed and possible alternate sources of data might be suggested. Most researchers propose to use one source of data yet you may propose few more sources through which you may also collect data from other sources to widen their scope.

Collection of Data

There are different methods of data collection. Each method of data collection has its special concerns which need to be considered fully before doing the study. This is why pre-testing is so valuable, because it helps you to find and address potential problems before they enter your study and cause bigger problems.

The plans for collecting data should be described carefully. In a field study, it is always more difficult to be precise, and you may need to make changes once you enter the field. Nevertheless, it is better to have a clear plan that can be changed as you move forward. For an experiment; data collection procedures can usually be described very precisely. This is also true of a survey. Surveys using mailed questionnaire tend to have multiple stages in the data collection procedure to increase the *response rate*. If you are using secondary data, you need to describe at this stage how you will collect the data.

The quality of the outcome of research also depends on the quality of data itself. In turn, the quality of data is determined by the procedure of data collection. The indication of the quality of data lies in the dependability of the information collected from the sample.

Processing of the Data

Once the data are collected, they must be processed. If the responses are in qualitative terms you have to prepare a code book where you have to give numbers for the qualitative responses. This is very much essential if you wish to process your data through computer. If they are field notes, they must be organised and categorised.

In the research proposal, a concise statement may be included to address this subject. It may describe what type of computer facilities is available, what possible sources of assistance are available, and what efforts are being made to increase accuracy in the handling of the data. There are now some technological advances in data gathering which speed the process from data gathering to data entry. An example is the SPSS (Statistical Package for Social Sciences) now becoming quite common for social research.

Analysis and Interpretation of Data

You need to plan how you will analyze the data. It is advisable to prepare a plan of analysis of data spelling out the various applications of statistical tests carefully while the study is being designed. It is better to have a planned strategy that can be adapted than to end up with piles of data for which you have no organised plan.

You are also required to explain how you are planning to compare or contrast different variables, for example, men with women, one rehabilitation program with another, length of time spent in an organisation by the attitude of employees towards the new incentive introduced recently?

In addition, you need to consider which statistical tests you plan to apply to evaluate the association/differences between the variables. For example, if you propose to measure correlation between the variables to test whether there are significant correlations between them you have to select an appropriate test of correlation that could get the result you need.

Presentation of the Report

Every research is conducted by presenting its results in the form of a report. The reporting of results of a research study depends on purpose, with which it was undertaken. A study might have been conducted for various reasons, such as a personal research conducted for award of a degree; an institutional project or a project funded by an outside agency, etc.

At the end of the study, you have to present the results of the study in the form of a report. Research studies follow scientific process. As such, when it is reported it follows certain conventions and formats for maintaining parity in reporting and for easy grasps by readers.

While preparing a research report you have to follow a number of stylistic conventions. These conventions are commonly known as research formats. These conventions/ research formats allow the researcher to present his/her findings within a framework, a framework which is both logical and sequential. By following conventions/research formats the researcher not only systematises and structures his/her research findings in terms of the research problem and its objectives but also facilitate the reading and comprehension of the report by others. In a very broad sense, the format of a research report consists of three parts: the preliminaries, the text and the reference materials. The length of any of these three parts is conditional on the extent of the study. Each of these parts may consist of several sub-sections. (For order of individual items within the three main sections and other details about the conventions/research formats you are advised to refer "Thesis and Assignment Writing" by Anderson, et. al.)

Time Estimate

Time estimate is another important step in preparing a research proposal. The various activities discussed above are completed in a sequence. A researcher is required to estimate time for each activity so that he/she will be able to know the total time required in executing the project. Time-estimate not only sets the time-frame for the execution of the project but it also helps the researcher to prepare budget estimate for the research project.

The preparation of the time-estimate for a particular research project depends primarily on the size of the sample for the study and the method and tools of data collection to be used for the study in time available for research and the finance available for the purpose.

For preparing a time-estimate for your research proposal, you are advised to discuss with your research supervisor or research experts. This will help you to decide optimum time for various research activities to be undertaken in the research study. A model of time estimate is given below:

S. No.	**Research Activity**	**Time Required**
1	Identification of Problem	2 Weeks
2	Review of Literature	1 Month
3	Identification of Objectives	1 Week
4	Formulation of Hypothesis	2 Weeks
5	Selection of Research Design	2 Weeks
6	Selection of Sample	1 Week
7	Selection/Construction of Tools of Data Collection	1 Month
8	Pre-testing of Tools of	2 Weeks
	Data Collection	3 Months
9	Editing of Data	2 Weeks
10	Preparation of Code Book	1 Week
11	Preparation of Master Chart	2 Weeks
12	Processing of Data	1 Week
13	Statistical Analysis of Data	1 Week
14	Writing of Report	2 months
15	Presentation of Report (Typing, Binding etc.)	1 Month
	Total	**12 Months**

Budget Estimate

In case you are contemplating to apply for a research grant to cover the expenses of the research project, you will be required to prepare a budget estimate along with your research proposal. The preparation of the budget estimate for a particular research project depends primarily on the area of study and size of the sample for the study and the method and tools of data collection to be used for the study. Common heads/items of expenditure for a research project are shown in the following table.

S.No.	**Item/Research Activities**	**No. of Personnel required**	**Duration**	**Cost (Rs)**
1.	Research Assistant @ Rs 6000.00 per	1	6 Months	36000.00
2.	Research Investigators@ Rs 3000.00 per month	2	3 Months	18000.00
3.	T.A./D.A for Research Assistant & Research Investigators (approximate estimate)			10000.00
4.	Typing & Binding of Report			5000.00
5.	Overhead Expenditure			5000.00
6.	Contingencies Expenses (10 % of the expenditure on items 1 to 5)			7400.00
			Total	**81400.00**

Conclusion

The research process consists of six major stages, namely, selection and formulation of a problem formulation of hypothesis, selection of research design, data collection, data analysis and interpretation and generalisation. In each stage there are a number of research activities which need to be taken up step by step. These activities are spelled out in a research proposal.

You should keep in mind that various steps involved in a research project are not mutually exclusive, nor are they separate or distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research project the requirements of the subsequent steps. However, the following order concerning various steps provides a useful procedural guideline regarding the research proposal: Identification/Formulation of the Research Problem, Review of Literature, Identifications of Objectives of the Study, Formulation of Hypothesis (if any), Operationalisation of Concepts, Preparation of Research Design, Selection of Sample, Selection of Method and Tools of Data Collection, Collection of Data, Processing and Analysis of Data, Analysis and Interpretation of the Data, Presentation of the Research Report, Budget Estimate, and Time Estimate.

References

Anderson, Janathn. *et.al.* (1976), *Thesis and Assignment Writing,* Wiley Eastern, New Delhi.

Ary, D., Lucy, C. Jacobs and Razavich, A. (1972), *Introduction to Research in Education,* Third edition, Rinehart and Winston Inc., Holt, New York,

Baker, L. Therese (1988), *Doing Social Research,* McGraw Hill, New York.

Bailey, Kenneth D. (1978), *Methods of Social Research,* The Free Press, London.

Black, James A. and Champion, Dean J. (1976), *Methods and Issues in Social Research,* John Wiley, New York.

Galtung, John (1970), *Theory and Methods of Social Research,* George Allen and Unwin, London.

Goode. W.J. and Hatt. P.K. (1952), *Methods of Social Research*, McGraw Hill, New York.

Kerlinger, Fred R. (1964), *Foundations of Behavioural Research,* Surjeet Publications, Delhi.

Kothari, L.R. (1985), *Research Methodology*, Vishwa Prakashan, New Delhi.

Kidder, Louise H. (1981), *Research Methods in Social Relations,* Holt, New York.

Lal Das, D, K. (2000), *Practice of Social Research: Social Work Perspective,* Rawat Publications, Jaipur.

Lundberg, G. A. (1946), *Social Research*, Longman, New York.

Monette, Duane R. *et. al.* (1986), *Applied Social Research: Tool For the Human Services*, Holt, Chicago.

Nachmias D and Nachmias C. (1981), *Research Methods in the Social Sciences*, St. Martins Press, NewYork.

Wilkinson, T.S. and Bhandarkar, P.L. (1977), *Methodology and Techniques of Social Research,* Himalaya Publishing, Bombay.

Broadbeck. May (ed.) (1968), *Readings in the Philosophy of Science,* The MacMillan, New York.

Thomas, P.T. (1977), “Social Research” in *Encyclopaedia of Social Work India*, Govt. of India, New Delhi.

Van Dalen, D.B., (1973), *Understanding Educational Research: An Introduction,* Mc Graw Hill, N.Y.

5

Introduction to Methods of Research in Social Work

**D.K. Lal Das*

Introduction

The ultimate goal of practice of social research is to improve the social functioning of individuals, groups and communities. In brief, the process of improving social functioning of individuals, groups and communities involves study, assessment, intervention and evaluation. In most cases, these steps require use of research methods in general, and measurement techniques in particular, such as rating scales, score analysis, statistical significance etc. The purpose of this Chapter is to describe some special research methods , also known as intervention research methods, It is commonly known as single-subject designs research, through which social researchers attempt to improve social functioning of individuals, groups, families and communities.

Single Subject Design Research

Single subject designs research is basically quasi-experimental research , which uses time series analysis technique of social research to the evaluation of the impact of interventions on individual cases, groups, family and community. Such designs involve repeated measure of the dependent variable before and after a particular intervention, to see if a sustained pattern of change in the dependent variable commences shortly after the onset of intervention (Rubin and Babbie, 1989).

**Dr. D.K. Lal Das, R.M. College of Social Work, Hyderabad*

The unit of analysis in this design of research is one irrespective of whether the unit of analysis is one individual, one family, one community or one organisation. As such, one of the major limitations of these designs is their dubious external validity. But we should not forget that single-subject experiments can identify with a high degree of internal validity in those interventions that seem to work in one, perhaps idiosyncratic, context and can be tested for generalisability in subsequent studies. These subsequent studies might include larger scale experiments utilising control groups or they might be additional single-subject experiments that attempt to approximate replications of the original single-subject experiment in other contexts (Rubin and Babbie, 1989)

Such research designs are also termed as "single-case designs", or "single-system designs". The latter two terms are used to indicate that subjects need not be individual's only, but can include a family, a community, and so on. But the term "single-subject designs" is more commonly used and hence will be used in this text with the understanding that it would also apply to cases or systems that may involve groups, family members and a community.

The Background

Prior to single-subject designs, social researchers had no alternative other than to use conventional experimental research designs such as comparison of experimental group with control group. Such experimental researches, however, were often inappropriate or impossible to conduct in practice settings. It was often too time-consuming and expensive to identify clients with similar problems and randomly assign some to treatment and others to control groups.

In such experiments the results were an average of the whole group's response, obscuring individual reactions which are significant to practitioners. For example, knowing that a given intervention was effective on majority in an experimental group may be interesting, but it does not help at all in inferring about a particular client (Monette et.al.,1986)

In nutshell, single-subject designs aim at systematic evaluation of practice through the use of scientific research techniques. It must be kept in mind, however, that this research design does not reject conventional large-group experimental researches. Such researches are necessary for evaluating completed programmes and for confirming the generalisability of programme effectiveness. In the following sections, we will discuss the stages in the single-subject design research.

The Baseline Phase

The single-subject design researches are based on the principle of time series data analysis. As such, it requires measurements of dependent variable at successive intervals of time. The measurement points before the intervention are called baseline phase. These measurements serve as control; that is, they serve the same function as control groups do in conventional group experiments. The data collected during the baseline phase are compared to the data collected during the intervention (experimental) phase. In order to infer that an intervention is effective – that is, change in the dependent variable can be attributed to the intervention and not to history or maturation – we look for shifts in the trend or pattern of data that coincide with the intervention.

To assess the shift in data-pattern, it is necessary that the data trend in the baseline phase is clear and stable. A trend is one that shows the target problem to be occurring in a predictable and orderly fashion.

The stability of observed trend is identified by plotting the data on a graph, and then observing whether the trend is clearly increasing (Figure A), decreasing (Figure B), cyclical (Figure C) or stable (Figure D).

The Single-Subject Designs – Research Process

Single – Subject designs have many similarities with scientific practice. Single-subject designs also bring in objectivity and empiricism into the practice. By following these research designs, social researchers are in a position to know precisely what intervention was applied and how much effect was produced and to have supporting data for proof. These designs link research and practice by putting the practitioner in the enviable position of not only bringing about change but also having valid evidence as to why the change occurred (Monette, et. al., 1986.p.255). The process of single-subject design research is presented below:

STEP I : Problem Formulation
STEP II : Identification of objectives
STEP III : Selection of Single-Subject Design
STEP IV : Pre-Intervention Assessment
STEP V : Intervention Strategies
STEP IV : Assessment of Intervention Effects
STEP VII : Drawing of Conclusions.

Fig. A: Steps in Single Subject Design Research Process

Problem Formulation

In the first stage, the researcher strives to obtain as clear and specific an understanding of the problem as possible, using various assessment methods and techniques, such as interviewing the individual, his peer group and family members, case history etc.

Identification of Objectives

After the problem is identified, the next step is to determine what objectives are to be achieved through intervention. At this point, the first real difference between the research-based practice and traditional practice is encountered. In research-based practice it is to be ensured, firstly, that the objectives are measurable in some way and secondly that they are more specific and precisely defined than is often done in conventional practice.

Selection of Single –Subject Design

Once a problem and corresponding objectives for intervention have been identified, the next phase of the research process is to select an appropriate single-subject design that will suit the objectives and constraints of a particular subject.

Pre-Intervention Assessment (Baseline Phase)

Pre – intervention Assessment or needs assessment is a systematic appraisal in evaluating the client's problems, needs and potential solutions. For this, the researcher generally uses one of the standardised rating scales designed to measure the degree or level of target behaviours or problems.

Single-subject designs call for repeated measures of the subject's behaviour or condition so that trends and changes can be noted. Thus, the fourth step in the research process is to establish a baseline or a series of measurements of the subject's behaviour or condition prior to intervention.

Intervention Strategies

In this phase of research, the researcher develops an intervention strategy which aims at modification of behaviour or conditions of the subject. The strategies may include a single intervention or a set of interventions at a time or in succession depending upon the degree of severity of the subject's condition. For example, a researcher may decide to use counselling technique to modify the behaviour of an adolescent student who is at high risk of dropping – out along with other supportive intervention such as facilitation, ventilation of feelings and universalisation.

Once the intervention strategy is decided, the next step is the introduction of intervention. When the intervention is introduced, it is important that only a single, coherent intervention be introduced during any intervention phase (Barlow and Hersen, 1973).

During the intervention phase, the measurement of the subject's condition, started during the baseline phase, is continued. This, of course, is done to track what changes (if any) the intervention is producing in the subject's condition. It is crucial that the conditions under which measurements are made during the intervention phase remain consistent with those under which the baseline measurements were obtained (Jayaratne and Levy, 1979).

Assessment of Intervention Effects

Assessment of intervention effects ascertains whether the intervention strategy has achieved the desired result in the subjects. It reviews all the other components of the process to make an appraisal of the result. It also gives answers to whether the intensity of the problem has reduced or increased or even remained constant.

The last stage of the research process addresses itself to assessing the effects of intervention. Let us assume that higher scores represent improvement, as in the case of "self esteem'. If the goal of intervention were to increase self-esteem, higher scores would indicate improvement.

A stable baseline is ideal since post-intervention comparisons will then readily reveal intervention effects. If the intervention is helpful, there should be a pronounced upward move in measurement levels. An ineffective intervention would be revealed by little changes from baseline levels. The value of a stable baseline is that it allows all three possible intervention outcomes to be readily noted.

Types of Single-Subject Designs

Although there are numerous types of single-subject designs, all involve repeated measurements during baseline and intervention phases and a comparison across phases as evidence of intervention effects. The designs differ in the number of phases involved, the number of intervention applied, and the number of baselines employed. Perhaps, the most important differences are in the internal validity of the designs. Some are more capable of providing evidence for the effect of an intervention when such an effect actually exists. Ideally, of course, researchers should select the most valid design that fits their particular case.

There are three alternative single-subject designs:

1) AB : The Basic Single Subject Design.
2) ABAB : Withdrawal / Reversal Design.
3) ABCD : Multiple Component Design.

AB: The basic Single Subject Design

The Basic Single-Subject design as the name suggests, is the simplest single subject design and most popular design among researchers mainly because it involves only one baseline phase (A) and one intervention phase (B) as illustrated below :

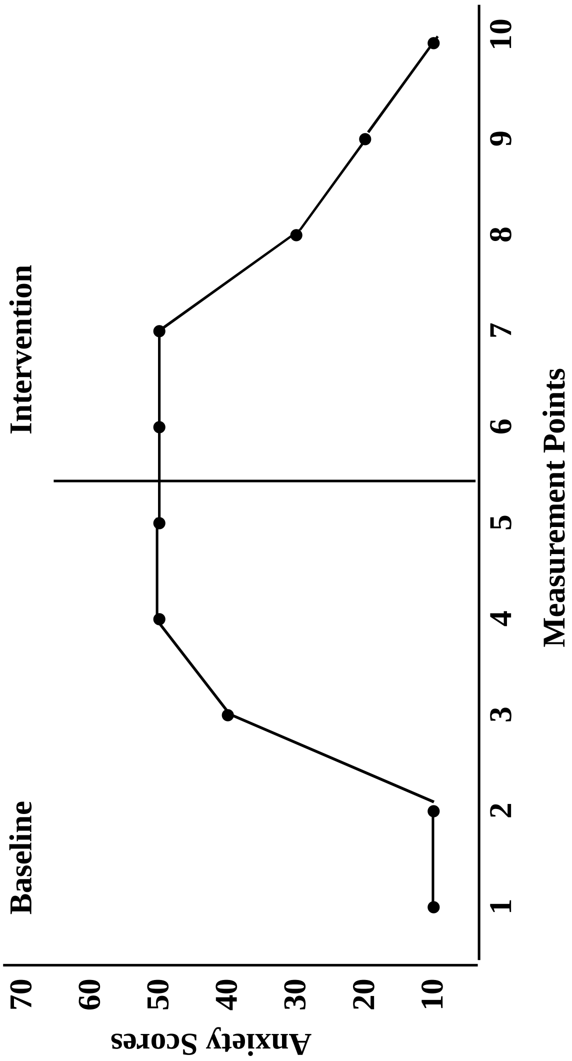


Fig.B: Hypothetical Baseline Followed by Successful Intervention

This design is more commonly known as AB design. The letter A signifies baseline phase and a period when intervention is withdrawn in some of the more complex designs. The letter B indicates an intervention phase when some specific intervention is introduced.

In this research design the effects of intervention are ascertained by comparing the client's condition during intervention phase with that of the baseline phase.

Since this design involves one baseline assessment and one intervention phase, its validity is threatened by history : events other than the intervention could be responsible for the change in the client's behaviour.

Despite the limitations of the AB design, it provides better evidence of intervention effects than non-experimental case histories. It also has the advantage of being applicable to most clinical situations, especially in cases where more rigorous designs might be precluded.

Despite its limitations and relative weakness, the AB design provides better evidence of effects than non-experimental case treatment. With enough repeated observations, this design can provide valid and reliable evidence concerning the effectiveness of interventions.

ABAB: Withdrawal / Reversal Design

In order to have better control over extraneous factors withdrawal / reversal design has two baseline phases and two intervention phases. In this research design, after the first intervention is over, it is withdrawn and the second base line phase is established. Once the second baseline is stable the intervention is reintroduced. This design is based on the logic that if there is improvement in the target problem by the first intervention, then the target problem will go back to its original baseline level during the second baseline if the intervention is withdrawn and the target problem should improve when intervention is reintroduced.

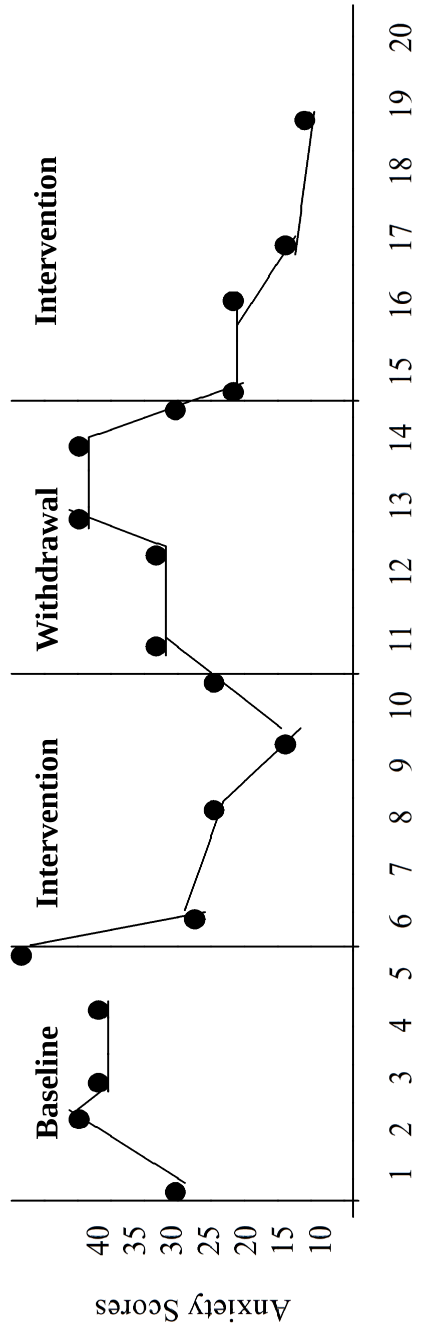


Fig. C: Hypothetical Examples of ABAB Design

The AB design can be strengthened substantially by moving to a reversal design because, after one intervention phase, the intervention is withdrawn for a period of time. There are basically two versions of the reversal design: ABA and ABAB. The two versions differ only in that the ABA design ends in a no intervention phase whereas, in the ABAB design, the intervention is reintroduced a second time.

The value of the reversal designs stems from their ability to demonstrate more conclusively that it is the intervention and not some extraneous factor that is producing change in the client's condition. If the client's condition deteriorates when the intervention is withdrawn, we have evidence that the intervention is the controlling factor. Even more evidence is provided with the ABAB design if the reintroduction of the intervention coincides with renewed improvement of the client. Although it is possible for a set of extraneous factors to produce the first client improvement, it is likely that the same set of factors would recur at precisely the right time to produce improvement on reintroduction of the intervention. As figure C illustrates. Especially with the ABAB design, we would have great confidence in the efficacy of an intervention that produced similar real life results.

This research design has higher strengths on internal validity when compared with the AB design. However, there are practical problems that restrict the use of ABAB designs. First, the changes in client's due to first intervention which are more or less, permanent in nature cannot be put in reverse order. Second, putting clients to their baseline is not only unwise but it is also unethical.

ABCD : Multiple Component Design

The multiple component designs, are designed to handle special problems in different situations. These designs are commonly known as specialised designs and symolised as ABCD design where B, C, D stands for alternative interventions.

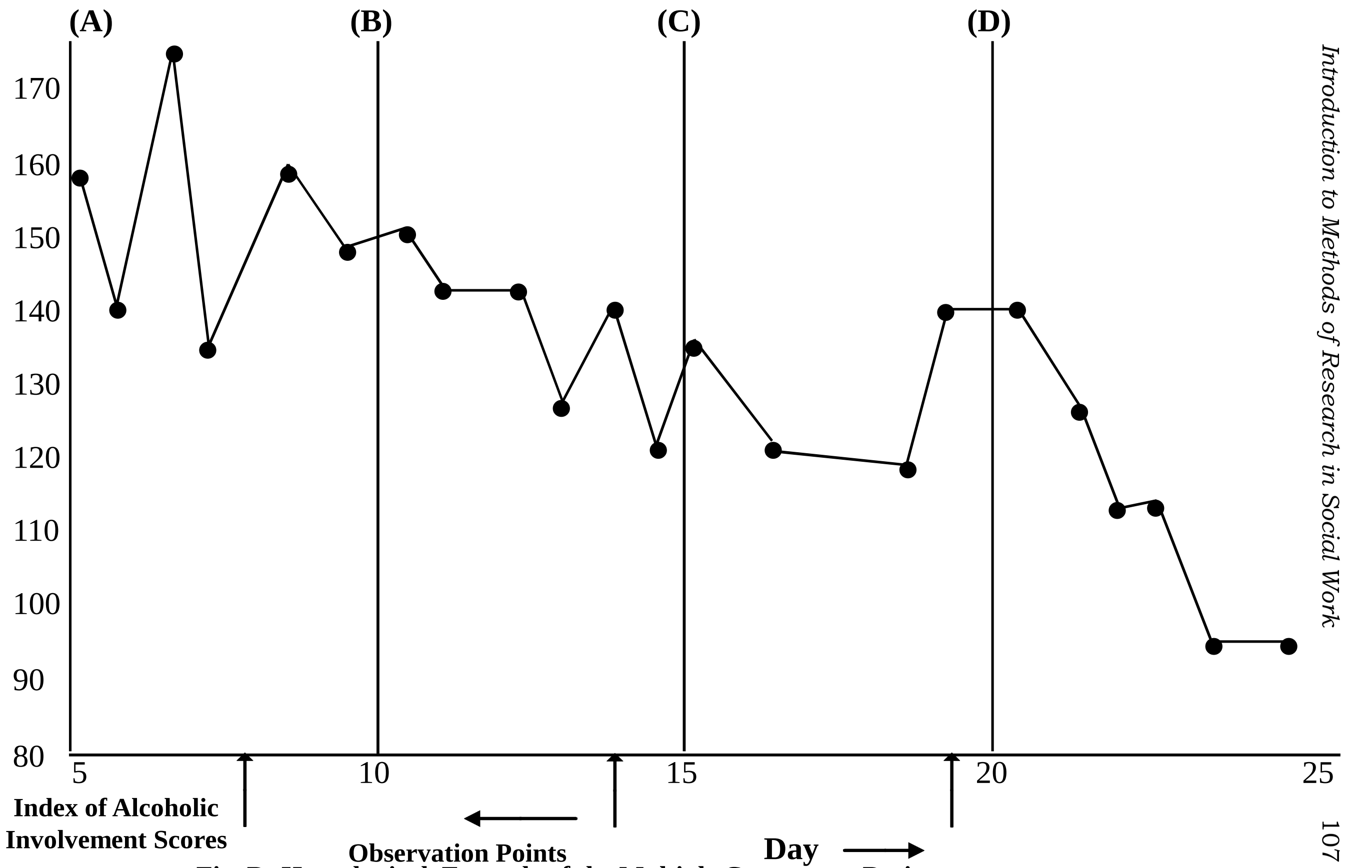


Fig. D: Hypothetical Example of the Multiple Component Design

These designs are basically used to evaluate the impact of changes in the intervention and modify the intervention that does not appear to be effective. Conversely, the researcher seeks to determine which intervention package is really responsible for the improvement in the target problem. Let us consider the problem of a client who is an alcoholic. Say for example, first we introduce problem experiencing in relation to drinking behaviour as a treatment (B) and find that it is not effective. Then we try the costs and benefits of drinking behaviour as a technique (C) in its place. Suppose, there still is no improvement then method for resolving drinking problems is used. The process describes a typical ABCD designs as Figure D.

A ⟶ Baseline

Interventions

B ⟶ Problems Experienced in relation to Drinking Behaviours

C ⟶ Costs and Benefits of Drinking Behaviours

D ⟶ Methods for Resolving Drinking Problems

Data Analysis

The results of single-subject experiments are presented in graphic form. In analysing data from the graph, generally, we look for pattern or trend of data and the slope of the line graph. When we analyse the meaning of a graph we look for the data pattern and its trend so that we can see the shifts in the target problem when intervention is introduced. That is, we try to get evidence for supporting that the intervention is affecting the target problem.

The point in analysing data through graph is the slope of the curve. That is the examination of the curve with reference to an axis of the graph (generally 'Y' axis). With reference to single subject design the slope is examined by comparing the proportion of data above and below the line showing the slope.

Both these points are further explained in the following section, which discuss about significance of data. The trend or slope analysis of observed data tells us whether a particular intervention, has caused the change or whether the change is caused by chance variation.

Tests of Significance for Single Subject Research Designs

There are a number of statistical procedures for testing the significance of change caused by interventions. Two procedures, namely, two- standard deviation method and Celeration line approach method, which will be discussed in this section, are most popular among researchers mainly because they involve simple mathematical operations:

Two- Standard Deviation Method

The two-standard deviation procedure is based on the presumption that if the difference between the average baseline value and the average intervention values are larger than twice the value of the standard deviation then the changes in the target problem is not due to chance. This procedure is used if the data-points are not dichotomous and the baseline trend is relatively flat or cyclical, it should not be used when there is a pronounced trend in the baseline.

The steps for computing Two Standard Deviation is given below :

1) Compute arithmetic mean of the baseline score.
2) Find standard deviation (SD) of the scores by using the formula

$$\text{SD} = \sqrt{\frac{\sum d^2}{n-1}}$$

3) Multiply the SD by 2

4) Find out $\overline{X} \pm 2$ SD

5) Calculate the difference between the baseline mean and intervention mean.

Let us take an example of scores obtained by a social worker in a single-subject design research. In a study mean baseline scores and standard deviation were found to be:

$\overline{X}$ (Mean Baseline Score) = 57.2 and SD = 2.29

Therefore

2SD= 2 × 2.29

= 4.516

= 4.6

= $\overline{X} \pm 2$SD

= 57.2 + 4.6 = 61.8 or 52.6

Method of Celeration Line Approach

Test of significance through celeration line approach is based on the assumption that the data would continue increasing or decreasing at the same rate it was in the baseline phase. As such, this test of significance is used when the slope of baseline is clearly showing increasing or decreasing trend of the data.

This test of significance is carried out in two stages. In the first stage, the slope of the baseline is determined and it is extended into the intervention period. Then, in the second stage, the proportion of data points above or below the line showing the slope of baseline to the proportion during the intervention phase.

The procedure involves the computation steps suggested by Gingerich and Feyerherm (1979).

1) Construct a chronological graph of the baseline scores.
2) Divide the baseline in half chronologically. (If there is an odd number of baseline data points, do not include the middle point in either half.)
3) Calculate the mean score of each half.
4) Plot the mean of each half at the chronological halfway point of each half (the one-quarter and three-quarter points of the overall baseline).
5) Draw a straight line connecting the two points plotted in step 4.
6) Extend the above line from the beginning of the baseline to the end of the intervention period. This is the celeration line.
7) Calculate the percentage of baseline observations that fall in the desired zone. The desired zone is above the celeration line if we are looking for an increase in the data points and below the celeration line if we are looking for a decrease.
8) Count the total number of data points in the intervention period.
9) Count the number of data points that fall in the desired zone during the intervention period. (See number 7 for definition of desired zone.)
10) Examine the cell entries in Appendix A to see if the proportion of data points in the desired zone is significantly greater during intervention than during baseline.

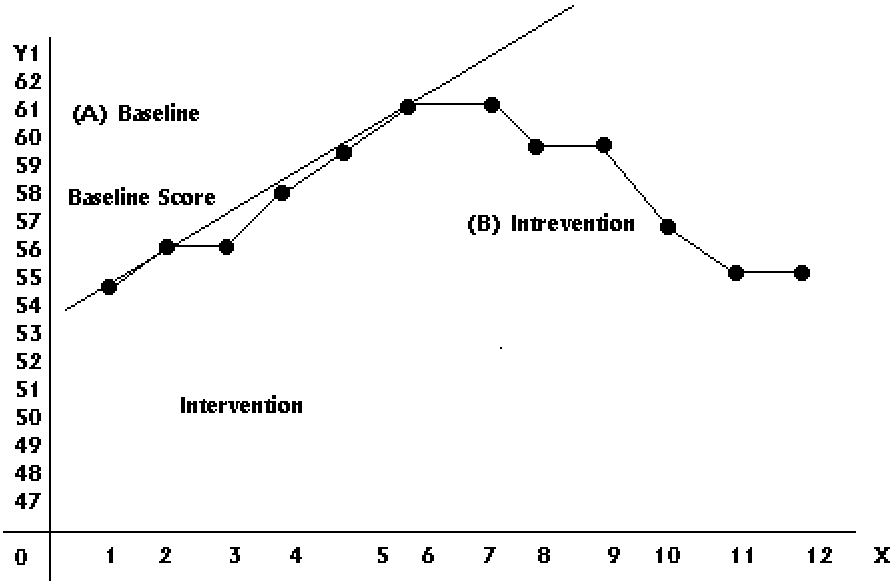


Fig. : Chronological Graph Showing Celeration Line

To rule out the possibility of change variation a number of statistical procedures have been evolved. However, some statistical procedures require a large number of measurements of observation points, which makes it impossible for researchers to use. Yet, some other statistical procedures are highly controversial.

Before we draw our conclusions we have to ascertain that the change in the target problem is not due to chance variation. In other words, we have to ascertain that the difference between baseline and intervention levels is too great to be due to chance variation. The procedure to rule out the chance factor is known as the test of statistical significance.

Generalisability of Single-Subject Designs

The ultimate goal of a scientific research is generalisability of the findings of the study. In social research, findings which are generalisable to a considerably large number of situations and cases can only contribute to the knowledge base of practice.

Interestingly, in single-subject designs research even if it is proved that the interventions were effective, there is no guarantee that the same intervention would be effective on other clients in different settings. This limitation of single-subject designs research, however, does not discourage social researcher because generaliability of findings can be achieved through repeating the study by taking more measurements.

Experimental Research Designs

Experimental researches are designed for testing causal relationships. A causal relationship refers to relationships between two variables where one variable (characteristic or occurrence) X determines another variable (characteristic or occurrence) Y. For example, if a researcher wishes to test a causal relationships that punishments (X) cause low self-esteem (Y) by comparing a group of students who have been exposed to punishments (X) with one that has not been exposed, he has to measure the two groups with respect of Y, either during or after exposure to X.

The Logic of Causal Inference

To clarify the issues raised above, we have to understand the logic of causal inference. The three conditions that have to be fulfilled to draw a causal inference are :

If 1) the cause precedes the effect in time,
2) there is an empirical correlation between them, and
3) the relationship is not found to be the result of the effects of some third variable on each of the two initially observed variables.

The first condition in a causal relationship is that the cause precedes the effect in time. For example, in the game of snooker, the first impulsion is the cause of movements of the second ball and the subsequent balls. The movements of second and subsequent balls are the effect of the cause induced by the impulsion

The second condition in a causal relationship is that the two variables may be empirically correlated with one another**.** For example, if a researcher wishes to examine if there is cause-effect relationship between gender and achievement, he or she has to use correlational technique to assess the magnitude of the relationship. It is also required that the coefficient of correlation is substantial.

The third condition for a causal relationship is that the observed empirical correlation between two variables cannot be explained away as being due to the influence of some third variable that causes both of them. For example, it may be observed that there is a strong correlation between 'knee joints pain' and 'amount of rainfall' but this does not mean that joints pain effect rainfall. A third variable, relative humidity is the cause of both knee joints pain and rainfall. Any relationship satisfying all these conditions is causal, and these are the only conditions of cause –effect relationship.

Types of Experimental Research Designs

There are a large number of experimental designs. Various authors have grouped experimental designs into certain categories based on extent of control. Most common grouping comprises:

- True Experimental Designs,
- Pre-Experimental Designs, and
- Quasi Experimental designs

In this chapter we will discuss the first category of experimental designs that is True Experimental Designs. The other two categories of experimental designs will be discussed in the next chapter.

True Experimental Designs

True Experimental Designs have maximum control and hence highest degree of internal validity. The essential components of an experimental research design involve (a) random assignments of subjects to experimental and control groups, (b) introducing the stimulus (independent variable) to the experimental group while withholding it from the control group, and (c) comparing the amount of change in dependent variable in experimental and control groups.

Pre-Test, Post-Test – Control Group Design

The classic experimental design, which is also known as pre-test-post–test control group design can be shown in shorthand notation as:

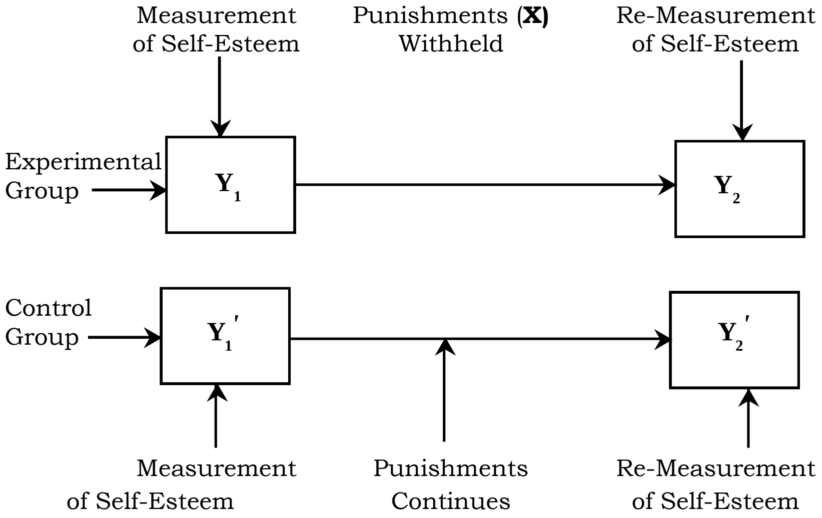
$$E \longrightarrow R \longrightarrow Y_1 \longrightarrow X \longrightarrow Y_2$$

$$C \longrightarrow R \longrightarrow Y'_1 \longrightarrow \text{Non-X} \longrightarrow Y'_2$$

E and C represent **e**xperimental group and control groups respectively. R stands for random assignments of subjects to either experimental group or the control group. The notation X represents the introduction of a stimulus, Y_1's represent pre-tests and the Y_2s represent post-tests. In this design, experimental group and the control group subjects are measured on a dependent variable before and after the introduction of stimulus.

Suppose, for example, a researcher wishes to test a hypothesis that punishments lead to low self-esteem using pre-test-post –test control group design. To test the hypothesis first he/she has to select a sample of students preferably from one particular class, say, 10th Standard. Then he/she has to randomly assign the subjects to either the experimental group(E) or the control group (C). Now both the groups are measured for their self-esteem (Y_1, Y'_1). Punishments (X) are withheld for students who are in control group. Later, both the groups are measured and compared for self-esteem (Y_2, Y'_2). If there is a significant difference in the pre- and post- self-esteem scores it can be concluded that suspension of punishment had an effect on self-esteem. Further, if it is observed that the average post self-esteem scores of students in group E is comparatively lower than the students in group C then the hypothesis that punishments lead to low self-esteem will be accepted.

The pre-test-post –test control group design, is diagrammed as shown below :



Effects on Experimental Group (D_1) = $Y_2 - Y_1$

Effects on Control Group (D_2) = $Y'_2 - Y'_1$

Net Effects = $D_2 - D_1$

The Post-test- Only Control Group Design

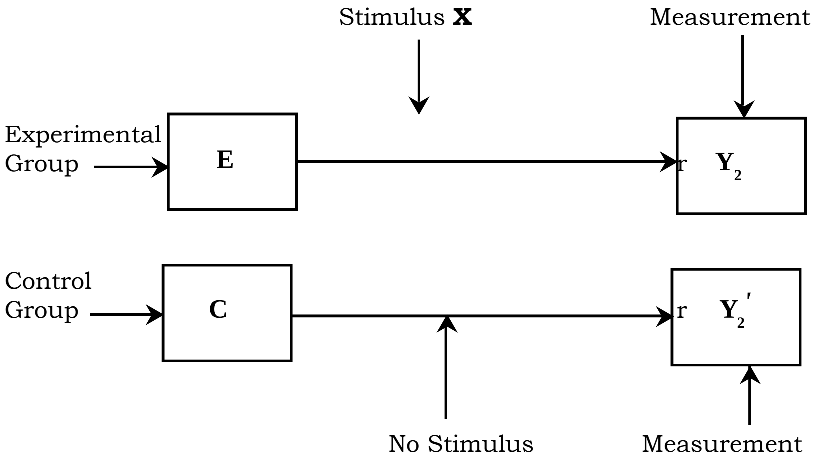
The Posttest- Only Control Group Design is modification of Solomon Four- Group Design by removing the pre-testing of the groups. In shorthand notation it can be shown as:

$E \longrightarrow R \longrightarrow X \longrightarrow Y$

$C \longrightarrow R \longrightarrow \text{Non-X} \longrightarrow Y'$

This design is used to nullify the effects of repeated testing which often enhances the performance without any corresponding improvement in the variable under examination. In this design the subjects are randomly assigned to either the experimental group or the control group and are measured during or after the introduction of the stimulus (the independent variable).

The post –test only control group design, is diagrammed as shown below :



Suppose, for example, that a researcher examining the effects of punishments on the self – esteem of the students selects a sample of subjects who are randomly assigned to either of the two groups. One group is not subjected to punishments and later both groups are measured for their self-esteem and their scores are compared. A significant difference will indicate that suspension of punishment had an effect on self –esteem.

Pre-Experimental Research Designs

Research designs in which most of the sources of internal and external validity are not controlled are termed as Pre-Experimental Research Designs. These designs are the weakest kind of research designs. In fact, the risk of drawing causal inference from these designs is extremely high. Still they are used quite often in social research. These designs help to illustrate the advantages of experimental research designs.

Types of Pre-Experimental Designs

The three very commonly used Pre-Experimental Designs are :

1) One Shot Case Study
2) One Group Pre-test, Post-test Design
3) The Post-test Comparison Group Design

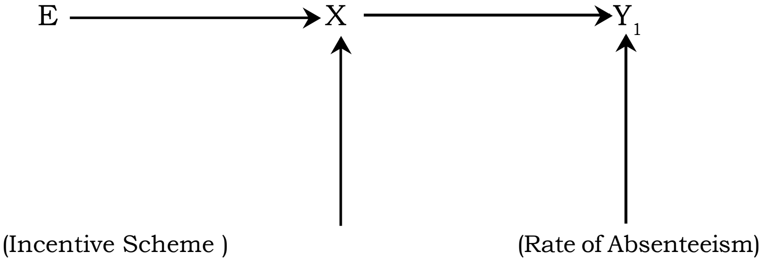
One Shot Case Study

The shorthand notation for One Shot Case Study design is :

$$\mathbf{X} \longrightarrow \mathbf{Y}$$

The X in this notation represents the introduction of stimulus. The Y represents the measurement of dependent variable. In this research design, a group of subject is measured on a dependent variable after the introduction of stimulus. In this design it is not possible to ascertain if the change in the dependent variable is higher (or lower) than it was before the introduction of stimulus. It also does not tell that there is no change among the comparable subjects where stimulus was not introduced. Thus, this design fulfills only two of three conditions of causal inference, that is, *time order* and *correlation*. Hence, we cannot rule out the possibility that the extraneous variables caused the observed change.

For instance, to solve the problem of absenteeism, an incentive scheme is launched for the employees who are found to be chronic absentees. After a month or so the attendance is checked. In case there is decrease in rate of absenteeism, it can be inferred that the decrease in the rate of absenteeism is because of new incentive scheme. This example may be shown diagrammatically as:



One Group Pre-test, Post-test Design

The shorthand notation for this design is:

$\mathbf{Y} \longrightarrow \mathbf{X} \longrightarrow \mathbf{Y}_1$

The notations Y an Y_1 refer to the measurement before and the measurement after the introduction of stimulus. In this design the dependent variable is measured before and after the introduction of stimulus is introduced. Although this research design measures *time-order*, *correlation* and *control* for internal factors, it does not take into account factors other than the independent variable that might have caused the change between pre-test and post-test results. The factors that might have caused the change may be associated with the various threats to the internal validity, such as, history, maturation, testing and statistical regression.

Suppose, we wish to assess the effect of cognitive behaviour intervention on abusive parents and we decide to undertake the study using One Group Pretest -Posttest Design. The shorthand notation for this design may be diagrammed as shown below:

$$E \longrightarrow Y_1 \longrightarrow X \longrightarrow Y_2$$

Where:

$X \longrightarrow$ Independent Variable (Intervention)

$Y_{1,} \longrightarrow$ Dependent Variable before introduction of X (Pre-Test)

$Y_2 \longrightarrow$ Dependent Variable after introduction of X (Post Test)

$E \longrightarrow$ Experimental Group

To conduct the study, first we select a group of abusive parents and measure their parenting skills and cognition about childhood behaviours. The test is followed by introduction of Cognitive Behavioural Intervention with the abusive parents. After a specified period of intervention its effects on parental skills are assessed. If it is found that there is significant increase in the parental skills scores of the abusive parents we may infer that the change in the score is due to the intervention.

The Post-test Comparison Group Design

The third commonly used pre-experimental research designs involves post-test measurement only but does employ a comparison group. The term comparison group denotes a group which is not formed by random selection of subjects and whom experimental manipulation is not performed. This research design can be symbolised as follows:

$E \longrightarrow X \longrightarrow Y_1$

$C \longrightarrow Y'_1$

In example mentioned above if we compare the parenting skills and cognition about childhood behaviours of the group of abusive parents who participated in experiment with the parenting skills and cognition about childhood behaviours of a group of abusive parents who did not, it exactly demonstrates, the post-test comparison group design of research. The comparison group is usually chosen to be as similar as possible to the group that was introduced to the intervention. The example may be shown diagrammatically as :

$E \longrightarrow X \longrightarrow Y_1$

$C \longrightarrow \text{Non-}X \longrightarrow Y'_1$

Where:

$X \longrightarrow$ Independent Variable (Cognitive Behaviour Intervention)

$Y_{1,} \longrightarrow$ Dependent Variable (Parental Skills) before introduction of X (Pre-Test)

$E \longrightarrow$ Experimental Group

$C \longrightarrow$ Comparison Group

One serious disadvantage of this design is that the groups were not equivalent before introduction of the stimulus (intervention) . In other words, it is possible that the subjects in the two groups might have differed initially with respect to the dependent variable measured (parenting skills and cognition about childhood behaviours)

The internal validity of the three pre-experimental research designs discussed in the preceding sections is week. Hence, causal inference drawn from pre-experimental research designs is inconclusive.

Quasi-Experimental Research Designs

Many a times it is not possible to achieve random assignments of subjects to experimental and control groups and withhold stimulus (intervention) to one group (control group). In such cases, instead of foregoing the study altogether, it is sometimes possible to create and execute alternative research designs that have less internal validity than experimental research designs but still provide reasonably good amount of evidences for causal inferences. These designs are called quasi-experimental research designs and are distinguished from experimental research designs due to lack of random assignments of subjects to experimental and control groups. In this section , we will discuss some quasi-experimental research designs that are applicable to social research.

Pre-test Post-test Non-equivalent Control Group Design

When it is not possible to divide subjects into experimental and control groups by random assignments, we try to get an existing control group (comparison group) that appears to be similar to experimental group. This research design is commonly called as Pre-test Post-test Non-equivalent Control Group Design and can be symbolized as follows:

$E \longrightarrow Y_1 \longrightarrow X \longrightarrow Y_2$

$C \longrightarrow Y'_1 \longrightarrow \text{Non-X} \longrightarrow Y'_2$

Where :

$X \longrightarrow$ Independent Variable (Intervention)

$Y_{1,} \longrightarrow$ Dependent Variable before introduction of X (Pre-Test)

$Y_2 \longrightarrow$ Dependent Variable after introduction of X (Post Test)

$E \longrightarrow$ Experimental Group

$C \longrightarrow$ Comparison Group

Suppose we wish to evaluate the effects of an intervention (say, counselling) on level of loneliness of residents of a Home for the Aged. It is unlikely that we would be permitted to select randomly in any Home for the Aged those residents who will be given counseling and those who will not be given. As an alternative, we may find two Homes for the Aged that agree to participate in our research study and which appear to be very similar apparently in all respects. That is we make sure that the inmates in two homes are very similar in terms of age, socio-economic status, mental and physical disabilities, psychological functioning, and so on. We can introduce the intervention in one home, and use the other as a comparison group. The two homes could be compared by a pre-test measurement to make sure that they really are equivalent on the dependent variable before introducing the intervention (independent variable). If their average loneliness scores are approximately same, then it would be reasonable to infer that differences in post-test scores are due to the effects of intervention. The example may be shown diagrammatically as:

$$\begin{tikzcd}
E \arrow[r] & Y_1 \arrow[r] & X \arrow[r] & Y_1 \\
C \arrow[r] & Y'_1 \arrow[r] & \text{Non-X} \arrow[r] & Y'_2
\end{tikzcd}$$

Where:

X Independent Variable (Intervention : Counselling)

Y_1 Dependent Variable before introduction of X (Pre-Test)

Y_2 Dependent Variable after introduction of X (Post Test)

E Experimental Group

C Comparison Group

Time-Series Designs

Simple Time-Series Designs

When comparison group is not available for assessing cause-effect relationship — Time-Series Designs can be used. In Time-Series Designs pre-test and post-test measures are taken a number of times before and after the introduction of stimulus. Usually the researcher attempts to obtain at least five sets of measures before and after the introduction of independent variable. A typical time series design can be represented as follows:

$$\mathbf{Y_1 \quad Y_2 \quad Y_3 \quad Y_4 \qquad Y_5 \quad X \qquad Y_6 \quad Y_7 \quad Y_8 \; Y_9 \qquad Y_{10}}$$

Y_1 to Y_5 → Measurements of Dependent Variable before introduction of X (Pre-Test)

X → Independent Variable (Intervention : Counselling)

Y_6 to Y_{10} → Measurements of Dependent Variable after introduction of X (Post -Test)

The above diagram indicates that the dependent variable was measured at five points in time before the intervention (X) was introduced and at another five points after that.

To illustrate the Time-Series Design we will take a group of students whose morale has been observed as very low. First, we will measure the morale of students by using a standardized scale. The measurement will be repeated another four times with an interval of a week. After recording the fifth observation, the intervention (a play which has been tested for boosting morale of students) is introduced. After completion of the intervention the dependent variable (morale in this case) is measured five times with an interval of a week. These measurements can be compared with the measurements recorded before the intervention to infer if there is significant change in the dependent variable. In case there is significant increase in the morale of students after witnessing/participating in the play it can be inferred that it is has been caused by the intervention (the play). The simple set of data is presented graphically in Figure given below

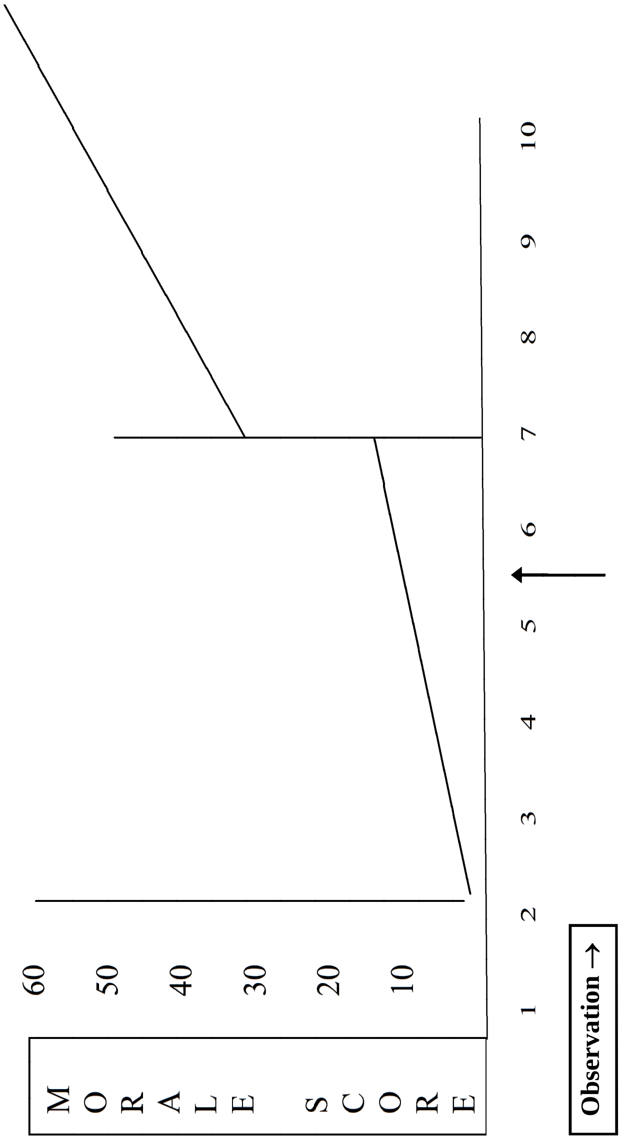


Fig. : Time Series Design

Multiple Time Series Design

Multiple Time Series Design is another form of time series design with greater internal validity. The shorthand notation for this design is :

E $\rightarrow Y_1$ Y_2 Y_3Y_4 Y_5 X Y_6 Y_7 Y_8 Y_9 Y_{10}

C $\rightarrow Y_1$ Y_2 Y_3 Y_4 Y_5 Non-X Y_6 Y_7 Y_8 Y_9 Y_{10}

In this design both an experimental group and a non-equivalent comparison group are measured at multiple points in time before and after intervention are introduced in the experimental group.

We will consider a hypothetical study of children at risk (severely underweight)**t**o illustrate the multiple time-series design. In this study, first age and weight of children in two communities are measured and children at risk are identified The measurements are repeated for five times with an interval of a week or so. After recording the fifth observation, the intervention (a supplementary nutrition programme) is introduced in one of the communities. On completion of the intervention, the dependent variable (weight) is measured five times with an interval of a week. These measurements can be compared with the measurements recorded before the intervention to infer if there is significant change in the dependent variable. In case there is significant increase in the weight of the children after implementing the supplementary nutrition programme it can be inferred that it has been caused by the intervention. To substantiate the causal inference the results can be compared with the measurements of the children of other community where the programme was not implemented.

Conclusion

Single subject designs research uses time series analysis technique for the evaluation of the interventions on individual cases, groups, family and community. Such designs involve repeated measurement of the dependent variable before and after a particular intervention, to see if a sustained pattern of change in the dependent variable commences shortly after the onset of intervention.

The process of single-subject design research involves Problem Formulation, Identification of objectives, Selection of Single-Subject Design, Pre-Intervention Assessment, Intervention Strategies, Assessment of Intervention Effects and Drawing of Conclusions.

There are three important single-subject designs, namely, (1) AB: The Basic Single Subject Design, (2) ABAB: Withdrawal / Reversal Design and (3) ABCD: Multiple Component Design..

Experimental researches are designed for testing causal relationships. A causal relationships refers to relationships between two variables where one variable (characteristic or occurrence) X determines another variable (characteristic or occurrence) Y.

There are a large number of experimental designs. They can be grouped into three categories based on extent of control; True Experimental Designs, Pre-Experimental Designs, and Quasi Experimental designs.

References

Campbell, D.T. and Stanley. J.C. *Experimental and Quasi Experimental Designs for Research,* Boston: Houghton Mifflin, 1963

Kidder, Louise H. *Research Methods in Social Relations,* New York: Holt, 1981.

Lal Das, D. K. *Practice of Social Research : Social Work Perspectives* : Jaipur : Rawat Publications, 2000

Lal Das, D. K. *Designs of Social Research* : Jaipur : Rawat Publications, 2005

Monette, Duane R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Rubin, Allen & Babbie E. *Research Methodology for Social Work*, Belmont California, Wadsworth, 1989.

6

Research Methods I: Descriptive, Exploratory, Diagnostic, Evaluation and Action Research

Introduction

We discussed about 'social work research methods' in the previous Chapter. In this Chapter we shall discuss Descriptive Method and Experimental Method of research in detail.

Descriptive Research

Descriptive research studies are designed to obtain information concerning the current status of a given phenomenon. They are concerned with the existing conditions or relationships, prevailing practices, current beliefs, points of view or attitudes, processes that are going on and their effects and the developing trends. In short, it determines the nature of a situation as it exists at the time of study. The aim of descriptive research is to describe "what exists" with respect to variables or conditions in a situation.

The descriptive research method is appropriate in behavioural sciences. Many types of behaviour that interest the researcher cannot be arranged in a realistic setting. For example, it would be unthinkable to prescribe cigarette smoking for the purpose of studying its possible relationship to throat or lung cancer, or deliberately arrange accidents, in order to evaluate the effectiveness of seat-belts or helmets in preventing serious injuries.

Although some experimental studies of human behaviour can be appropriately carried out, both in laboratory and in the field, the prevailing method used in social sciences is descriptive. Under the conditions that naturally occur at home, inside the classroom, on the playground or within the community, human behaviour can be systematically examined and analysed. This analysis may lead to the modification of factors or influences that determine the nature of human interaction. It is through this modification of factors that social institutions may exercise more effective influences in promoting human welfare.

Correlational Studies

Human behaviour at both individual and the social level is characterised by great complexity. However, given the present state of social research, we understand too little of this complexity. One approach to a fuller understanding of human behaviour is to begin by testing out simple relationships between those factors and elements which are supposed to have some bearing on the phenomenon in question. The value of correlational research is that it is able to achieve this end. We know that one of the primary purposes of science, as conceived traditionally, is to discover relationships among phenomena with a view ultimately to predicting and, in some situations, controlling their occurrence.

Much of social sciences research is concerned at our present stage of development with the first step in this sequence, i.e., establishing interrelationships among variables. Correlational studies are concerned with determining the extent of relationship existing between variables. They enable us to measure the extent to which variations in one variable are associated with variations in another. We may wish to know, for example, how delinquency is related to social and class background, or whether a relationship exists between the number of years spent in full-time education and subsequent annual income, or whether there is a link between personality and achievement.

Correlational studies are generally intended to answer three questions. These are:

a) Is there a relationship between two variables (or two sets of data)? If the answer to this question is 'yes', then other questions follow:

b) What is the direction of the relationship? and

c) What is the magnitude of the relationship? The magnitude of the relationship is determined by the coefficient of correlation.

For instance, on the basis of his/her experience, a researcher may hypothesize that there is a relationship between performance in an intelligence test and a test of achievement in arithmetic. The correlational technique will help him test his/her hypothesis about the relationship. Pearson's product moment, one of the best known measures of association, is a statistical value of the coefficient of correlation ranging from –1.0 to +1.0, through zero and expresses relationship in quantitative form. Where the two variables fluctuate in the same direction, i.e., as one increases so does the other, a **positive** relationship is said to exist. A **negative** correlation or relationship, on the other hand, is to be found when an increase in one variable is accompanied by a decrease in the other variable. The values near zero indicate a weak relationship between the variables, whereas values closer to either +1.0 or –1.0 indicate a stronger relationship in either of directions.

Thus, the coefficient of correlation, tells us something about the relationship between two variables. However, other measures exist which allow us to specify relationship when more than two variables are involved. These are known as measures of **multiple correlation** and **partial correlation.** (We will not go into details about these measures over here.)

One danger in interpreting correlations is to assume that because two variables are related in a predictable fashion to one another with a high degree of probability, they are also in a causal relationship. This is not necessarily the case. For one thing, there is never more than a probable relationship between variables in any case. For another, it is quite possible for two variables to be related to one another with a high degree of probability but with a third variable accounting for the nature of relationship. Correlation must not be interpreted to mean that one variable is causing the scores in other variable to be what they are. For example, it may be found that there is a negative correlation between measures of anxiety and measures of intelligence. It should not be interpreted that there is a causative relationship between anxiety and intelligence; that is, that pupils are anxious because they are unintelligent or that pupils appear unintelligent because they are anxious. It might be that there are other underlying characteristics of individuals that tend to make some appear unintelligent and anxious, and others, intelligent and not anxious. Interpretation of such a correlation is difficult without experimental confirmation, For example, the relationship between anxiety measures and intelligence measures could be investigated experimentally by deliberately inducting anxiety in a testing situation and determining the effect on intelligence test scores.

Causal-comparative Studies

There is, at times the need to discover **how** and **why** a particular phenomenon occurs, and not confine our investigation to **what** a phenomenon is like. In this instance, the investigator tries to compare the similarities and differences among phenomena to find out what factors or circumstances seem to accompany or contribute to the occurrence of certain events, conditions or practices.

Unlike a scientist working in a laboratory, a social researcher cannot always select, control and manipulate factors that are necessary to study cause-effect relations. An investigator cannot, for example, manipulate domestic background, social class, intelligence, etc. in situations that do not allow researchers manipulate the independent variable and establish the controls that are required in "true experiments", they may conduct a causal-comparative study.

In a causal-comparative investigation, a researcher studies a real life situation in which subjects have experienced what he/she wants to investigate. For example, if an investigator wants to study emotional instability, he/she does not place children in a situation where all factors are kept constant except one variable which is manipulated to determine what causes a particular type of emotional disturbance. Rather, he/she chooses children who according to a selected criterion are 'disturbed' and compares them with emotionally stable children. After searching for factors or conditions which seem to be associated with one group and not the other, he/she may present a possible explanation of the underlying causes of the emotional problem.

Evaluation Research

Voluntary organisatons undertake many welfare programmes and provide services to individuals, groups and communities. While they provide the services they are constantly concerned about the outcome of their services: Do they achieve their goals while providing services? A set of questions are raised: Are the services effective? Are these programmes leading to undesirable consequences? Are the services relevant; will these services achieve their predetermined goals? And many such questions puzzle agency administrators. As such, they need some reliable and valid data which can give answers to these questions. The term used for the process of getting these reliable data in assessment using some scientific technique is known as evaluation. Broadly speaking, evaluation is a systematic assessment of progress made by the implementing machinery; an analysis of problems and difficulties arising in the effective implementation of a programme and an indication of the corrective measures necessary.

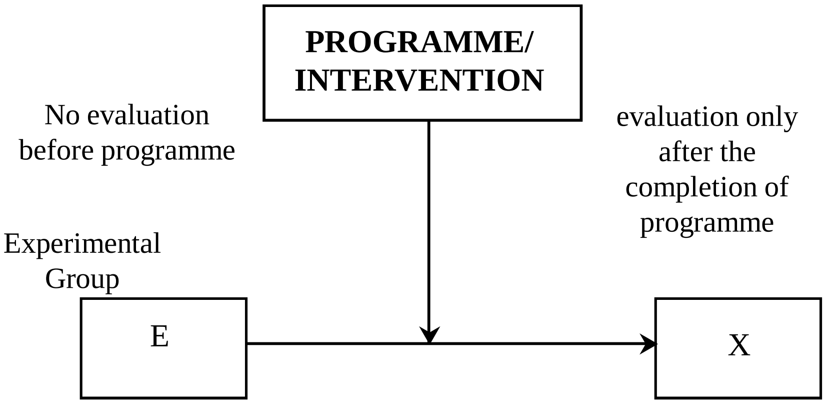
In a very broad sense, the concept of evaluation research simply connotes use of research methods to evaluate programmes or services and determine how effectively they are achieving their goals. The terms like evaluation research, evaluative research, programme evaluations and evaluation are synonymous, interrelated and hence used interchangeably.

Evaluation Research Designs

Any of the basic research designs, can be used for the purpose of evaluation research with some modifications. However, evaluation research often calls for testing of cause-effect relationship. As such, *experimental designs* are more appropriate for the purpose of evaluation research.

The After-Only Evaluation Design without a Control (Comparison) Group

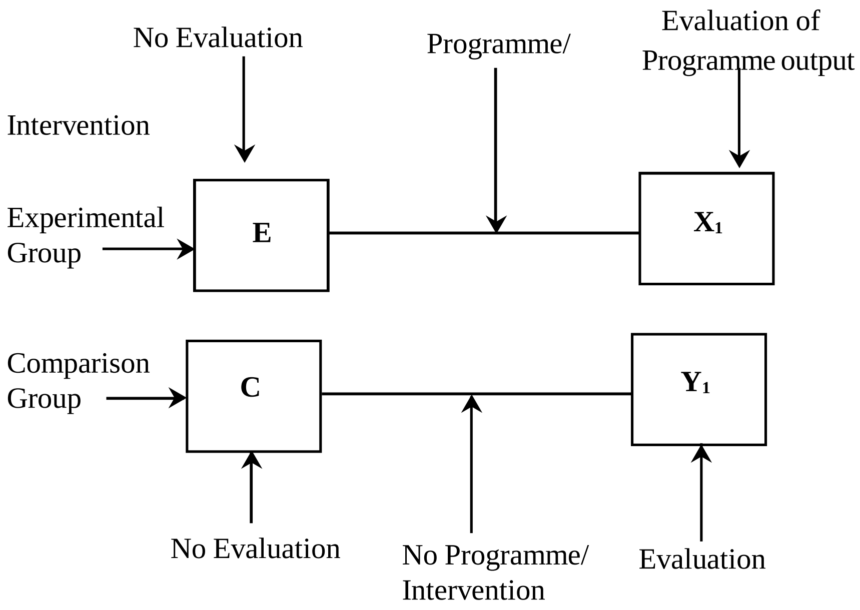
In this study design, the measurements are limited to the target group and taken only once at some point of time after completion of the programme / project activities. This is by far the weakest evaluation design. It is difficult to know whether any change has occurred or to assess the degree to which the changes, if any, can be attributed to the programme / project implementation.



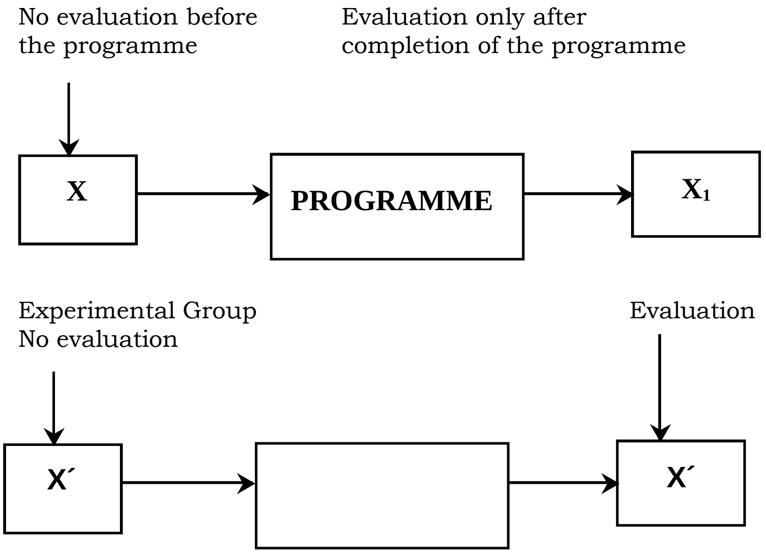
The After-Only Evaluation Design with a Control (Comparison) Group

In this design, a *control group* (comparison group)) similar to the *experimental group* for which programme/project activities have been implemented, is selected. Both the groups are measured with respect to the dependent variable only after completion of the programme/project activities.

The major weakness of this design is that the measurements are not taken before the introduction of the programme. Both the groups are assumed to be similar in respect of the 'before' measures on the dependent variable. Hence, it is quite likely that the change in the dependent variable may really be due to the initial differences between the two groups.

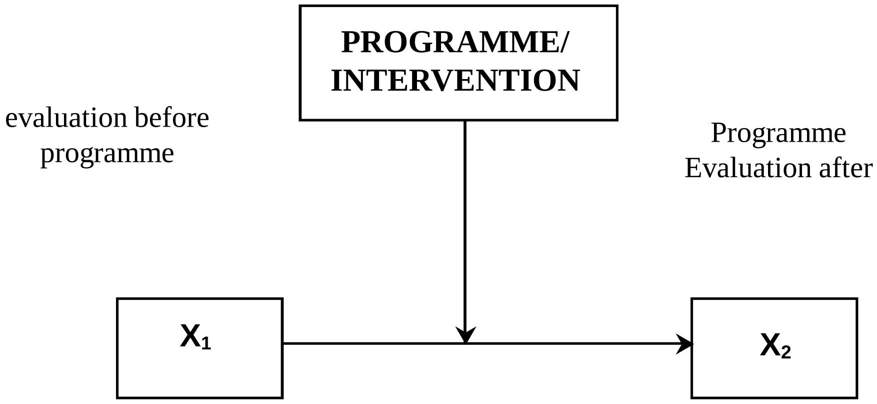


Effects = X1 – Y1



The 'Before' - 'After' Evaluation Design without Control Group

This design involves two measurements on the target/ treatment group; one before the implementation of the programme / project and another after the completion of the programme / project. The difference between the target group's positions on the dependent variable [the effect of the programme] is taken as a measure of the effect of the program [dependent variable].

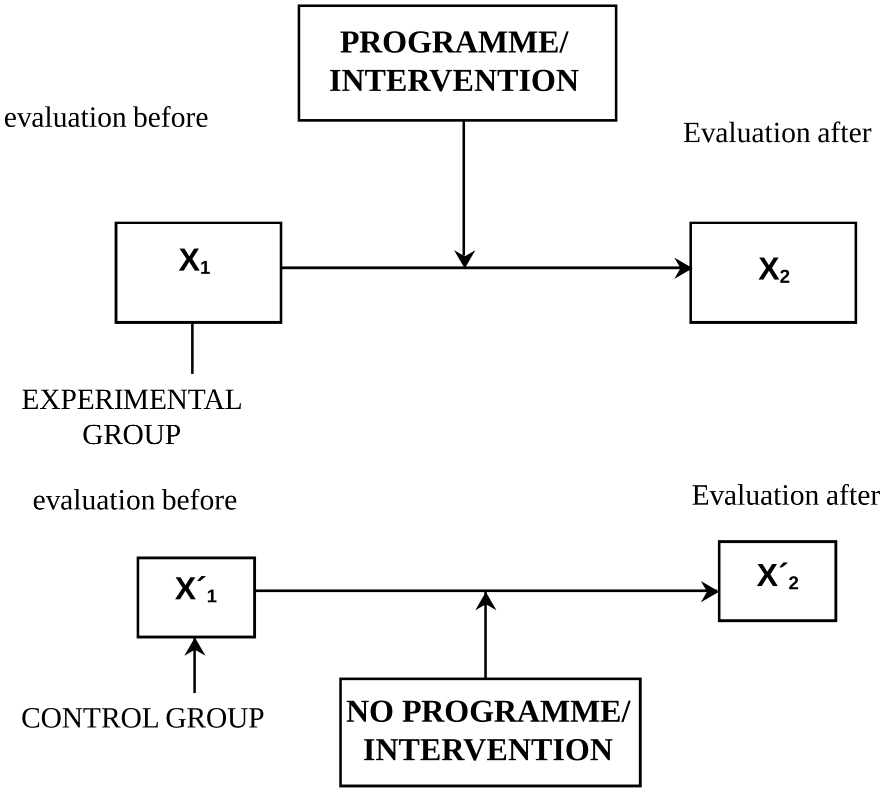


Effect/Impact: $X_2 - X_1$

But it is obvious that external factors unrelated to the programme treatment have been in operation leading to a change in 'before' target group's position on the dependent variable. The 'before' measurement itself may change the dependent variable. Thus, the major weakness of this evaluation study design is that it does not distinguish between the effects of the programme activities and effects of external factors or developmental process.

The 'Before' - 'After' Evaluation Design with Control Group

This study design may involve one, two or more control groups [groups] similar in characteristics where the programme is not being implemented. The variations in control groups arrangements relate to the attempts to take account of contemporaneous events, maturational or natural developmental process and the effects of 'before' measurement. In this design of study, both the target group and control group are measured at the beginning and also at the end of the programme / project activities alone.



D_1 (Difference in Target Group) = $X_2 - X_1$

D_2 (Difference in Control Group) = $X'_2 - X'_1$

Effect/Impact = $D_1 - D_2$

Alternative Evaluation Study Design

The Ex-Post-Facto Evaluation Study Design

The ex-post-facto study design is an attempt to detect causal relationships with data gathered by survey. Here, the evaluator controls the crucial variables only by selecting one, which has already been recorded. For example, an agency has conducted an opinion survey of adult beneficiaries aged 25 or more, taking their age, gender, place of birth and so on. The Agency authorities are interested in the causal effect of place of birth (the independent variable) on respondent's opinion on the effectiveness of the programme of non-formal education (dependent variable). Through manipulation of data the evaluator achieves some control over the other dependent variable (opinion) and the independent variable (birthplace).

In the ex-post-facto design the evaluator does not have very good control of causal variable, study condition, outside variables and measurement of dependent variable. The major drawback of this study design is that the data gathered by a survey is only a cross-section taken at one point of time, but the casual relationship in question is the link between the person's birth place and his opinion. This is a casual chain that may be of over 25 years' duration and the environment in which the person lived during these years may have varied widely from subject to subject.

Because of the problems encountered in setting up control groups, several alternative impact study designs have been evolved. One of them is differentiation of samples according to degree of 'exposure' and comparison amongst groups characterised by different degrees of exposure. To understand the alternative impact study design we will take up the following example.

In a study of mid-day meals programme where neither there was benchmark data nor was it possible to study a control group, comparing the children who had more exposure to the programme with those who had less exposure helped assess the programme impact. The children with less exposure were treated as a control group. The relationship between the level of programme efficiency and magnitude of impact on the children was tested, the magnitude of impact on the beneficiaries was found to be greater with higher programme efficiency.

Multiple Study Designs

Sometimes, multiple research designs are also used to assess the impact of a programme instead of a single design. For example, while using quasi-experimental design, some evaluators suggest supplementing the outcome with the case studies. By doing so, evaluators are able to capitalise on the merits of both the methods and impact assessment becomes more objective and reliable.

Impact Study Based on 'Opinions' or 'Views'

An overview of some of the important impact studies would reveal serious lapses by the evaluators. For instance, in a study of impact of Applied Nutrition Programme "Opinions" / "Views" about the impact were used to study the impact itself. Basing on impact study almost entirely on 'views' and 'opinions', would be a very superficial assessment and there is likelihood of varied opinions and views on which inferring something specific would be absolutely impossible.

Cost Benefit Analysis

One special type of evaluation research is cost-benefit analysis. In this type of evaluation all one has to do is to add up the costs of a programme, subtract them from the value of benefits, and we get the results. Either benefit exceeds costs or vice-a-versa. On the surface it appears simple. But in practice it is one of the most difficult evaluation designs, as quantifying benefits in particular, is really a difficult task.

This is more popular among policy makers and programme planners concerned about the cost involved and benefit accrued out of a programme. In the present context when every one asks about accountability, programme evaluation is probably here to stay.

Cost-benefit analysis is not as simple as it appears. Converting programme benefits into a monetary value is extremely difficult, particularly when a programme is intended to accrue long term benefits.

Cost Effective Analysis

Cost effective analysis is an alternative to cost benefit analysis because it is difficult to quantify the benefits. Instead, cost-effective analysis compares programme costs with programme effects measured in achievement test scores, skill performance level, coping abilities etc.

In the first stage of cost-effective analysis, the cost of the programme is determined. Going through the records of expenditures could do this. In the second stage, the programme effects are required to be quantified. The cost per beneficiary is calculated by dividing the total costs by number of beneficiaries. The cost thus obtained for each programme is calculated and compared to find out which programme is more effective.

Impact Study Designs

The focus of social impact analysis is to explain whether the programme has achieved its goal and if ‘yes’, then whether the analysis has to use experimental or quasi experimental designs of research involving serious quantitative measures. In an impact study programme/ participants/beneficiaries will make up the experimental group, and their counterparts who don't receive benefits/ participate in the programme, will make up the control group. In a social impact study, a prgramme is assessed to see what effect, if any is produced. Typically, the goals of the programme are identified and measured in terms of how well it achieves the goals (Monette *et. al.* , 1986).

Social Impact Analysis

A social development project is designed to produce significant effect in order to affect social structure and lead to social change and social transformation. This effect is commonly known as social impact.

Action Research Designs

Action researches are primarily for problem solving. Different types of researches have been undertaken for this purpose. Most distinguishing feature of this type of researches is their action plan which is designed, tried out and evaluated to assess exactly the extent of alleviation of the problem. Action research is commonly termed as applied research.

The methodological rigour of this kind of research is as important as for other type of research mentioned in the previous section. Action research deals with the application of research methods and skills in solving the social problems. In other words, action research is combination of research and practice. Therefore, while we undertake action research, we have to keep in mind the action plan, to resolve the problem under study.

What is Action Research?

Action research is one of the recent developments in the field of research. Understanding of the process of action research is of fundamental values for the community workers. Unlike other forms of social researches, action research deliberately sets out to create change. Action research is a series of cycles that begin and end with research and incorporate planned action to bring change.

Action research has its roots in community development programmes. Modern action research brings together social research methodology and community organisation/ development programmes together. Mc Taggart argues that this convergence has occurred because it has been demonstrated over and over again that research findings from one context do not necessarily work when applied to new contexts. Instead , 'people must conduct substantive research themselves on the practices that affect their lives'(Mc Taggart 1997).

Thus, involvement of people, for whom the action research is conducted, is the key to action research. For this reason, perhaps, some authors prefer to call action research as 'participatory action research'. This type of action research always contains the following :

1) The Researcher;
2) Involvement of individuals who are fundamental to the issue being researched; and
3) Focus on action to bring social change.

Action research intends to solve practical problems through research and planned actions. In this research, the emphasis is on solving problems through adoption of alternative practices suggested by a research study. The two distinct purposes of action research are : (a) to find out the causes of the problem, and (b) to suggest actions to resolve the problem.

Action research is applied research that treats knowledge as a form of power and abolishes the line between research and social action. There are several types of action research , but most share common characteristics, those who are being studied participate in the research process; research incorporates ordinary or popular knowledge; research focuses on power with a goal of empowerment; research seeks to raise consciousness or increase awareness; and research leading to political action.

Nature of Action Research

The ultimate object of action research is to solve the practical problems with the help of research techniques. Action research, then, like social research seeks to identify the exact nature and magnitude of the problem, analyse the causes in all their variety and intensity. Action research, however, assumes a distinct character of its own in a significant measure when it comes to the action to solve social problem. Action research emerges out of situational needs and a solution is also designed with respect to the situation.

Unlike other social researches, action research is increasingly becoming a team work where researchers collaborate with practitioners and subjects/beneficiaries participate in the research process. Although the researcher takes the initiative and leads the team, action research is a team work wherein other partners: beneficiaries and other stake-holders have to put in conscious effort in the research process.

Action research is a self-evaluative process where the action research team evaluates the outcome of the exercise. Action research is initiated by practicing individual or group. Hence it becomes necessary for the researchers to understand the problem as it exists and develop the action research design.

Action research concerns with social data, which are much more complex than that of the physical data. The basis of all social interactions, whether it is a large complex group or a small cohesive group, is expectations of behaviour, which in turn is result of many factors. The complex nature of social data reduces the power of exact solution of the problem. Most of the subject matter of action research is qualitative and does not admit quantitative measurement. In action research, it is difficult to segregate the cause and effect. It is because many a time the cause is also the effect. This makes it very clear that the social data typically pose certain problems when it is analysed for taking action to solve social problems.

Objective of Action Research

The major objective of action research is to search for answers to questions raised while trying to resolve social problems. In other words, action research attempts to provide knowledge about what interventions or treatments can really help in resolving social problems. In addition, it also helps in searching for answers to problems or difficulties faced by practitioners in the practice of their profession.

Areas of Action Research

In a very broad sense, action research concerns itself with the problems faced by social activists/practitioners. It encompasses those questions which are encountered in working with people or in planning or administering social services which are capable of being solved through research and which are appropriate for social investigation.

Action research utilizes the same scientific methods and techniques, as does social research. No doubt, when some research designs/ procedures of social research are not suitable to action research, it would be necessary to develop the tools which would be appropriate to action research.

Diagnostic Research Studies

The diagnostic studies are concerned with discovering and analyzing the causes of a problem. It examines variables leading to diagnose the causes of problems. For example: Why girls are more interested in higher education than boys? To know the reason one needs to take up a diagnostic study. Another example could be a study to find out why people from low income group seem to be better adjusted to married life than those from higher income group? This means the focus of a diagnostic study is on the nature and causes of problem. These studies presuppose some prior knowledge of the problem, usually through a descriptive study. The example cited above may come up when we come to know through a descriptive study that comparatively more girls than boys are interested in higher education. Since main objectives of these studies are to diagnose the problem, it is necessary that specific variables under study are measured accurately. To determine the frequencies of significant variables and to find out whether certain variables are mutually related, in diagnostic studies, one has to define clearly what he wants to measure and must find adequate methods and techniques for its measurement. In addition, he must be able to specify who are to be included in the sample to be studied. In collecting data for these studies, what are needed are appropriate, valid and reliable techniques to measure the variables.

The procedures to be used in diagnostic studies must be carefully planned since the aim here is to diagnose the problem. The research design for these studies must make a much greater provision for protection against bias.

Exploratory Research Studies

The purpose of exploratory studies is to formulate a problem for a more precise investigation or to develop hypotheses. However, an exploratory study can also be conducted to enhance the familiarity of researcher with the phenomena, he/she wishes to study some time later in a more scientific way.

For instance, if a researcher wanted to study social interaction patterns of AIDS/HIV patients but knew little or nothing about the phenomenon; an exploratory research would be appropriate. A preliminary interview with the relatives of AIDS/HIV patients would enable the researcher to develop a specific study design. Exploratory studies, therefore, help researchers to acquaint themselves with the characteristics of their research problem.

Conclusion

Descriptive research describes what the condition is and involves the description, recording, analysis and interpretation of conditions that exist. We also studied various types of descriptive research, like survey, documentary analysis, correlational and causal comparative studies. Experimental research describes what will be when certain variables are carefully controlled or manipulated.

Correlational studies are concerned with determining the extent of relationship existing between variables. In a causal-comparative investigation, a researcher studies a real life situation which subjects have experienced.

Evaluation research is a systematic assessment of progress made by the implementing machinery; an analysis of problems and difficulties arising in the effective implementation of a programme, and an indication of the corrective measures necessary.

Any of the basic research designs, can be used for the purpose of evaluation research with some modifications.

However, experimental designs are more appropriate for the purpose of evaluation research.

There are several alternative Evaluation Study Designs, namely: the Ex-Post-Facto Evaluation Study Design, Multiple Study Designs, Cost Benefit Analysis, Cost Effective Analysis and Impact Study Designs.

Action researches are undertaken to prepare action plan which is designed, tried out and evaluated to assess exactly the extent of alleviation of the problem.

The diagnostic studies are concerned with discovering and analyzing the causes of a problem. The purpose of exploratory studies is to formulate a problem for a more precise investigation or to develop hypotheses.

References

Ary, D., Lucy, C. Jacobs and Razavich, A. (1972), *Introduction to Research in Education,* (3rd Edition) Rinehart and Wdition Inc., Holt, New York.

Ackoff, R.L. (1953), *The Design of Social Research,* University of Chicago Press, Chicago.

Bailey, Kenneth D. (1978), *Methods of Social Research,* The Free Press, London.

Baker, L. Therese. (1988), *Doing Social Research,* McGraw Hill, New York.

Black, James A. and Champion, Dean J. (1976), *Methods and Issues in Social Research,* John Wiley, New York.

Cohen, L. and Manion, L. (1989), *Research Methods in Education* (Third Edition), Routledge, London.

Campbell, D.T. and Stanley. J.C. (1963), *Experimental and Quasi Experimental Designs for Research,*Houghton Mifflin, Boston.

Chapin, F.S. (1974), *Experimental Design in Sociological Research,* Harper, New York.

Epstein, I & Tripodi, T. (1974), *Research Techniques for Program Planning, Monitoring and Evaluation*, Columbia University Program, New York.

Festinger, L. and Katz. D. (eds.) (1953), *Research Methods in the Behavioral Sciences,*The Dryden Press, New York.

Goode, W.J. and Hat. P.K. (1952), *Methods in Social Research,* McGraw Hill, New York.

Kerlinger, Fred R. (1964), *Foundations of Behavioral Research,*Surjeet Publications, Delhi.

Kidder, Louise H. (1981), *Research Methods in Social Relations,*Holt, New York.

Kothari, L.R. (1985), *Research Methodology*, Vishwa Prakashan, New Delhi.

Lal Das, D.K. (2000), *Practice of Social Research: A Social Work Perspective,* Rawat Publications, Jaipur.

Mill, J.S. (1930), *A System of Logic*, Longmans (8th Edu.), New York.

Miller, D.C. (1964), *Handbook of Research Design and Social Measurement,* David Mckey Co., New York.

Monette, Duane R. (et. al.) (1986), *Applied Social Research: Tool for the Human Services,* Holt, Chicago.

Moser, C.A. and Kalton, (1975), *Survey Methods in Social Investigation,* Heinemann Educational Books, London.

Nachmias D. and Nachmias C. (1981), *Research Methods in the Social Sciences*, St. Martins Press, New York.

Rubin, Allen & Babbie E. (1989)*, Research Methodology for Social Work*, Belmohf, California, Wadsworth.

Sellitz, G. (et. al.) (1973), *Research Methods in Social Relations:* Holt, Rinehart and Winston (3rd edition), New York.

Shah. V.F. (1977), *Research Design,* Rachna Prakashan, Ahmedabad.

Stouffer, S.A. (1962), *Social Research to Test Ideas,* Free Press of Glencoe, New York.

Suchman, E.A. (1953), *The Principles of Research Design.* In John T Doby et. al., An Introduction to Social Research, The Stackpole, New York.

Wilkinson, T.S. and Bhandarkar, P.L. (1977), *Methodology and Techniques of Social Research*, Himalayan, Bombay.

Yin. Robert K. (1982), *Case Study Research Design and Methods,* Applied Social Research Methods Series Vol. 5 Sage, New Delhi.

Young, P.V. (1953), *Scientific Social Surveys and Research,* (4th edition), Englewood Cliff, Prentice Hall, N.J.

7

Research Methods II: Experimental Research

Introduction

As you studied in the previous Chapter, a 'research method' is a particular way of studying a problem. The features of the research problem and also the field of inquiry determine the 'method'. In this Chapter we shall discuss Experimental Method of research in detail.

Experimental Research

Experimental research studies are designed for establishing causal relationships. This method begins with a question concerning the relationship between two or more variables. At the same time, the researcher advances one or more hypotheses stating the nature of the expected relationship. The experiment is the event planned and carried out by the researcher to gather evidence relevant to the hypotheses.

In its simplest form an experiment has three characteristics:

i) an independent variable is manipulated,

ii) all other variables except the independent variable are held constant, and

iii) the effect of the manipulation of the independent variable on the dependent variable is observed.

The independent variable and the dependent variable(s) are important in an experiment. The independent variable is manipulated or changed by the experimenter. The variable upon which the effects of changes are observed is called the dependent variable, which is observed but not manipulated by the experimenter. The dependent variable is so named because its value is hypothesised to depend upon, and vary with, the value of the independent variable. For example, to examine the effect of training upon decision making, an investigator would manipulate training, the independent variable, by using different training methods in order to ascertain their effect upon decision making, the dependent variable.

Introduction

Experimental researches are designed for testing causal relationships. A causal relationships refers to relationships between two variables where one variable (characteristic or occurrence) X determines another variable (characteristic or occurrence) Y. For example, if a researcher wishes to test a causal relationships that punishments (X) cause low self-esteem (Y) by comparing a group of students who have been exposed to punishments (X) with one that has not been exposed, he has to measure the two groups with respect of Y, either during or after exposure to X.

Before discussing about the various types of experimental studies used for testing the causal relationship it is essential to know about the concept of 'causality'.

In the words of J.S.Mill (1930), "a cause which is itself a phenomenon without reference to the ultimate cause of any thing". Further he says, "causation is simply uniform antecedence. Though this explanation of the concept of 'cause' and 'causation' is more or less accepted by sciences including social sciences there are still ambiguities about the concepts specially when one thinks of a *first cause* and *subsequent cause* and a *final cause*. As a result, 'even in scientific' explanation, the different measures of the term 'cause' are frequently confused.

A cause may act by impelling or by releasing or by unwinding. Let us consider an example. In the game of snooker a ball is impelled to strike another ball which may in turn strike on number of balls. In this case, the first impulsion is the cause of movements of the second ball and the subsequent balls. The movements of second and subsequent balls are the effect of the cause induced by the impulsion. In other words, the event in question is shown to be determined by the preceding events.

In short, the investigation of preceding event (the cause) and successive events (the effects) caused by the preceding event constitutes causal relationships. Scientific research is mainly concerned with discovery of necessary and sufficient conditions for an effect. While common sense leads one to expect that one cause may provide a complete explanation for the effect the researcher rarely expects to find a single cause or condition that is both necessary and sufficient to bring about an effect. Rather, he is interested in finding out multiplicity of 'effects' or 'events'.

It is rather impossible, however, to demonstrate directly that a given variable 'X' either by itself or in conjunction with other variables, causes 'Y'. Hence, we prefer to infer from the data that the causal relationship (hypothesis) that 'X' is a cause for the occurrence of 'Y' is tenable only with some level of confidence.

The Logic of Causal Inference

To clarify the issues raised above, we have to understand the logic of causal inference. The three conditions that have to be fulfilled to draw a causal inference are:

If 1) the cause precedes the effect in time,

2) there is an empirical correlation between them, and

3) the relationship is not found to be the result of the effects of some third 'variable on each of the two initially observed.

The first condition in a causal relationship is that the cause precedes the effect in time. For example, in the game of snooker the first impulsion is the cause of movements of the second ball and the subsequent balls. The movements of second and subsequent balls are the effect of the cause induced by the impulsion

The second condition in a causal relationship is that the two variables be empirically correlated with one another**.** For example, if a researcher wishes to examine if there is cause-effect relationship between gender and achievement, he or she has to use correlational technique to assess the magnitude of the relationship. It is also required that the coefficient of correlation is substantial.

The third condition for a causal relationship is that the observed empirical correlation between two variables cannot be explained away as being due to the influence of some third variable that causes both of them. For example, it may be observed that there is a strong correlation between 'knee joints pain' and 'amount of rainfall' but this does not mean that joints pain effect rainfall. A third variable, relative humidity is the cause of both knee joints pain and rainfall. Any relationship satisfying all these conditions is causal, and these are the only conditions of cause –effect relationship.

In a typical experimental study, two groups are chosen such that they do not differ significantly from each other except by chance. One of the groups is exposed to the independent variable (known as 'experimental group'). The two groups are then compared in terms of the effects. Research design, which involves comparison of two or more groups of subjects who have been exposed to an experiment, there is an underlying assumption that the groups being compared were similar before the introduction of experiment. To ensure this, the techniques such as 'randomization' or 'matching' are utilised. The technique of randomisation involves assignment of members of a group of subjects to experimental and control group. The procedure of assignment must give each member equal chance of being assigned to any of the groups. The technique of matching involves putting the subjects for assignment to the experimental or control group in a manner that a particular type of the experimental group is balanced by assigning his exact counterpart in the control group.

Validity of Causal Inference

While drawing causal inference we need to consider two forms of validity: internal validity and external validity.

Internal validity refers to the confidence we have that the causal inference from a study accurately explains whether one variable is a cause of another. If three conditions of causality are fulfilled it is said that the causal inference has internal validity. External validity refers to the extent to which the causal inference of a study can be generalised.

Threats to Internal Validity

Campbell and Stanley (1963) and Cook and Campbell (1971) have mentioned a number of threats to internal validity. Some of the important threats are discussed below:

1) *History* : The threat of history refers to events that occur during the course of an experiment. It is

presumed that these events might have affected the dependent variable. History is a threat to an experiment which lasts longer and allows events to affect the dependent variable.

2) *Maturation* : As time passes, a number of changes occur within experimental subjects, such as, growing older, wiser, more experienced. These changes in the experimental subjects are called maturation changes. If any of these changes are found with dependent variable it could confuse the effect of independent variable.

3) *Testing* : Repeated testing often enhances the performance without any corresponding improvement in the variable under examination. For example, people taking intelligence test for a second time tend to score higher than they did the first time. The change in performance could lead to change in the dependent variable which in fact changes due to the repeated measure rather than the impact of the independent variable.

4) *Statistical Regression* : In the case of subjects scoring very high or very low the threat of statistical regression may arise any time. When those extreme cases re-measured will tend to score less extremely. In other words, they will tend to regress toward the average score.

Three Characteristics of Experimental Research

There are three essential ingredients in the conduct of an experiment: control, manipulation and observation. We shall discuss each of them as follows:

i) **Control:** Control is the first essential ingredient of experimental method. Without control, it is impossible to evaluate unambiguously the effects of an independent variable. Basically, the experimental method rests upon two assumptions regarding variables. These are:

a) If two situations are equal in every respect except for a variable that is added to or deleted from one of the situations, any difference appearing between the two situations can be attributed to that variable. This statement is called the **law of the single variable.**

b) If two situations are not equal, and it can be demonstrated that none of the variables is significant in producing the phenomenon under investigation, or if significant variables are made equal, then any difference occurring between the two situations after the introduction of a new variable to one of them can be attributed to the new variable. This statement is called **the law of the only significant variable.**

The main purpose of 'control' in an experiment is to arrange a situation in which the effect of variables can be measured. The conditions to be fulfilled under the first law can be obtained more easily in physical sciences. A high degree of control is much easier to achieve in a laboratory setting than in situation outside the laboratory. In the laboratory, there is only limited number of variables which can be manipulated easily. However, as social research is concerned with human beings, there are always many variables present in situation. To attempt to reduce social problems to the operation of a single variable is not only unrealistic but perhaps impossible as well. Fortunately, we do not require such rigorous control to be introduced in social settings, for many factors involved in such a setting may be quite insignificant and irrelevant for our study. To this extent, in social research, the law of the single significant variable is more appropriate. For example, if we were to study the effect of two methods of teaching alphabets to two groups of adult learners, we are likely to select the two groups which are identical in every respect except in the way they are taught alphabets. But it is impossible to have two groups that are identical in every respect. So, the endeavour of the researcher should be towards obtaining two groups that are as similar as possible, at least in those factors that are thought to have an effect on learning alphabets. These could be, general intelligence, motivation, reading ability, etc. Other variables that are not likely to affect achievement in learning alphabets can be ignored. Thus, in experimental studies in social research we need procedures that permit us to compare groups on the basis of significant variables. 'Control' is used to indicate an experimenter's 'procedures' for eliminating the differential effects of all variables extraneous to the purpose of the study. (An extraneous variable is variable that is not related to the purpose of the study but may affect the dependent variable). The experimenter exercises controls, for instances, when the groups are made comparable on extraneous variables that are related to the dependent variable. If a variable is known to be unrelated to the dependent variable, it cannot influence the dependent variable and we do not need to control it for its effects.

ii) **Manipulation:** Manipulation of a variable is another distinguishing characteristic of experimental research. It refers to a deliberate operation performed by the researcher. In contrast to the descriptive research in which the researcher simply observes conditions as they occur naturally, the researcher in the experimental research actually sets the stage for the occurrence of the factors whose performance is to be studied under conditions where all other factors are controlled or eliminated. In social research and other behavioural sciences, the manipulation of a variable takes a characteristic form in which the experimenter imposes a pre-determined set of varied conditions on the subjects. This set of varied conditions is referred to as the independent variable; the experimental variable, or the treatment variable. Then, different conditions are designed to represent two or more values of the independent variable. These may be differences in degree or differences in kind. That is, the independent variable may have two or more values and the difference in the values may be of quantitative or qualitative nature. Methods of teaching, attitudes, socio-economic status, personality characteristics, types of motivation, etc. are some common examples of the independent variable in social research. For example, if the researcher compares two methods of teaching, then method of teaching is the independent variable and can be manipulated by the teacher. We may manipulate a single variable or a number of variables simultaneously.

iii) **Observation:** In experimentation, we are interested in the effect of the manipulation of the independent variable on a dependent variable. Observations are made with respect to some characteristics of the behaviour of the subjects employed in the research. These observations which are quantitative in nature may constitute the dependent variable. This needs some explanation.

The dependent variable in social research is often changing of some type, such as attitude towards learning. We are often interested in explaining or predicting attitude. Since attitude cannot be measured directly, we can only estimate it through measures like scores in a scale. Therefore, strictly speaking, the dependent variable is scores or observations rather than change in attitude.

Steps Involved in Experimental Research

A number of steps are involved in experimental research. Here, we shall talk about four steps to reach the stage of the 'actual experiment'. Brief explanations are needed for steps 3 and 4 only. The steps are:

i) Surveying the literature related to the problem,

ii) Identifying and defining the problem,

iii) Formulating hypotheses is an important step in experimental research. They suggest that an antecedent condition or phenomenon (independent variable) is related to the occurrence of another condition, phenomenon, event, or effect (dependent variable). To test a hypothesis, the experimenter attempts to control all the conditions except the independent variable which he/she manipulates. Then he/she observes the effect on the dependent variable presumably because of the exposure to the independent variable.

iv) Constructing an experimental plan is the next step in experimental research. This refers to the conceptual framework within which the experiment is conducted. This would involve:

- Selecting a research design,
- Selecting a sample of subjects to represent a given population, assign subjects to groups, and assign experimental treatments to the groups. (Subject implies the respondent or living organism that is studied),
- Selecting or constructing and validating instruments to measure the outcomes of the experiment,

- Stating the procedures for collecting the data and possibly conduct a pilot or "trial run" test to perfect the instruments or design, and
- Stating the statistical or null hypothesis.

The above steps bring the researcher to the stage when he/she actually conducts the experiment, applies statistical measures to the data obtained, and then test the significance of the results.

In the next sub-section, we shall take up the various designs involved in experimental method.

Designs of Experimental Study

A research design is very important for the researcher. A well developed design provides the structure and strategy to control the investigations and extract dependable answers to the questions raised by the problem or hypothesis. It is the nature of the problem that determines the appropriateness of the design.

Before we discuss the experimental designs, it will be relevant to look into the terms and symbols which we shall make use of.

i) X represents the independent variable, which is manipulated by the researcher; it is also referred to as the experimental variable or the treatment variable.

ii) Y represents the measure of the dependent variable. Y_1 represents the dependent variable before the manipulation of the independent variable X. It is usually a pre-test of some type administered before the experimental treatment. Y_2 represents the dependent variable after the manipulation of the independent variable X. It is usually a post-test administered to subjects after the experimental treatment.

iii) S represents the *subject* or *respondent* used in the experiment.

iv) E group refers to the *experimental group* – the group that is given the independent variable treatment.

v) C group refers to the *control group* – the group that does not receive the experimental treatment.

vi) R indicates *random assignment* of subjects to the experimental groups and the random assignment of treatments to the groups.

There are a large number of experimental designs. Various authors have classified experimental design into certain categories. Most common categorization comprises:

- Pre-experimental Design
- True Experimental Design
- Quasi Experimental Design

Some authors like Donald Ary and others (1985) have added more categories namely

- Factorial Design
- Time Series

Various designs under the above mentioned categories are given in the table below:

However, in this section, we will bring before you only a few most frequently used designs, from each of the five categories.

Pre-experimental Design

The two designs classified as pre-experimental designs offer minimal control of extraneous variables. Still they are used quite often in social research. These designs help to illustrate the advantages of more rigorously controlled designs that are presented later.

Design 1: One Group Pre-test Post-test Design

When this design is employed, the dependent variable is measured before the independent variable or treatment is applied or withdrawn, and then measured yet again. The one group design usually involves three steps:

a) administering a pre-test measuring the dependent variable,

b) applying the experimental treatment X to the subjects, and

c) administering a post-test again measuring the dependent variable.

Differences attributed to application of experimental treatment are then determined by comparing the pre-test and post-test scores.

Pre-test	**Independent variable**	**Post-test**
Y_1	X	Y_2

Design 1: One Group Pre-test Post-test Design

To illustrate the use of this design, let us assume that we want to evaluate the effectiveness of a particular self-instructional material in Social work for post graduate students. How may we go about this task?

At the beginning of the academic year, the students are given a standardized test that measures the objectives of the course quite satisfactorily, following which the distance teacher then introduces the self-instructional material (SIM). At the end of the year, the students are administered the standardized test a second time. Comparing the scores of the two tests would reveal what difference the exposure to the SIM has made.

However, using only one group, as in Design 1, gives us superficial control. The major limitation of the one-group design is that, since no control group is used, the experimenter cannot assume that the change between the pre-test and the post-test scores is brought about by the experimental treatment alone. It is quite possible that some extraneous variables account for all or part of the change. For example, students experience changes with the passage of time; they grow mentally as well as physically, or they may acquire additional learning experiences that would affect the dependent variable. This extraneous variable can be thought of as **maturation** i.e., with the passage of time students get maturity and this in turn may affect achievement level. Another type of extraneous variable that can operate between the pre-test and the post-test scores and which cannot be controlled is **history.** History as a source of extraneous variances refers to the specific events that can occur between the pre-test and post-test other than the experimental treatment. In the example cited above, not receiving material regularly or illness just before the test, could decrease achievement scores. Similarly, a crucial research finding in history could increase widespread interest and hence affect the test scores. In fact, history and maturation become increasingly influential sources of extraneous variance when the time interval between Y_1 and Y_2 is long.

Another shortcoming of Design 1 is that it offers no way of assessing the effect of the pre-test Y_1 itself. We know that "practice effect" exists when subjects take a test a second time or take an alternate form of the test. In other words, subjects do better the second time even without any instruction or relevant discussion during the interval. This is true not only for achievement and intelligence tests but also for personality tests. In the case of personality tests, a tendency towards better adjustment is generally observed.

To sum up, Design 1 has little to recommend it; without a control group to make a comparison possible, the results obtained in a one group design are basically uninterpretable. The results of the experiment would have been dependable if there could be a comparable group i.e. control group to which SIM had not been given.

Design 2: Static Group Comparison

Design 2 utilizes two or more groups, only one of which is exposed to experimental treatment. The groups are assumed to be equivalent in all relevant aspects; they differ only in their exposure to X.

This design is often used in social research, For example, achievement of adult learners taught by a new method is compared with that of similar class taught by a traditional method.

Design 2 has a control group or groups, which permit (s) the comparison that is required for scientific respectability. If the experimental group is superior on the Y_2 measure, the researcher then has more confidence in his/her conclusion that the difference is due to experimental treatment.

However, there is a basic flaw in this design. Since neither **randomization** nor even **matching** is used to assign subjects to the experimental and control groups, we cannot be sure that the groups are equivalent prior to the experimental treatment. They may differ on certain relevant variables, and it may be these differences rather than X that are responsible for the observed change. Because we cannot be sure that the groups are equal with regard to all the factors that may influence the dependent variable, this design is considered to be lacking in the necessary control and must be classified as pre-experimental.

Group	**Independent Variable**	**Post-test**
E	X	Y_2
C	—	Y_2

Design 2: Static Group Comparison

True Experimental Designs

The following two designs belong to the 'true experimental' design, because of the control that they provide. i.e.

i) Random assignment of subjects to the groups.

ii) Random assignment of treatment to the groups.

iii) Post-testing all the groups.

Design 3: Randomized Subjects, Post-test only Control Group Design

This particular design requires two groups to which subjects are randomly assigned and each group is assigned to a different condition. No pre-test is used; randomization controls all the possible extraneous variables. This does not mean that randomization procedures (like drawing names out of a hat, or flipping a coin) remove the extraneous variables, such as the IQ or age, which may affect the dependent variable, or control their presence. These extraneous variables still affect the inquiry; but, now, it is the laws of chance rather than the personal feature of E that operate. In fact, the larger the number of subjects used the more equivalent or similar the groups will tend to be. Suppose a researcher wants to study the effect of instructional material on achievement in a course during a contact programme. He/she may randomly assign the students to the groups and provide treatment to one of the groups. The assigning of the treatment will be random. At the end of the contact programme, he/she may test both the groups.

After the subjects are assigned to the groups, only the experimental group is exposed to the experimental treatment. Otherwise, in all other respects, the two groups remain similar. Members of both groups are then measured on dependent variable Y_2. Scores are then compared to determine the effect of X.

Group	**Independent Variable**	**Post-test**
(R)E	X	Y_2
(R)C	—	Y_2

Design 3: Randomized Subjects, Post-test only Control Group Design

The main advantage of Design 3 is randomization, which assures statistical equivalence of the groups prior to the introduction of independent variable. Design 3 provides controls for the main effects of history, maturation and pre-testing; because no pre-test is used, there can be no interaction effect of pre-test and X (treatment).

Design 4: Randomized Matched Subjects, Post-test only Control Group Design

This design is similar to Design 3 except that it uses a matching technique, rather than random assignment, to obtain equivalent groups. Subjects are matched on one or more variables that can be measured conveniently, such as IQ or reading scores. The matching variables used are generally those that have a significant correlation with the dependent variable. On the basis of these variables subjects are paired so that opposite member's/scores' are as close as possible; and then, one member of each pair is randomly assigned to one treatment and the other to the second treatment.

Group	Independent Variable	Post-test
(M) E	X	Y_2
(M) C	—	Y_2

Design 4: Randomized Matched Subjects, Post-test only Control Group Design

Matching is most useful in studies where small samples are to be used and where Design 3 is not appropriate. Also, the matched subjects' design serves to reduce the extent to which experimental differences can be accounted for by initial differences between groups. However, for matching to really become a means of control, the matching of all the potential subjects must be complete, and assignment of the members of each pair to the groups must be determined randomly. If one or more subjects should be excluded because an appropriate match could not be found, this would bias the sample. When using Design 4, it is essential to match every subject, even if only approximately, before random assignment is effected.

Quasi Experimental Design

One of the Quasi Experimental Designs is Non-randomized Control Group, Pre-test Post-test Design. You would notice that randomized control group pre-test post-test design is a true experimental design which we have presented before. The only difference on the quasi experimental design is that the groups are not randomized. Hence they are unlikely to be comparable. In fact, it is on this ground that the design becomes quasi experimental and not true experimental. Since the rest of the design related characteristics remain common with the randomized control group pre-test post-test design of the true experimental design category, we do not need to provide any further details on this design.

Group	Pretest	Independent Variable	Post-test
E	**Y_1**	**X**	**Y_2**
C	**Y_1**	_	**Y_2**

Factorial Designs

A factorial design is one where two or more variables are manipulated simultaneously in order to study the independent effect of each variable on the dependent variable as well as the effects due to interaction among the several variables. Factorial designs are of two types. In the first type, one of the independent variables may be experimentally manipulated. The researcher is primarily interested in the effect of a single independent variable but he/she must take other variables into consideration which may influence the dependent variables. In the second type of design, all the independent variables may be experimentally manipulated. Factorial designs have been developed at varying levels of complexity, the simplest factorial design is the 2 by 2 (2 × 2) Design. The two independent variables have two values.

Level 1 subject receives Treatment A and others Treatment B. Some level 2 subjects receive Treatment A and others Treatment B.

Attribute Variable X_2	Experimental Variable X_1	Variable X_2
	Treatment A	Treatment B
Level 1	Cell 1	Cell 3
Level 2	Cell 2	Cell 4

The strength of the factorial design is that it can achieve in one experiment what might otherwise require two or more separate studies.

Time Series Design

We have already discussed pre-test post-test designs. They generate one time data on the dependent variable before and after the experimental treatment. There are instances where it becomes necessary to compare changes in the trend of a particular phenomenon or process or product. For example, let us assume that learners behaviour to attitudes, achievements etc. changes over a period of time. If a specific treatment is introduced in an institution to study the change in attitude or achievement, it is useful to study the trend through measurement at certain intervals before the introduction of the treatment. Instead of one time pre-test, the test is repeated three or four times before the treatment is administered. This generates data on the trend of behaviour. Similarly after the treatment is administered instead of one time post-test, the post-test is administered several times at intervals. This provides data to derive the trend in the change in behaviour. Since both pre-tests and post-tests are used over a time series design, the effect of the treatment on the dependent variable is tested by comparing the trends. This can be represented in the following form:

$Y_1 \quad Y_2 \quad Y_3 \quad Y_4 \quad Y \quad Y_5 \quad Y_6 \quad Y_7 \quad Y_8$

What we have described above is one group time series design. If you add a control group and repeat the same time series measurement without the treatment of the control groups, it becomes control group time series design. Similarly control group time series design is represented as:

Group

E $Y_1 \quad Y_2 \quad Y_3 \quad Y_4 \quad X \quad Y_5 \quad Y_6 \quad Y_7 \quad Y_8$

C $Y_1 \quad Y_2 \quad Y_3 \quad Y_4 \quad X \quad Y_5 \quad Y_6 \quad Y_7 \quad Y_8$

Conclusion

In this Chapter, we studied two important research methods, viz., Descriptive Method and Experimental Method. Descriptive research describes what is the condition and involves the description, recording, analysis and interpretation of conditions that exist. We also studied various types of descriptive research, like survey, documentary analysis, correlational and causal comparative studies. Experimental research describes what will be when certain variables are carefully controlled or manipulated.

References

Ary, D., Lucy, C. Jacobs and Razavich, A. (1972), *Introduction to Research in Education,* 3rd Edition, Rinehart and Wdition Inc., Holt, New York.

Ackoff, R.L. (1953), *The Design of Social Research,* University of Chicago Press, Chicago.

Bailey, Kenneth D. (1978), *Methods of Social Research,* The Free Press, London.

Baker, L. Therese. (1988), *Doing Social Research,* McGraw Hill, New York.

Black, James A. and Champion, Dean J. (1976), *Methods and Issues in Social Research,* John Wiley, New York.

Cohen, L. and Manion, L. (1989), *Research Methods in Education* (Third Edition), Routledge, London.

Campbell, D.T. and Stanley. J.C. (1963), *Experimental and Quasi Experimental Designs for Research* ,Houghton Mifflin, Boston.

Chapin, F.S. (1974), *Experimental Design in Sociological Research,* Harper, New York.

Epstein, I & Tripodi, T. (1974), *Research Techniques for Program Planning, Monitoring and Evaluation*, Columbia University Program, New York.

Festinger, L. and Katz. D. (eds.) (1953), *Research Methods in the Behavioral Sciences,* The Dryden Press, New York.

Goode, W.J. and Hat. P.K. (1952), *Methods in Social Research,* McGraw Hill, New York.

Kerlinger, Fred R. (1964), *Foundations of Behavioral Research,* Surjeet Publications, Delhi.

Kidder, Louise H. (1981), *Research Methods in Social Relations,*Holt, New York.

Kothari, L.R. (1985), *Research Methodology*, Vishwa Prakashan, New Delhi.

Lal Das, D.K. (2000), *Practice of Social Research: A Social Work Perspective,* Rawat Publications, Jaipur.

Mill, J.S. (1930), *A System of Logic*, Longmans 8th ed., New York.

Miller, D.C. (1964), *Handbook of Research Design and Social Measurement,* David Mckey Co., New York.

Monette, Duane R. (et. al.) (1986), *Applied Social Research: Tool For the Human Services,* Holt, Chicago.

Moser, C.A. and Kalton, (1975), *Survey Methods in Social Investigation,* Heinemann Educational Books, London.

Nachmias D. and Nachmias C. (1981), *Research Methods in the Social Sciences*, St. Martins Press, New York.

Rubin, Allen & Babbie E. (1989), *Research Methodology for Social Work*, Belmohf, California, wadsworth.

Sellitz, G. (et. al.) (1973), *Research Methods in Social Relations:* Holt, Rinehart and Winston (3rdedition), New York.

Shah. V.F. (1977), *Research Design,* Rachna Prakashan, Ahmedabad.

Stouffer, S.A. (1962), *Social Research to Test Ideas,* Free Press of Glencoe, New York.

Suchman, E.A. (1953), *The Principles of Research Design.* In John T Doby et. al., An Introduction to Social Research, The Stackpole, New York.

Wilkinson, T.S. and Bhandarkar, P.L. (1977), *Methodology and Techniques of Social Research*, Himalayan, Bombay.

Yin. Robert K. (1982), *Case Study Research Design and Methods,* Applied Social Research Methods Series Vol. 5 Sage, New Delhi.

Young, P.V. (1953), *Scientific Social Surveys and Research,* (4th edition), Englewood Cliff, Prentice Hall, N.J.

8

Research Methods III: Qualitative Research

Introduction

This Chapter is a continuation of our discussion of the methods of social research that we introduced in earlier chapter. We take up Qualitative Method, Case study Method and Participatory Research Methods for discussion in this chapter. The term qualitative research denotes investigations concerning social phenomena conducted in natural settings. Mostly, qualitative inquiry is identified with the concept of field studies in the areas of Anthropology and Sociology. It has a unique position in the conduct of research in social sciences and has attracted social researchers relatively recently. If a researcher is interested in studying the problems related with development of rural community, he/she may use these methods to study the problems in their natural settings to find out actual problems that confront them.

Case Study can be defined as an intensive investigation concerned with pertinent aspects of a particular unit in a given situation. The unit of investigation may be an individual or a group of individuals, or a social institution, a community or a culture.

A case study conducted on individuals may be linked with the processes of growth and development of a child; the behaviour of gifted children, psychoanalysis of a problem child, role of a leader in specific social movements, etc.

Participatory researches are conducted for depicting people's existing situation by making maps and diagrams. We shall look into these methods in some detail in this Chapter.

Qualitative Research

In qualitative research, a researcher takes into account the phenomenon as a whole and describes it as it exists. In some situation, it is difficult to analyse a phenomenon into various components or variables which can be measured in quantified terms. In such cases, the researcher takes into consideration the phenomenon as a whole and assumes that there is some quality in the phenomenon in its entirety. When the researcher attempts to retain the significant totality of a phenomenon while verifying propositions regarding it, he/she adopts qualitative research methods. This method of research describes the experiences of people in depth and permits the researcher to study and understand people in depth in their own perceptions. Qualitative research helps us to examine the nature of human behaviour and experience and social conditions. It also permits the researcher to study selected issues, cases or events in depth. While using this method the researcher seeks to capture what people have to say in their own words.

Qualitative Research follows an altogether distinct conceptual framework which takes into account the following factors.

i) **Multiple Realities:** First, naturalists assume that there exist multiple realities in social situations which can be observed and researched. They are perceived by people differently and thus become different mental constructs for different people. In other words, realities are taken to be what people perceive them at a particular point of time. Since social situations keep on changing from time to time, the realities, too, keep on changing. Furthermore, since the realities are context-specific, they cannot be tangible in a generalised form.

ii) **Meanings and Interpretations:** Naturalists emphasise study of meanings given to or interpretations made about objects, events and processes concerning social situations. To them, changes in terms of social and behavioural phenomena cannot be identified with the concept of physical movements but by external observation alone. An understanding of human behaviour or a social phenomenon involves understanding of how humans see what they are doing or participating in an activity.

iii) **Generation of Knowledge:** Qualitative inquiry insists on generation of knowledge resulting from the interaction between the researcher and the respondents. The respondents answer the questions put by the inquirer in terms of their perception or the meanings they attach to their actions. Moreover, interactions take place between the researcher and his/her respondents to achieve maximum levels of responsiveness and insights concerning the problem under investigation.

iv) **Generalisation:** As stated above, naturalists do not believe in the process of generalization as propounded by scientists. Naturalists argue that in the process of making generalization, a lot of meaningful information existing in individual units is undermined; hence, generalized knowledge does not represent real or complete knowledge. For them, the process of knowledge generation must take into account the differences or the real evidence existing in specific situations. That is why; they take into account extreme cases while collecting data.

v) **Human Relations:** In the case of human relations several intrinsic factors, events and processes keep on influencing each other constantly. Therefore, it is not possible to identify one-to-one cause and effect relationships in this case of qualitative studies. To naturalists, causality in social sciences cannot be demonstrated in the 'hard' sense as it is done in the case of physical sciences. Rather, only patterns of plausible influences can be inferred from social and behavioural studies.

vi) **Value Systems:** Naturalists do not believe in value-free inquiry. They assume the influence of value systems in the identification of problems, selection of samples, use of tools for data collection, conditions in which data are gathered, and the possible interaction that take place between the researcher and the respondents. That is why naturalists stress that the researcher's bias cannot be ignored and it must be mentioned in research reports.

Procedural Uniqueness of Qualitative Research

From the procedural viewpoint, the following need to be highlighted.

i) **Holistic approach:** Naturalists intend to develop a deeper understanding of a given situation in a holistic fashion. In other words, all possible information concerning all the significant dimensions of the situation under study is gathered with a view to portray the situations in their totality. For example, role of voluntary actions in social work cannot be studied in a partial fashion. It has to be studied in a holistic manner taking into account the composite influence of all the socio-economic and cultural factors.

ii) **Insightful inquiry:** Naturalists emphasise insightful inquiry, where humans are treated as the sole means of data collection. Qualitative methods like participant observation, informal interviews and discussions, reading of relevant literature, and daily observation notes and diary writing are very often used for fieldwork. However, the use of quantitative techniques like test administration and survey are not totally ruled out in the process of data collection under this approach.

iii) **No *a priori* theory:** A researcher goes to the field for data collection without having any *a priori* (pre-specific) theory in mind. Naturalists apprehend that an *a priori* assumption restricts the inquiry to those elements which may have been significant prior to developing an understanding of the situation. It blocks the process of holistic enquiry. The naturalist investigator develops theoretical propositions only after interacting with the field. However, it is pointed out by naturalists that there is no insistence on developing theories afresh in each and every inquiry. Experience-based concepts theories in relation to specific situations may act as preliminary guidelines for many qualitative investigations.

iv) **No pre-specific design of study:** Prior to fieldwork, naturalists do not make explicit statements on the hypotheses and the conditions in which data are to be collected, analysed and interpreted. The researcher develops only a broad outline of the study in advance. As the inquiry progresses, appropriate design emerges in the field; hypotheses, mostly in the question form are developed therein; final decisions are taken about the sample respondents/situations during the field work; experiences gathered through personal insights, intuition, personal images and apprehensions are recast into appropriate procedures for analyses.

v) **Qualitative setting:** As stated earlier, naturalists believe in conducting studies in realistic settings. To them, reality cannot be studied in fragmented and controlled situations. They intend to unfold what happens in realistic situations rather than studying what can happen in controlled situations.

Qualitative Research: Main Steps

Different opinions have been expressed by naturalists about the procedural details of qualitative research studies. On the one hand, the radical naturalists believe in non-specification of the processes of conducting a study. They take field work as an almost mystical process which is non-teachable. Accordingly, an investigator can start his/her field work after learning about the relevant substantive theory or theories and reviewing the empirical results of some field studies related with it.

On the other hand, most experts recommend field work to be made as deliberative as possible, retaining the qualitative status of the study as a whole. This is to smoothen the processes of the conduct of the study. As stated by Erickson (1986), "Preconceptions and guiding questions can be developed beforehand. But the researcher should not presume to know at the very outset, where specifically the initial questions might lead next." The steps can be organised in the following sequence.

i) **Identification of broader questions of inquiry**: First, the researcher is supposed to specify the pertinent issues or questions related to social settings which can be resolved or answered through field study. The main focus of the researcher should be on the specific structure of occurrences rather than general character of any social phenomenon. The issues can be directly linked with improvement of social practices in specific situations. Questions can be raised not only to study the events or facts but also to identify the perspectives of the individuals involved in particular events or processes. As stated earlier, emphasis should be laid on identifying perceptions of individuals regarding their own decisions or contributions to the occurrence of events or processes.

The motto of the social researcher should be to understand the realities by identifying satisfactory patterns in the actions of individuals participating in social activities. For instance, in a social situations, broader questions can be raised, such as, if relationships between a community organiser and the community are fully interactional, how do people give clear feedback to community organiser, or how do leaders influence community organiser or how do the community organiser and people create an atmosphere where most of the community people appear to utilise the programmes/services?

The above questions guide the preliminary field work and generate further questions in a given context in the course of inquiry. Besides identifying the broad framework of questions, we must prepare a general outline of the sample population to be contacted or situations to be observed in particular contexts, and draw a sketch of the types of instruments or techniques to be employed for data collection.

ii) **Collection of the initial level data:** Once we identify the broad questions for the investigation, we may make deliberate attempts to identify a full range of variations in the social and the organisational arrangements related to the situations/problems under study. We may start the inquiry in a broader context of the situation before proceeding to investigate specific occurrences of events in a social set up like a rural/ tribal community. For instance, prior to starting an in-depth inquiry of functioning of a social institution, we may gather evidence on external social surroundings where the institution operates. This may require us to do an extensive exercise of data collection. After this, we concentrate on indepth observations or interaction with the situation which is being studied.

iii) **Procedures for the collection of data:** Data collection can be carried out in different phases through participant observation. You may be introduced as one of the internal members/participants of the social set-up under study. It may be possible that real participants of the system like community leaders, people and head of the community, or head of the social institution can act as observers for conducting the study. We can collect data through all the relevant and available sources and means such as:

  a) study of available literature, records and documents, diaries, pictures, photographs;

  b) interactions with the persons concerned with the programme under study, and

  c) our direct observation of and experiences regarding the programmes/situations.

You, as a field worker, would make use of purposive sampling of significant situations or behaviours you want to study, as well as the persons you want to interact with. Flexible approaches are followed in the field to identify:

a) the situations where participation can take place more intensely;

b) the persons with whom intensive interaction is required, and

c) the people with whom casual dialogue is needed.

As stated earlier, even though a broad framework of sampling is chalked out prior to data collection, the actual process of sampling takes place during field work.

iv) **Devices of data collection:** You can use different devices for data collection, such as taking notes about an observed situation, using electronic appliances like tape recorders and video cameras, taking photographs and collecting relevant documents and literature on the problem. Planned informal interviews/dialogues with different groups of respondents can be conducted and their opinions and perceptions can be recorded either during the time of the interview or immediately after the interview. Daily diaries pertaining to the experiences of the field work also need to be maintained.

You have to maintain separate records regarding (a) what you observe in the situations, (b) perception of respondents about the problems/events, and (c) your own perceptions about the persons and their involvement in the issue or programme under study.

Since there is no hypothesis prior to data collection, data are not manipulated directly to test the hypotheses. However, through scrutiny of daily observation records and evidence gathered, you would identify the emerging themes and patterns, phrases, actions, action sequences, expressed thoughts, feelings, etc. This process helps you identify further the meaningful situations to be studied and also the way in which the complete information can be collected.

As we saw earlier, field work can be conducted in different rounds. At the end of the first round of intensive field work, you may analyse the data qualitatively, refine the previous questions, and arrive at new specific questions for further verification. This is the stage where you can generate certain context-specific hypotheses for minute observation.

Moreover, at this stage, your focus is on a more restrictive range of events within the setting, and you begin to look for possible connections or influences between the setting and its surrounding environment.

Again, you return to the field with pinpointed questions/hypotheses. Since the scope of inquiry is sharpened at this stage, in-depth interaction concerning the pinpointed questions takes place conveniently. It should be noted that in the final stages of field work, the focus becomes more and more specific along with the development of the working hypotheses.

v) **Data analysis:** In qualitative studies, data are analysed descriptively. The synoptic views of descriptive data are referred for interpretation. More specifically, the frequency data are presented in two or three-way contingency tables indicating the patterns of behaviour. Occasionally, we use non-parametric statistical techniques (you will read about it in Block 4 Unit 3) like a chi-square test, Man-Whitney two tailed tests or rank-order correlation techniques for the identification of certain patterns of relationships in the context of the specific situation under study.

A sound qualitative study follows a cyclic process of data collection, generation of hypotheses, examination of data, further generation and/or modification of hypotheses, further data collection and verification till specific research questions are identified and the patterns of refined relationships are arrived at. Moreover, the final level analysis of data can provide a ground for identification of specific suggestions for improvement of the system.

Let us do the following exercise before we proceed to highlight the issues and problems related to qualitative inquiry.

Issues Regarding Trustworthiness and Objectivity in Qualitative Studies

Trustworthiness of findings: There have been attacks on naturalists on the issue of the trustworthiness in their process of inquiry. It is said that qualitative approaches may bring subjectivity into the inquiry, and the biases of the researcher may not produce authentic information for others. Moreover, because of subjective interaction, valid knowledge may not be generated. Naturalists have reacted to these objections with force and conviction.

In the recent past, there have been efforts to fix certain standards to check the trustworthiness of qualitative inquiry. The criteria are outlined as follows:

i) **Credibility** pertains to the level of agreement between researchers' data and the interpretations, and the multiple realities that exist in the minds of respondents.

ii) **Transferability** is the quality that makes it possible to derive the accurate meaning of information on interpretation available in specific contexts.

iii) **Dependability** is essentially the stability of information sought and interpretation derived in different situations on a specific issue.

iv) **Confirmability** refers to the possibility of studying the collected objective/systematic information and reaching similar/same conclusions by different researchers.

The qualitative approach is guided by the following principles to enhance the credibility, transferability, dependability and confirmability of the studies they lead to:

a) Prolonged field work can enable one to overcome a variety of possible biases and wrong perceptions, which may appear in one short trip. Moreover, it can help us to identify the salient characteristics of the problem/programme under study.

b) Persistent observation of certain typical meaningful features can increase the credibility of the study.

c) Interaction with colleagues helps us evolve suitable designs, share the researcher's anxieties, apprehensions and feelings concerning field work and share with them the growing insights in the field.

d) A variety of data-sources using different investigators with different perspectives can project a consolidated picture of the field easily and can enhance the dependability and confirmability of the data.

e) Study of the varieties of adequate reference materials like documents, pictures, films, videotapes and audio recordings are essential for increasing trustworthiness of data.

f) Cross-checking of data and interpretations by some of the respondents can enhance internal validity of the study.

g) Increasing purposive sampling to collect different instances across a wide range of events can be useful in maximising the range of information and increasing external validity of information.

h) Substantive description of events in specific contexts can be useful in establishing the reliability and dependability of information and conclusion.

Although the above checks are followed in qualitative inquiry, there is no guarantee for the trustworthiness of a study. However, such checks can generate a convincing situation regarding the meaningfulness of the study. Unlike a long history of scientific inquiry which has established clear-cut standards for its trustworthiness, qualitative inquiry has a very recent origin, and is yet to evolve suitable checks to enhance its trustworthiness and authenticity.

Problems of observation: The strength of qualitative inquiry lies more in the competence of the field worker than the tools, techniques, and designs of data collection. There are several issues pertaining to the experience and expertise of the field worker, such as his/her relationship with the group being studied, the ethics involved in the processes of intensive data collection etc. We shall now touch upon some of these issues briefly as follows:

a) First, it is necessary that only a researcher with a clear understanding of the problem should take up the task of conducting a qualitative study. Since the meaningfulness of the conduct of the study depends entirely on the human factor, it is very important to see 'who' conducts the study and 'how' he/she proceeds with the study.

b) There have been some problems in situations in which an outside researcher acts as a participant observer. In such cases, there is an apprehension that a stranger who is accepted as an observer may be deliberately informed and invited to observe just because he/she is a stranger. Strangers may notice events that contrast with their expectations. They may affect the behaviour of the group through their influence while assessing this group. The personality traits of the observers and the situations to be studied are the major factors in developing a close affinity between the scholar and the field and making him/her comfortable with the situations.

c) The inside observer, i.e., a person from within the institution studied who now acts as an observer, may face major problems in the process of data collection. The group member who acts as an observer may confuse his/her role as an observer with that of a group member. He/she may get a biased picture about his/her group or the institution because of his/her personal/emotional involvement with the group. Then, there are ethical constraints too; they chiefly pertain to the confidentiality required within the group. For example, he/she may be denied access to certain situations or documents because he/she is one of the members of the group.

To sum up, the investigator needs a great deal of self-awareness and a thorough understanding of the group processes to make the process of qualitative inquiry meaningful.

Case Study Method

Case studies of social institutions may include the study of different individual units like the family, a cultural organisation, a social institution, a class or a developmental programme. In the case of studies on communities, a village, a tribe, a slum area or a culture, each can be considered a unit of investigation.

Whatever the unit of a case study, it is treated as a whole in the context of specific situations. The wholeness is determined through an abstraction of ideas. In one case, an individual's specific behaviour may be perceived as a totality; in another case, a situation consisting of group activities my be treated as a whole. Especially, in social situations, the units under investigation could be a whole developmental programme, a micro-credit system, instructional development in a group setting or in an 'individual setting', allowing the possibility of using a single method or integration of a number of methods.

Purposes of Case Studies

Usually, case studies are conducted for developing a deeper understanding about intricate relationships existing in the processual aspects of specific unit/units through qualitative investigations. In this context, the case study method is not very different from the approaches of naturalists. So, many a time, the case study method is treated as a kind of qualitative inquiry. For example, the functional aspects of any normal or exceptional institution may be the focus of a case study or any other approach used by the naturalists.

Case studies are conducted with a clinical purpose. They are treated as diagnostic and prognostic measures for clients' treatment. This approach has a psycho-therapeutic background. In social research, case studies are conducted for resolving different problems and bringing about improvement in institutions facing such problems.

There can be case studies of biographical type, which aim at giving an account of an individual or tracing the development of an institution or a developmental programme through longitudinal and prolonged investigation.

Characteristics of Case Study Method

The procedural aspects of a full-fledged case study display certain specific characteristics, viz., continuity in investigation, completeness, authenticity of data, confidential recording and intellectual synthesis. We shall explain each one of them briefly as follows:

i) **Continuity in investigation:** Continuous and prolonged enquiry about the situations is necessary till the underlying factors are explored and plausible patterns of their interaction/relationship identified.

For example, the problems underlying the communal harmony cannot be explored in one go. A researcher may have to undertake prolonged inquiries.

ii) **Completeness:** A sound case study involves extensive collection of data concerning internal as well as external environment of the unit under study. Data collection continues till the completeness of data is ensured and a complete picture of the unit emerges.

iii) **Authenticity of data:** A report of the case study must be based on meaningful, reliable and valid information regarding the case. Several qualitative and quantitative techniques such as interviews, observations, record surveys and administration of test questionnaires find their appropriate application in case studies. Use of multi-techniques approach to data collection and cross-examination of data through different techniques can take care of the authenticity of data. Moreover, since the researcher interacts with the typical situations personally, most of the ethical issues regarding the nature of data, the sample situations or sample respondents, the nature of interactions etc., emerge during the investigation. These issues need to be dealt with care to make the case study ethically meaningful.

iv) **Confidential recording:** The necessary data, involving personal and ethical issues like relationships of teachers and pupils with the management, discipline, confidential records, documents about the institution etc., must be handled tactfully and every care must be taken to maintain their secrecy.

v) **Intellectual synthesis:** Since a case study involves multi-method inquiry and deals with all significant situations concerning the unit, appropriate synthesis of the data is necessary to depict the uniqueness of the unit and to explore significant relationships. A skilled investigator with theoretical sophistication, insightfulness and writing skills can do justice and prepare a sound case study.

Case Study: Main Steps

Most researchers treat case study method as one of the forms of qualitative inquiry. Therefore, the case study method follows the same steps as are followed in the case of qualitative inquiry. However, the following steps are considered to be very significant.

i) **Selection of a case for investigation:** The first step in any case study is the identification and selection of a case for investigation. It mostly depends on the basic questions of researcher, such as: Am I interested in the study of a normal situation with a view to developing deeper insight in the phenomenon? Or, am I determined to solve the problems of a typical institution? Or, am I assigned the job of evaluating the functioning of an institution? Or, am I interested in identifying the underlying factors contributing to the excellent performance of an institution? Once the case is identified, then one needs to determine the status of the case. For this, several pieces of preliminary information are collected about the background of the case through the already available sources. At this stage, the initial exercise in setting the course of research is accomplished; it comprises, the following:

   - Demarcation of the relevant aspects of the case to be investigated;
   - Preparation of a broad outline of the study of sample situations, and
   - Preparation of the appropriate tools for collecting

the 'benchmark' data about all the pertinent aspects of the case under study.

Answers to the questions would tell us whether we have identified the 'case' or not.

ii) **Data collection:** Now we move on to the stage of data collection. In the process of collecting benchmark data about the case, we may make use of both qualitative as well as quantitative techniques like observations, interviews, check lists, proforma, open-ended questionnaires, record surveys, psychological tests, etc. Every care must be taken to use the tools specifically relevant for the case. In most cases, the first round exploratory work is done through personal interaction with the situation under study.

iii) **Analysis of first round data:** Through systematic analysis of the first round data, we can identify the more complicated situations or problems, and raise pertinent questions about the influential factors. In the case of clinical investigations, we can state various hypotheses about the solutions to the problems.

iv) **Second round investigation:** The second round investigation is conducted for only those specific questions or factors which are identified through the analysis of the first round data. Intensive investigations about these specific issues/problems are conducted through prolonged observations, informal and formal interviews, questionnaires, cross-examination of different documents and records, administration of specific tests etc. At the end of this second round of data collection, analysis and interpretation of data begins. However, during the interpretation of the data, if some more evidence is needed we may go for another round of data collection. Actually, in a case study, the process of data collection, its analysis and interpretation go on in cyclical order till satisfactory answers to the questions arising in the course of investigation are found and a clear cut picture of the case emerges through investigation. Most case studies aiming at understanding the dynamics of an educational/social unit stop at this stage.

v) **Follow-up:** Investigations should be made regarding the effectiveness of the alternative measures introduced. Such investigations give us feedback on the strengths and weaknesses of the corrective measures. If we find them to be less effective, we should conduct further studies to arrive at some 'newer' remedial measures and apply them to the case.

Scientific Nature of Case Study Method

There have been criticisms against the case study method for lack of scientific approach. One criticism is that the case study method is useful in the exploration of knowledge related to a single unit, but it does not have scope to test hypotheses or confirm any evidence.

However, this limitation of the case study method cannot undermine its meaningfulness in the process of generating knowledge. Even though the case study method is viewed as a kind of qualitative inquiry, this method does accommodate the process of hypothesizing, though in a manner different from that of the survey and the experimental method.

i) **Generating hypothesis in the case study method:** Hypotheses in the case study method are generally found in the form of questions or statements related to the various aspects of the given aspects of the educational process which are tested or confirmed more qualitatively in the given context of investigation. As stated earlier, while conducting a preliminary study on the unit, we may start with certain broad questions since we have limited experience of the case. Further, in the process of interaction with different educational situations, several statements may be generated for further verifications.

For instance, in an investigation of the classroom dynamics of an instructional system taken as a case, we may start with broad questions such as: what is the interactional pattern in the class; and "how is it related to students' achievement?" While observing the interactional pattern you may witness a very high degree of cohesiveness among the group members and this could induce you to think further regarding the factors related to the cohesiveness in the specific case leading to further questions.

ii) **Testing hypotheses in the case study method:** Testing hypotheses in case studies generally follows the qualitative approach, viz., the researcher's insight into and impressionistic views about the process under investigation. However, the data processed in quantitative terms can be integrated with qualitative treatment for developing a holistic perspective regarding the case.

iii) **Generalization of case study findings:** Contributions of the case study method to the process of evidence-generalization depends on several considerations, viz., the nature of the case under study, the theoretical framework generated, and the extent of objectivity possible. An investigator approaching a case would primarily have the purpose of understanding that particular case in its entirety and, hence, he/she may not be concerned with extending his/her understanding to other cases. However, such an understanding may take the form of further hypotheses which could be tested through other investigations.

There are possibilities of considering the findings of a case which may be significantly similar to another case studied at a later stage. There are situations where studies of different cases can be useful in developing a new trend. For example, Piaget's intensive studies on selective children have generated respectable generalization, but more generalizations may be possible from the findings of a large number of case studies, provided the researchers concerned come from similar background and have similar experiences, ideological commitments and interest in certain issues. Although the contribution of the case study to the generalization of findings seems to be neglected, its potential in contributing to theorisation cannot be ignored by any insightful researcher.

The issues concerning the objectivity and trustworthiness of the case study method are similar to those of the qualitative method already discussed in the preceding section.

Participatory Research

Usually, participatory research is conducted by people for depicting their existing situation by making maps and diagrams and coming out with plans to change their situations and by analyzing the same. This method provides an opportunity to articulate their problems and to indicate what could be done to ameliorate their conditions.

A number of participatory approaches with different terminologies have since come into practice over a period of time. Rapid Rural Appraisal (RRA) was first to come. This term was then used to denote Relaxed Rural Appraisal. It later evolved into Participatory Rural Appraisal (PRA). Subsequently, a section of development professionals preferred to call it Participatory Learning and Action (PLA).

Though, all these terms are commonly used for participatory approaches.

The term Participatory Rural Appraisal (PRA) was initially used to appraise existing situations only in rural areas. Later, it has also been used in urban areas and in other fields like adult education, policy influencing and advocacy, and organisation development. In addition, it has been used not only for appraisal but also for various other purposes. As such, the term Participatory Learning and Action (PLA) seems more comprehensive and suitable.

The basic presumption of participatory approaches has been that the poor and marginalized people are capable of analyzing their own realities and those they should be enabled to do so. Hence, its focus is on how people generate their own realities and how they reflect upon them so as to bring about changes in their situations.

The process of Participatory Rural Appraisal (PRA) employs varieties of techniques. Some of the commonly used techniques are meetings, group discussions, socio-drama, and sharing of knowledge generated through various forms of folk, oral, written, and visual arts.

Participatory Rural Appraisal Methods

A wide range of Participatory Rural Appraisal methods are in use today. These methods can be broadly classified as space, time, and relationship methods.

Space Related PRA Methods

Space related PRA methods are useful for the spatial dimension of people's reality. These methods include social mapping and the focus is on how people perceive and relate to space rather than just to the physical aspects, as they exist. The other common space-related methods are the resource map, participatory modelling, mobility map, services and opportunities map and transect, mobility map.

The social map is used to describe the habitation pattern while the resource map is focussed on the natural resources. Participatory modelling is three-dimensional description of an area. Mobility map is used to depict and analyse the mobility patterns of the local people while services and opportunities maps help in presentation of the availability of various services and opportunities in the locality. Transect presents a cross-section of an area and is particularly useful in natural resources managements.

Time Related PRA Methods

This is used to explore temporal dimensions of people's realities. The uniqueness of this method is that it allows people to use their own concept of time. This method includes time-line, trend analyses, historical transect, seasonal diagram, daily activity schedule, participatory genealogy and dream map.

Time-line depicts an aggregate of the various landmark events as perceived by the local people. Trend analysis focuses on changes that have taken place across certain time landmarks. Historical transect, 'then and now' and 'past, present and future' methods are ***variants*** of trend analysis. Seasonal diagrams show the change in people's lives across the annual cycle and across sessions or months. Daily activity schedule shows how the people spend their day from the time they get up till they go to bed. The participatory genealogy helps pinpointing the various generations, descent and the changes that have taken place over the generations. Dream maps are prepared to show the future vision and aspirations of people.

Relationship Methods

Relationship methods include flow diagrams like cause-effect diagrams, impact diagrams, system diagrams, network diagrams and process maps. It also includes well-being ranking method, Venn diagrams, pair-wise ranking, matrix scoring/ranking, force field analysis, pie diagrams, livelihood analysis, spider diagrams and body mapping. The main purpose of this method is to study the relationships between various items or various aspects of the same item.

Conclusion

In this Chapter, we have discussed Qualitative and Case Study methods of research. We have focussed on the meaning and significance of these methods, their uses in the educational field, steps in conducting studies in each method and problems and issues raised about them.

- With regard to generating knowledge in context specific situations, qualitative inquiry makes unique contributions in the field of research in social sciences. It uses the researcher's impressionistic views as the main source of knowledge.
- Case study method can be treated as a kind of qualitative inquiry since this method also aims at developing deeper understanding about a case; an institution, a programme or an individual in ways not very different from those used in qualitative inquiry. A well-organised case study can generate meaningful hypotheses for further research through prolonged interaction with the case use of multi-method investigations and cross-examination of data.
- Participatory research is conducted by people for depicting their existing situation by making maps and diagrams and coming out with plans to change their

situations and by analyzing the same. This method provides an opportunity to articulate their problems and to indicate what could be done to ameliorate their conditions.

- Participatory Rural Appraisal methods are : space related methods, time related methods, and relationship methods.

References

Cook, Thomas D. and Charles S. (1979), Reichardt (eds.) *Qualitative and Quantitative Methods in Evaluation Research,* Sage, Hills.

Engstorm, G.A. (1970), "Research Utilization, the *Challenge of Applying Social Research*", Welfare in Review, Vol. B, No.1.

Epstein, I & Tripodi, T. (1973), *Research Techniques for Programme Planning, Monitoring and Evaluation*, Columbia University Programme, New York.

Erickson, F. (1986), Qualitative Methods in Research on Teaching in Merlin C. Wittrock (Ed.). *Handbook of Research on Teaching,* Third Edition, Collier Macmillan Publishers, London.

Freeman, H. and Sherwood, C. (1965), "Research in Large – Scale Intervention Programme". *Journal of Social Issues*. Vol. 21, No.11.

Jain, S.C. (1982), A*pplication of Social Research in Developmental Projects*, Baroda Citizens Council, Baroda.

Kumar, Somesh. (2002), Methods for Community Participation : A Complete Guide for Practitioners, New Delhi : Vistaar Publications.

Kidder, Louise H. (1981), *Research Methods in Social Relations,* New York: Holt,.

Lal Das, D.K. (2000), Practice of Social Research : A Social Work Perspective, Rawat Publications, Jaipur.

Monette, Duane R. et. al. (1986), *Applied Social Research: Tool For the Human Services,* Holt, Chicago.

Rubin, Allen & Babbie E. (1989), *Research Methodology for Social Work*, California: Belmont Wadsworth,

Strauss, Anseln (1982), *Qualitative Analysis for Social Scientist,* Cambridge: Cambridge University Press (Photocopies of a major portion of Ch.1 in the Library).

Van Maanen, John (1982), *Varieties of Qualitative Research,* New Delhi: Sage.

9

Methods of Sampling

Introduction

We collect data in order to make generalisation. For example, 'Are professional social workers today more progressive than they were in nineties?' Question of this kind calls for generalisation. But only rarely does a study include observations of all respondents that are defined by the research problem. A familiar example is the elections. To predict the outcome of the elections, pollster interviews a subset of the total electorate and predicts the behaviour of the entire set (the electorate or population). Similarly, suppose that, as a researcher, you want to study the effects of social work intervention on HIV/AIDS patients in your city. For this, you do not have to select all the HIV/AIDS patients in your city. Instead, you may select a few patients from your city and assess the effects of the programme. The process of selection demands thorough knowledge of various sampling methods. In this chapter, we shall familiarize you with the concepts of sample and population. We shall also discuss the characteristics of good sample and various methods of sampling.

Concept of Population and Sample

Sometimes it is not feasible to study a whole group or an extremely large group. For example, social work researchers might be interested in learning about the mentally challenged children, mentally ill, prison inmates, street children or some other large group of people. It would be difficult rather impossible to study all members of these groups. Here comes a process called *sampling* which allows us to study a manageable number of people from the large group to derive inferences that are likely to be applicable to all the people of the large group.

Another reason why we should study a sample is, the results obtained from a sample are more precise and correct than the results from the study of the whole group. Cost involved in studying all units of a large group is yet another factor which suggests us to study a small group of people instead. Associated with cost, there are certain other factors such as time available for the study and accessibility of the units of study. Above all, the point to be kept in mind is, if we can get results of almost same dependability by studying a carefully selected small group of people why should we study the large group at all.

A single unit of study is referred to as an element of population. When we select a group of elements for studying a particular phenomenon, we refer to that group of elements as a *sample*. The aggregate of all the elements that conform to some defined set of definitions is called population. Thus, by the term college students of a city we define a population consisting of all the students studying in various colleges of the city. We may similarly define populations consisting of all the mentally challenged children in the city, all the women workers in a particular slum in a city , all the child workers in a given community less than sixteen years of age who work in hotels, or all the case records in a file. A single unit of a population is referred to as an element of the population. To get the desired information, generally, we study some of the elements rather than all. It is generally much more economical in time, effort and money.

By the logic of sample selection, it is presumed that the results obtained from the sample are true of the total population of the universe as a whole. In reality, this may or may not be true. How closely the sample statistics correspond to the population depends largely on the way the sample is selected. (Kidder, 1981)

For instance, suppose we want to know what percentage of a population agrees with a statement: "Child labour should be banned". We might put the statement to a sample, compute the percentage of those who agree with the statements, and take this result as an estimate of the percentage of the population who agrees. We can devise a sampling plan that will carry the assurance that our sample estimates will not differ from the corresponding true population parameters by, say, more than five percent; the estimates will be correct within the limit of five per cent (commonly known as "margin of error" or "limit of accuracy") 95 per cent of the time (commonly termed as the "probability" or "confidence level"). We can similarly employ another sampling procedure, which will produce results within the limits of one per cent 99 per cent of the time.

The sampling procedures, which ensure that the sample statistics will be correct within certain limits, are referred to as a "representative sampling plan." Here the usage of the word "representative" does not qualify sample, but sampling plan. A representative sampling plan ensures that the selected sample is sufficiently representative of the population to justify our running the risk of taking it as representative. (Kidder, 1981).

Based on this assumption, probability sampling makes it possible to select a sample which will be representative. This helps researchers to estimate the extent to which the sample statistics are likely to differ from population parameters. This means, if probability sampling method is used, it is possible to ascertain the size of the sample that will be needed if we want to have a given degree of accuracy that their sample results do not differ by more than a specified value from those of the population parameters.

There are a number of sampling techniques which decrease the likelihood of misleading generalisations based on sample statistics. These techniques assure the inclusion of diverse elements of the population in the sample by controlling the proportions of the various types of elements. Alternatively, statistical procedures are used in the analysis of the data.

Another important factor, which affects the representativeness of samples, is data collection procedures used in the study. This is the reason why the sample study of a large population can, in practice, produce more valid and reliable results than can a census. For instance, it is always difficult to get skilled interviewers in large numbers to cover wide-spread area of study. Even if we manage to get required number of skilled interviewers, it is not possible to get anything beyond the most superficial data in a census study. Moreover, the reliability of such data is also not beyond doubts. On the contrary, in a sample study, which requires lesser number of skilled interviewers, not only can we probe thoroughly by spending more time with each respondent but can also depend on the quality of data collected. In addition to this, a sample study reduces the large expenses required for a census study to a large extent.

Thus a “sample” is a miniature representation of and selected from a larger group or aggregate. In other words, the sample provides a specimen picture of a larger whole. This larger whole is termed as the “population” or “universe”. In research, this term is used in a broader sense; it is a well defined group that may consist of individuals, objects, characteristics of human beings, or even the behaviour of inanimate objects, such as, the throw of a dice or the tossing of a coin.

Suppose there are 60 wards in your city and we include all the wards in our study, it would not only be expensive but also cumbersome and time consuming. So, we select a few wards. The selected wards are termed as constituting a sample. The total number of wards is called 'population' or 'universe'. This process of selecting few wards is known as sampling.

Representativeness and Adequacy

Basically, there are two requirement of a sample: it has to be 'representative' and adequate. If the nature of the population has to be interpreted from a sample, it is necessary for the sample to be truly representative of the population. Moreover, it calls for drawing a representative 'proportion' of the population. The population may contain a finite number of members or units. Sometimes, the population may be 'infinite'. Therefore, a population has to be defined clearly so that there is no ambiguity as to whether a given unit belongs to the population or not. Otherwise, a researcher will not know what units to consider for selecting a sample.

The second issue related to the representation of a sample is to decide about the 'sampling frame', i.e., listing of all the units of the population in separate categories. In a study, there can be different sampling frames, such as male/female students, employed/unemployed students, etc. The sampling frame should be complete, accurate and up-to-date, and must be drawn before selecting the sample.

Thirdly, a sample should be unbiased and objective. Ideally, it should provide all information about the population from which it has been drawn. Such a sample based on the logic of induction, i.e., proceeding from the particular to the general, falls within the range of random sampling errors. This leads us to the results expressed in terms of "probability".

A sample should not only provide representativeness, but should also be adequate enough to render stability to its characteristics. What, then, is the ideal size of a sample? An adequate sample is the one that contains enough cases to ensure reliable results. If the population under study is homogenous, a small sample is sufficient. However, a much larger sample is necessary, if there is greater variability in the units of population. Thus the procedure of determining the sample size varies with the nature of the characteristics under study and their distribution in the population. Moreover, the adequacy of a sample will depend on our knowledge of the population as well as on the method used in drawing the sample.

Methods of Sampling

In the previous section, we suggested that the method used for drawing a sample is significant to arrive at dependable results or conclusions. With this fact in view, here in this section, we shall now talk about the various sampling methods. Sampling methods can be broadly classified into two categories:

i) Probability Sampling, and

ii) Non-probability Sampling.

Probability Sampling

Probability sampling is based on random selection of units from a population. In other words, the sampling process is not based on the discretion of the researcher but is carried out in such a way that the probability of every unit in the population of being included is the same. For example, in the case of lottery, every individual has equal chance of being selected. Some of the characteristics of a probability sample are:

i) each unit in the sample has equal probability of entering the sample,

ii) weights appropriate to the probabilities are used in the analysis of the sample, and

iii) the process of sampling is automatic in one or more steps of the selection of units in the sample.

Probability sampling can be done through different methods, each method having its own strengths and limitations. A brief account of these is given below:

Simple Random Sampling

Simple random sampling is a method of selecting a sample from a finite population in such a way that every unit of population is given an equal chance of being selected [see item (I) above]. In practice, you can draw a simple random sample unit by unit through the following steps:

i) Define the population.

ii) Make a list of all the units in the population and number them from 1 to *n*.

iii) Decide the size of the sample or the number of units to be included in the sample.

iv) Use either the 'lottery method' or 'random number tables' to pick the units to be included in the sample.

For example, you may use the lottery method to draw a random sample by using a set of 'n' tickets, with numbers '1 to n' if there are 'n' units in the population. After shuffling the tickets thoroughly, the sample of a required size, say x, is selected by picking the required x number of tickets. The units which have the serial numbers occurring on these tickets will be considered selected. The assumption underlying this method is that the tickets are shuffled so that the population can be regarded as arranged randomly. Similarly, to select five wards from the total number of wards (60 wards) in the city you will write the serial numbers of all the wards on small pieces of paper, jumble the chits as well and then choose five numbers.

The best method of drawing a simple random sample is to use a table of random numbers. These random number tables have been prepared by Fisher and Yates (1967). After assigning consecutive numbers to the units of population, the researcher starts at any point on the table of random numbers and reads the consecutive numbers in any direction horizontally, vertically or diagonally. If the read out number corresponds with the one written on a unit card, then that unit is chosen for the sample.

Let us, suppose that a sample of 5 wards is to be selected at random from a serially numbered population of 60 wards. Using a part of a table of random numbers reproduced here, five two digit numbers (as the total population of Blocks 60, is a two-digit figure) are selected from Table given below.

Table : An Abbreviated Table of Random Numbers

Row							
Column	1	2	3	4	5	...	N
1	2315	7548	5901	8372	5993	...	6744
2	0554	5550	4310	5374	3508	...	1343
3	1487	1603	5032	4043	6223	...	0834
4	3897	6749	5094	0517	5853	...	1695
5	9731	2617	1899	7553	0870	...	0510
6	1174	2693	8144	3393	0862	...	6850
7	4336	1288	5911	0164	5623	...	4036
8	9380	6204	7833	6280	4491	...	2571

9	4954	0131	8108	4298	4187	...	9527
10	3676	8726	3337	9482	1569	...	3880
11	...	...	...	..	...	....	...
12	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...
15	...	....	...	...	...	...	...
n	3914	5218	3587	4855	4881	...	5042

If you start with the first row and the first column, 23 is the first two-digit number, 05 is the next number and so on. Any point can be selected to start with the random numbers for drawing the desired sample size. Suppose the researcher selects column 4 from row 1, the number to start with 83. In this way he/she can select first 5 numbers from this column starting with 83.

The sample, then, is as follows:

83
53 ☐
40 ☐
05 ☐
75
33 ☐
01 ☐
26

Now, in selecting the sample of 5 wards, two numbers, 83 and 75, need to be deleted as they are bigger than 60, the size of the population. The processes of selection and deletion are stopped after the required number of five units gets selected.

The selected numbers are 53, 40, 05, 33, and 01. If any number is repeated in the table, it may be substituted by the next number from the same column. The researcher will go on to the next column until a sample of the desired size is obtained.

Simple random sampling ensures the best results. However, from a practical point of view, a list of all the units of a population is not possible to obtain. Even if it is possible, it may involve a very high cost which a researcher or organisation may not be able to afford. Therefore, simple random sampling is difficult to realize. Also, in case of a heterogeneous characteristic of the total population, even though all selected units participate in the investigation.

Systematic Sampling

Systematic sampling provides a more even-spread of the sample over the population list and leads to greater precision. The process involves the following steps:

i) Make a list of the population units based on some order – alphabetical, seniority, street number, house number or any such factor.

ii) Determine the desired sampling fraction, say 50 out of 1000; and also the number of the K^{th} unit. [K = N/ n = 1000/50 = 20].

iii) Starting with a randomly chosen number between 1 and K, both inclusive, select every K^{th} unit from the list. If in the above example the randomly chosen number is 4, the sample shall include the 4th, 24th, 44th, 64th, 84th units in each of the series going up to the 984th unit.

This method provides a sample as good as a simple random sample and is comparatively easier to draw. If a researcher is interested to study the average telephone bill of an area in his/her city, he/she may randomly select every fourth telephone holder from the telephone directory and find out their annual telephone bills. However, this method suffers from the following drawbacks because of departure from randomness in the arrangement of the population units.

i) Periodic Effects

Populations with more or less definite periodic trends are quite common. Students' attendance at a residential university library over seven days in a week, sales of a store over a twelve months in a year and flow of road traffic past a particular traffic point on a road over 24 hours are a few examples to show periodic trend or cyclic fluctuation in a given population. In such cases systematic sample may not represent the population adequately or remain effective all the time.

ii) Trend

Another handicap of systematic sampling emerges from the fact that very often 'n' is not an integral multiple of 'k'. This leads to a varying number of units in the sample from the same finite population.

Suppose a population of 100 beneficiaries is listed according to seniority and a researcher wants to select a sample of 20. First he/she divides 100 by 20 to get 5 as the size of interval. Suppose he/she picks 4 at random from 1 to 5 as a starting number. Then, he/she selects each 5th name at 9, 14, 19, ...until he/she draws the desired 20 names. If he/she picks 2 as the starting point, next sample units would be 2, 7, 12, ... In the latter sample each beneficiary's seniority is lower than his/her counterpart in the former sample. The mean average of these two samples would be significantly divergent as regards seniority and other associated variables. Many such samples can be drawn by taking different starting points but there will be greater variation among them.

Thus, the 'periodic effects' and 'trend' of the listed population unduly increase the variability of the samples, and calculations made from such samples cannot show the sources of variability. The main advantages of systematic sampling are:

a) It involves simple calculations.

b) It is less expensive than random sampling.

Stratified Sampling

Stratified random sampling takes into account the stratification of the main population into a number of sub-populations, each of which is homogenous with respect to one or more characteristic(s). Having ensured this stratification, it provides for selecting randomly the required number of units from each sub-population or any mode of selection. The steps involved in the stratified sampling are given as follows:

i) Deciding upon the relevant stratification criteria such as sex, geographical region, age, courses of study, etc.

ii) Dividing the total population into sub-population based on the stratification criteria.

iii) Listing the units separately in each sub-population.

iv) Selecting the requisite number of units from each sub-population by using an appropriate random selection technique.

v) Consolidating the sub-samples for making the main sample.

Thus, stratification improves the representativeness of a sample by introducing a secondary element of control. However, the efficiency of the stratified random sample depends on the allocation of sample size to the strata. Rendering proportional weightage to each criterion improves it further by allowing the use of a smaller sample and by helping in achieving higher efficiency at a reduced cost.

Stratified random sample is very useful when lists of units or individuals in the population are not available. It is also useful in providing more accurate results than simple random sampling. For example, while selecting a sample of undergraduate student of the Open University in your country, the researcher may divide the whole population of undergraduate students as constitutive of males and females, of those drawn from north, east, south, and west regions of the country. All these will be different strata. From each stratum researcher may select 50 students as a sample.

Sometimes stratification is not possible before collecting the data. The stratum to which a unit belongs may not be known until the researcher has actually conducted the survey. Personal characteristics such as sex, social class, educational level, age etc., are examples of such stratification criteria. The procedure in such situations involves taking a random sample of the required size and then classifying the units into various strata. The method is quite efficient provided the sample is reasonably large, i.e., more than 20 in every stratum.

Proportionate Stratified Random Sampling

In the sampling plan the sample will have specified characteristics in exact proportion to those characteristics which are distributed in the population. To understand this sampling plan we will consider the following example.

Let us consider the students of college of social work. The researcher wishes to have proportionate stratified random sample of them taking year of study in the college as the basis of stratification. Let us suppose that the students at this college are distributed as is shown in given Table.

Table : Distribution of Students According to Year in College

Year	Population	Proportion of each class
BSW I	50	.25
BSW II	40	.20
BSW III	30	.15
MSW I	40	.20
MSW II	40	.20
Total	200	1.00

Further, we suppose that the researcher decides to have a sample of 60 students. First, he determines the proportion of students in each class (as shown in the second column). Then he calculates the composition of the sample taking each proportion of the stratifying characteristics in the population and multiplying it by the desired size of the sample. Thus, he multiplies 60, the desired sample size by .25, the proportion of BSW first year students in the population or (60) (.25) = 15

As such, he has to include 15 students from the BSW first year in his sample. This precedence is repeated for each year as described below: (60) (.25) = 15, (60) (.20) = 12, (60) (.15) = 9, (60) (.20) = 12, (60) (.20) = 12 **Sample Size (N) = 60**

Table : Distribution of Students by Proportion

Year	Sample Break-up	Proportion
BSW I	15	.25
BSW II	12	.20
BSW III	9	.15
MSW I	12	.20
MSW II	12	.20
Total Sample (n) =	60	1.00

After having determined the sample size from each sub-category, the researcher uses simple random sampling for drawing the desired number of elements from each category.

Disproportionate Stratified Random Sampling

This sampling plan is almost similar to proportionate stratified random sampling except that the sub samples are not necessarily distributed according to their proportionate weight in the population from which they were drawn. It is possible that some sub samples are over represented while other sub groups are under represented.

Let us suppose that the researcher stratifies the population into two sub strata using sex as the criteria. He would get, the following break-up of the population:

Table : Distribution of Students by Sex

Sex	**No. of Students**	**Percentage**
Male	160	80
Female	40	20
Total	200	100

If the researcher wants to draw a disproportionate stratified random sample of 60 from this population, stratified by sex, then he has to draw 30 from each substrata, this means male students (30) will be under- represented and female students (30) will be over represented in the sample. In other words disproportionate sampling gives equal weights to each substratum.

Cluster Sampling

In case the area of study is markedly wide-spread, large expenses are involved if simple and stratified random samplings are used. For example, in the preparation of sampling frame from the population and in covering the widespread areas by interviewers a large amount of expenditure is required. The more widely spread the area of study, the greater are the travel expenses, the greater is the time spent in traveling, and hence expensive-and the tasks of administering, monitoring and supervision of the research project and in particular supervising the field staff become more complicated. For the reasons mentioned above and few other reasons, large scale research studies make use of the methods of cluster sampling.

In cluster sampling, first the whole research area is divided into sub areas, more commonly known as "clusters". The simple random or stratified method is used to select clusters. Finally, researcher arrives at the ultimate sample size to be studied by selecting sample from within the clusters which is carried out on a simple or stratified random sampling basis.

Let us suppose, for example, that we want to do a survey of beggars in urban areas of a state. We may proceed as follows: prepare a list of districts and group them into clusters, and then select a simple or stratified random sample from each cluster. For each of the districts included in the sample, list the cities/towns and take a simple or stratified random sample of them. If some or all of the towns/cities thus selected for the sample have more number of beggars can be studied, we may take a sample of these towns/cities in each district. The questionnaires may then be administered to all the beggars in these towns/ cities or, if it is desirable and administratively feasible to do so, to a sample of the beggars.

Characteristically, the procedure moves through a series of stages-hence the common term, "multistage" sampling-from more inclusive to less inclusive sampling units until we finally arrive at the population elements that constitute the desired sample.

Non-probability Sampling

Non-probability sampling is based on the judgement of the researcher. The guiding factors in non-probability sampling include the availability of the units, the personal experience of the researcher and his/her convenience in carrying out a survey. Since these samples are not prepared through random sampling techniques, they are known as non-probability samples. Depending on the technique used, non-probability samples are classified into accidental, quota and purposive samples. A brief description of these samples is given below.

Accidental Sampling

Accidental sampling refers to a method of selecting respondents who happen to meet the researcher and are willing to be interviewed. Thus, a researcher may take the first hundred people he meets who are willing to be interviewed.

For example, let us consider the situations where a programme director, wishes to make some generalisation about the programme in progress, selects beneficiaries who have come to the agency for a service or a community organiser, trying to know how “the people” feel about the status of health in that community, interviews available community members like shop-keepers, daily wage earners, barbers and others who are presumed to reflect public opinion. In both the situations those who are available for study are included in the samples. This is exactly what we call *accidental sampling.* It is very obvious that the sample so collected are biased and there is no known way (other than by doing a parallel study with a probability sample) of evaluating the biases introduced in such samples. However, in the situation illustrated above , most probably , accidental sampling is the only way out because of the reason that the population parameters of the beneficiaries or the community people are not available with the researcher.

Quota Sampling

Quota sampling ensures inclusion of diverse elements of the population in the sample and make sure that these diverse elements take account of the proportions in which they occur in the population. For example, we take a sample from a population with equal number of boys and girls. And that there is a difference between the two groups in the characteristic we wish to study but we fail to interview any girls. The results of such a study would almost certainly provide us with extremely misleading generalisations about the population. In practice, elements in small numbers are frequently under represented in accidental samples. In anticipation of such possible exclusion of small groups, *quota sampling* ensures inclusion of enough cases from each stratum in the sample. It should be noted here that the major goal of quota sampling is the selection of a sample that is a replica of the population to which one wants to generalise.

Hence it should be clear that the critical requirement in quota sampling is not that the various population strata be sampled in their correct proportions, but rather that there be enough cases from each stratum to make possible an estimate of the population stratum value (Kidder, 1981, p.426). Quota-sampling, however, is more or less similar to the earlier described accidental sampling procedure except that it ensures the inclusion of diverse elements of the population.

Purposive Sampling

Purposive sampling is based on the presumption that with good judgment one can select the sample units that are satisfactory in relation to one's requirements. A common strategy of this sampling technique is to select cases that are judged to be typical of the population, in which one is interested, assuming that errors of judgment in the selection will tend to counterbalance each other. For example, if a researcher were conducting a study of patients who are not regular in attending out-patient department, it might be desirable to choose patients for the sample from among those who are frequently irregular. Because, the causes of irregularity can be described by irregular patients only. If he selects a random sample he would have got patients who are regular and that might influence the findings of the study. It is also possible that in a truly random sample, the regular patients would nullify the effects of irregular patients.

Snowball Sampling

Snowball sampling is externally helpful in studying some special sampling situation like getting a sample of drug abusers, or alcoholics or pickpockets. In snowball sampling we start with a few respondents of the type we wish to include in our study, who in turn are expected to guide us to get more respondents and so on. Like the rotating snowball, sample increases in its size as we continue to get more units of study. The technique is especially useful in the investigation of sensitive topics mentioned above because this sampling technique depends on sampled cases having knowledge of other similar cases. Another argument in favour of using this sampling technique is that, the victims might be hesitant to identify themselves if approached by a stranger but might be friendly to someone whom they know and share their experiences with (Gelles, 1978).

Special Applications of Non-probability Sampling

In general, the major advantages of non-probability sampling are convenience and economy. However, in social work research, most often we have no option other than non-probability sampling. For example, a social worker who is interested to study why cancer out-patients are not regular in reporting to the doctor or what are the problems of the parents of the mentally challenged children and the like, will have to use any one of the non-probability sampling plans. It is likely, therefore, that many sampling operations in social work research will be conducted according to non-probability principles. Social work researchers are convinced that these sampling procedures work reasonably well, despite the fact that they do not provide any basis for estimating how far the sample results are likely to deviate from the true population figures. Social work researchers, in other words, will continue to use non-probability methods and to justify their use on the grounds of practical experience, even while conceding the representativeness in principle of probability sampling. Moreover, many researchers argue that, many a time, this so-called representativeness exists only on paper. They believe that there is a difference between the sampling plan and its actual implementation; there can be many a slip in the implementation of the plan, which would nullify its theoretical merits.

For example, in situations where investigators may fail to follow the instructions in selecting respondents, or some of the selected respondents may refuse to be interviewed or not be available, investigators are allowed to substitute other respondents when those selected for the sample are not available for interview. Truly speaking, the sample thus obtained hence may not be the probability sample as it was planned to be.

In fact, there are situations in social work practice, in which probability sampling is unnecessary or inappropriate. One such situation arises from the fact that many a time, social work researchers do not necessarily carry out studies of samples only for the purpose of generalisation to the populations from which samples have been drawn. If samples are used for other reasons, ability to evaluate the likelihood of deviations from the population values is irrelevant.

For example, a social worker who wants to study the problems of parents of mentally challenged children would be interested in obtaining ideas, good insights and critical appraisals rather than assessing the status of opinion among the parents. In this situation researcher has to select a non-probability sample most probably a purposive sample. The situation is almost exactly analogous to one in which a social worker tries to evaluate the effectiveness of a new technique of educating alcoholic patients. The alcoholics-also a purposive sample-are not called in order to get an average opinion that would correspond to the average opinion of the entire alcoholic population. They are called in precisely because of their special problems.

Another example of sampling is for diagnosing the problems of a group of delinquent children rather than for the estimation of population values may be provided by the single subject research known as evaluative research. The typical problem of evaluative research is to find out something about motives, attitudes, and associations that are evoked by certain social conditions, but that may not be obvious even to the respondents themselves. The results of such studies are reported to agencies, which make use of them in developing treatment plans for their inmates. Interestingly, the evaluative researchers are quite happy with accidental samples, or with purposive samples selected in such a way as to maximize the likelihood of differences among the elements in the sample. They are looking for causative factors to transmit to the agency people, not for correct estimates of population distributions.

Combinations of Probability and Non-probability Sampling

If sampling is carried out in a series of stages, it is, of course, possible to combine probability and non-probability sampling in one design. That is, one or more of the stages can be carried out according to probability sampling principles and the remaining by non-probability principles.

The investigators may select clusters by probability cluster-sampling techniques, but, at the final stage, select the elements as a quota sample. Thus, it is possible to select a probability sample of districts in a state, within each of these districts, a probability sample of towns: and within each of the selected towns, a quota sample controlled for say, age and sex.

The advantage of such a design is the cost of obtaining cases for the sample. It is relatively inexpensive to select the areas within which the final stage of sampling will take place by probability sampling, and we thereby gain the advantages of probability sampling, at least for the areas. There is some evidence, for instance, that quota samples built up in selected areas are more successful in controlling such variables as socio-economic status than quota samples in which the control of these variables depends on the judgments of the interviewers (Kish, 1965).

The second example of combining probability and nonprobability sampling involves the opposite strategy. The investigator takes a probability sample of elements within a non-probability sample of areas. The areas are selected as a purposive sample. For example, a number of districts may be selected on the grounds that they have lower rate of literacy. Within each of the “typical” districts, the investigator selects a probability sample of respondents.

Social work researchers do not, generally, engage in sampling process like those used for conventional research process. Yet, the process of sampling in social work practice is based on principles of sampling discussed in this chapter. Though the needs and characteristics of the clientele groups typically guide the evaluations of social work programmes, the inferences about the client's problems are guided by research principles.

In social work practice setting, most of the times, it is unlikely that we use probability sampling. Irrespective of whether one's clients are mentally challenged children, delinquent children, street children, abused children or drug addicts we have no way of knowing whether all people with such characteristics had a chance to be in our sample. That much, we are most likely to deal with non- probability samples with their limitations. Most often, we have people who have happened to come to our agency to have our services. As such, social work researchers have to be careful while making generalisatons about the findings. Nevertheless, there is no reason to despair. One simply has to keep in mind the limitations of non-probability samples and use care in generating the required sample (Monette, et. al. 1986).

Choice of the Sampling Method

The choice of sampling method depends on several considerations unique to each individual project. These include issues related to the definition of population, availability of information about the structure of the population, the parameters to be estimated, the objectives of the analysis including the degree of precision required, and the availability of financial and other resources. This calls for appropriate selection of a sample for the conduct of any research study.

Characteristics of a Good Sample

A good sample should have the characteristics of (i) Representativeness and (ii) Adequacy.

It is essential that the sample should be 'representative' of the population if the information from the sample is to be generalized for that population. The term representative sample means an ideal 'miniature' or 'replica' of the population from which it has been drawn.

A good sample should also be 'adequate' or of sufficient size to allow confidence in the stability of its characteristics. An adequate sample is considered to be one that contains enough cases to ensure reliable results. Hence, planning the size of the sample in advance is very important. It varies with the nature of the characteristics under study and its distribution.

It may be mentioned that representativeness and adequacy do not automatically ensure accuracy of results. The sampling and data collection techniques need to be selected and employed carefully to obtain higher degrees of precision in results and generalizations about the population.

Determination of Sample Size

Most researchers find it difficult to determine the size of the sample.

Krejcie and Morgan (1970) have given a table in which no calculations are needed to determine the size of the sample. The table is reproduced here for the facilities of all of you.

Table for Determining Sample Size from a Given Population

N	**S**	**N**	**S**	**N**	**S**
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	396
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	341
N	**S**	**N**	**S**	**N**	**S**
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	361
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379

180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note: N is population size, S is the required sample size

Let us take one example. If you want to know the sample size required to be representative of the opinions of 300 beneficiaries, refer table at N=300. The sample size representative of the beneficiaries in this case will be 169. The table given above is applicable to any defined population.

Conclusion

A population is a well-defined group of units: individuals, objects, attributes, qualities, characteristics, traits of human beings, etc. A sample is a small representation of a population. It is a miniature picture of the entire group from which it has been selected. To obtain a representative sample, you must select the unit in a specified way. This process is called sampling. It usually involves the following four steps: (i) Defining the population; (ii) Listing the population; (iii) Selecting a representative sample, and (iv) Obtaining an adequate sample.

Sampling methods can be classified into two broad categories: (i) Probability sampling and (ii) Non-probability sampling.

In *probability sampling*, the units of the population are not selected at the discretion of the researcher but by means of certain procedures which ensure that every unit of population has the same probability of being included in the sample.

Simple or unrestricted random sampling, systematic sampling, stratified sampling, cluster sampling, multistage sampling and probability proportion to size sampling are the six main types of probability sampling. In all these types each unit in the sample has some known probability of entering the sample. In simple or unrestricted random sampling each unit of the population is given an equal chance of being selected, and the selection of any one unit is in no way tied to the selection of any other. The law of chance is allowed to operate freely in the selection of such samples and carefully controlled conditions are created to ensure that each unit in the population has an equal chance of being included in the samples. The researcher may use the lottery method or a table of random numbers for drawing a simple random sample. Simple random sampling ensures best results. However, it is neither feasible nor possible if the lists of units do not exist or if such lists are incomplete. If there is more heterogeneity among the units of population, a simple random sample may not necessarily represent the characteristics of the total population even if all selected units participate in the investigation.

In *systematic sampling*, a researcher generally starts with a list in which all the N units of the population are listed in alphabetical or in any other order. To select a sample of size n, the researcher has to select a unit at random from the first k = (N/n) units of the list and then every subsequent k^{th} unit is selected. A systematic sample is as good as a simple random sample and is comparatively more convenient to draw. However, the characteristics of "trend", "cyclical fluctuations" and "periodic effects" of a listed population unduly increase the variability of samples.

When the units in a sample are proportional to their presence in the population, the sampling is said to be stratified. When a population is stratified, the units within each stratum are more or less homogeneous than the units within the entire population. Stratified random sampling is very useful when lists of units in the population are not available. The method has been found practical even for small finite populations when cent percent response is difficult to secure within the desired time. Stratified random sampling provides more accurate results than simple random sampling only if stratification results in greater homogeneity within the strata than in the whole population taken as one unit. It is particularly useful in opinion survey studies. When the units vary in size, it is better to select a sample in which the probability of selection of a unit is proportional to its size. This sample is known as proportionate stratified sample.

Cluster sampling is used when the population under study is infinite, where a list of units of the population does not exist, when the geographical distribution of units is scattered, or when sampling of individual units is not convenient for various practical purposes. Cluster sampling involves division of the population of elementary units into groups of elements or clusters instead of individual members or items in the population. Cluster sampling is economical, especially when the cost of measuring a unit is relatively small and cost of reaching it is relatively large.

Non-probability sampling is based on the judgement of the researcher. Its guiding principles are: (i) availability of sampling units, (ii) personal experiences of the researcher, and (iii) the researcher's convenience in conducting the research. Since this type of sampling does not involve the principle of probability, it is called non-probability sample. Non-probability sampling provides (i) *purposive* samples, (ii) *incidental* samples, and (iii) *quota* samples.

A purposive sample is arbitrarily selected because there is good evidence that it is a representative of the total population. The evidence is based on researcher's experience. An incidental sample is generally used with those groups which are selected because of the easy or ready availability of sample units.

A quota sample involves selection of the sample units within each stratum or quotas on the basis of the judgement of the researcher rather than on calculable chance of being included in it.

Non-probability samples are very convenient in situations where the sample to be selected is very small and the researcher wants to get some idea of the characteristics of a population in a shorter time. Non-probability samples have certain limitations. No valid generalisations can be made beyond the sample studied. These samples depend exclusively on uncontrolled factors and the researcher's insight. Hence, the sampling error of such samples is hardly determinable.

The choice of an appropriate sampling method by a researcher depends upon many factors. These include (i) defining the population, (ii) availability of information about the structure of population, (iii) the parameters to be estimated, (iv) the objectives of the analysis, including degree of precision required, and (v) the availability of financial and other resources.

Representativeness and adequacy are the major characteristics of a good sample.

References

Bailey, Kenneth D. *Methods of Social Research*, London: The Free Press, 1978.

Baker, L. Therese. *Doing Social Research,* New York: McGraw Hill, 1988.

Black, James A. and Champion, Dean J. *Methods and Issues in Social Research,* New York: John Wiley, 1976.

Festinger. L. and Katz. D. (ed.) *Research Methods in the Behavioural Sciences,* New York : The Dryden Press, 1953.

Galtung, John *Theory and Methods of Social Research,* London : George Allen and Unwin, 1970.

Galtung, John "Theory and Methods of Social Research: A Plea for Pluralism" in Oyen, Else (ed) Comparative Methodology : Theory and Practice in International Research. London.

Gelles, R.J. *"Methods for Studying Sensitive Family Topics". American Journal of Orthopsychiatry*, 48 , 408-424, 1978.

Goode. W.J. and Hatt. P.K., *Methods of Social Research*, New York : McGraw Hill, 1952.

Kerlinger, Fred R. *Foundations of Behavioural Research,* Delhi: Surjeet Publications, 1964.

Kothari, L.R. *Research Methodology*, New Delhi: Vishwa Prakashan, 1985.

Kidder, Louise H. *Research Methods in Social Relations*, New York: Holt, 1981.

Kish, Leslie. *Survey Sampling*, New York,: 1965.

Lakatos, Imre *The Methodology of Scientific Research Programmes,*(Vol.1) Cambridge: Cambridge University Press, 1978.

Lal Das, D.K. (2000), *Practice of Social Research: A Social Work Perspective,* Rawat Publications, Jaipur.

Monette, Duane R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Moser. C.A. and Kalton. G. *Survey Methods in Social Investigation,* London : Heinemann Educational Books. 1975.

Nachmias D and Nachmias C. *Research Methods in the Social Sciences*, New York : St. Martins press, 1981.

Rubin, Allen & Babbie E. *Research Methodology for Social Work*, Belmont, California, Wadsworth.

Sellitz. G. et. al. *Research Methods in Social Relations,* New York: Holt. Rinehart and Winston (3rd edition), 1973.

Stouffer. S.A. *Social Research to Test ideas,* New York: Free Press of Glencoe, 1962.

Wilkinson, T.S. and Bhandarkar, P.L. *Methodology and Techniques of Social Research*: Bombay: Himalayan, 1977.

Young. P.V. *Scientific Social Surveys and Research,* Englewood Cliff. N.J. Prentice Hall (4th edition), 1953.

10

Research Tools: Questionnaires, Rating Scales, Attitudinal Scales and Tests

Introduction

One of the important stages of research process is data collection. In order to collect the requisite data for any type of research, you have to devise appropriate tools and use suitable measuring techniques, and decide on the relevant attributes of the samples drawn. There are several research tools, varying in design, operation, complexity of features, and interpretation. In certain situations, you may select from a list of available tools. In other situations, you may find that existing research tools do not suit your purpose or objective of research and, therefore, you may like to modify them or develop your own. Each tool is appropriate for collecting a particular type of data or information which lends itself to a particular type of analysis and interpretation for drawing meaningful conclusions and generalisations. For this, you need to familiarise yourself with the nature, merits and limitations of various research tools. In this chapter we focus on the characteristics, types, uses and limitations of some commonly used research tools – questionnaires, rating scales, attitude scales and tests.

Measurement in Social Research

The Concept of Measurement

The concept of measurement refers to the process of describing abstract concepts in terms of specific indicators by assigning numbers to these indicants in accordance with rules. Measurement of social phenomena has become an essential prerequisite because of a number of reasons. One of the important reasons for measuring social phenomena is to allow the researcher the opportunity of using these phenomena in hypotheses to determine the effects of a set of variables on others. (Black and Champion, 1976)

Let us consider the following hypothesis: "the adults who are lower in their self-esteem will tend to become chronic absentees in adult literacy classes than the adults with higher self-esteem" (a social psychological component of personality). Testing of this hypothesis needs a formal theoretical scheme where 'self-esteem' would be related systematically to 'absenteeism' in a causal fashion. One part of the testing process would consist of determining rank of absentees of the adults from the attendance records. We would match those adults with another group of adults selected randomly; from the same village who are regular in attending their classes. To ensure comparable samples of "absentees" and "regulars", the groups could be matched according to several other characteristics such as age, sex, year of education, socio-economic background, education and occupation of parents and others.

Other part of testing of hypothesis requires assessment of socio-psychological variable 'self-esteem'. How do we determine that a particular adult learner who is a chronic 'absentee' or 'regular' has more or less of this trait than the others? We cannot test the hypothesis mentioned above, until and unless we can quantify the variable 'self-esteem'. To test the hypothesis it is essential that the variable 'self-esteem' is measured empirically. We must be able to say that adults vary according to this variable, and further more, we should specify the degree to which each adult possesses this variable. Only then we will be able to test our hypothesis. Measurement allows the researcher the opportunity of using variables in hypothesis to determine their effects on others.

Let us examine the following questions?

1) Do you save money? Yes/No, If yes, how much?
2) "Child labour in our country must be banned".

   Strongly Agree/Agree/Undecided/ Disagree / Strongly Disagree

The first question measures one aspect by determining the presence or absence of a characteristic 'saving habit' among child labour. The second question tries to measure in a more specific way involving the amount saved thus trying to determine the degree or intensity of saving. Finally, a reaction or comment to a statement is in a sequence of responses, which in turn can be converted into scores and would measure the phenomena in question more specifically.

Levels of Measurements

Social phenomena can be measured in various ways, such as by asking questions or noting/observing behaviour. Measurement also differs from one another in terms of the level of measurement. Level of measurement refers to a set of rules that defines permissible mathematical functions that can be performed on numbers/scores produced by a measure. There are four levels of measurement, namely; nominal, ordinal, interval and ratio.

Nominal Level of Measurement

Nominal level of measurement is the lowest and simplest most level of measurement. When a variable is classified into several nominal sub-classes it is said that the variable in question is measured on a nominal level. For example, the variable sex has two nominal sub-classes; male and female. Similarly, religion has many sub-classes, if not infinite, among which are included Hindu, Muslim, Christian and Sikhs.

Numbers assigned to nominal subclasses at this level of measurement represent serial order only. The numbers do not have mathematical values. Hence, no mathematical function is possible with nominal data. For example, let us consider the classification of nominal data as shown below:

1) Hindu
2) Muslim
3) Christian

In this example, suppose we add 1 and 2 we will get 3. Which would be equivalent of saying that a Hindu plus a Muslim equals a Christian. This is not true. In other words 1, 2 and 3 here represent first categories of respondents who are Hindus, second categories of respondents who are Muslims and third categories of respondents belonging to Christianity. Another example of nominal level of measurement is getting information about marital status in the following format:

Marital Status: 1) Unmarried ( )
2) Married ( )
3) Divorcee ( )
4) Widow ( )

Ordinal Level of Measurement

When the relative positions of objects or persons with respect to some characteristics are defined, measurements are possible on ordinal levels. The fundamental requirement of an ordinal level of measurement is that one is able to determine the order of positions of objects or persons in terms of characteristics under study. Ordinal level measurements are considered of higher level than nominal level because in addition to being mutually exclusive (feature of nominal level of measurement) the categories have a fixed order. Level of education, for example, constitutes an ordinal variable and measures levels of education on ordinal scales.

Following illustration shows level of education divided into ordinal categories. In ordinal level of measurement, the numbers are used not only to differentiate sub-classes, but also to determine less than or greater than the relationship between them. For example, see the responses given to the level of education:

Level of Education: 1) Graduate ( )
2) Intermediate ( )
3) High School ( )
4) Middle School( )
5) Primary ( )
6) Illiterate ( )

The responses have numbers ranging from 1 to 6 and are designed to identify ordinal differences between levels of education. Each level is assigned a particular number relative to others and it can be determined readily that graduate level of education is higher than intermediate. However, there is no attempt to say that an equal distance will be found between all numbers. We cannot say that the same distance exists between 1 and 2 as exists between 3 and 4.

Interval Level of Measurement

Interval-level between the categories of measurement have equal spacing in addition to the characteristics of nominal level (mutually exclusive) and ordinal level (having fixed order). In interval measures the positions are not only ordered either in ascending order (lower, middle and higher) or in descending order (higher, middle and lower) but the intervals of measurement are also equal. In other words, the distance between the positions is equal, such as the degrees of a temperature scales. The examples of true interval scales are Fahrenheit and Celsius temperature scales. The units of measurement of both the scales are *degree* and are based on equal spacing characteristics of interval- level of measurement.

In an interval scale an equal distance between units will be found. That means, 2 has the same distance from 3 as 6 has from 5 and so on. For example, in thermometer having Celsius as unit of measurement, 60 degrees is 10 degrees more than 50 degrees. However, we cannot compare the ratios of two temperatures. It would be erroneous to infer that 100-degree is twice as hot as 50 degrees. This is because, internal scale does not have an absolute zero.

Ratio Level of Measurement

For example, income can be measured at ratio level of measurement because it has an absolute zero (no income, at least in money terms, not in term of economic status). Hence, a person with monthly income of Rs. 1,500 has thrice as much as a person earning Rs. 500. Most of the function can be performed on data measurement on interval scales.

In social science research, we have very few measures clearly of interval level. One such measure that is relevant to social work is measurement of intelligence by intelligent quotient (IQ) tests. Units of measurement on IQ test are specific and each point on the scale is mutually exclusive. In addition, the distances between IQ scores of 90 and 100 and 100 and 110 are equal. However, since the zero point on the interval scale is arbitrary, we cannot say that a person with an IQ of 130 is twice as intelligent as a person with on IQ of 65.

Ratio level of measurement is the highest level of measurement. This level of measurement has all the characteristics of interval level of measurement except that the zero point is absolute in this case rather than arbitrary as in interval level of measurement. This means the ratio level of measurement contains the characteristics of nominal level of measurement (mutually exclusive) ordinal level of measurement (fixed order) and interval level of measurement (equal spacing, in addition to an absolute zero).

In social work research we rarely come across a situation where ratio level of measurement is warranted mostly because it is really difficult to arrive at absolute zero while measuring social phenomena. However, to understand the ratio level of measurement we will consider the measurement of income with which researchers are likely to deal with. Though there is considerable controversy on whether 'no income at all' can be considered as an absolute zero point of the scale, and whether there is equal spacing between the units. We will consider the measurement of income on this scale for the sake of better understanding.

Since the ratio level of measurement facilitates the equality of ratio, we can make statements like an income of Rs. 30,000 is thrice as much as Rs. 10,000 but only one-third as much as Rs. 90,000. However, one has to keep in mind that income, as ratio measure is only an indicator of the amount of money available to a person not as the measure of person's socio-economic status. For example, a difference between Rs. 1,00,000 and Rs. 1,10,000 does not necessarily indicate a change in socio-economic status equivalent to that between Rs. 20,000 and Rs. 30,000. It should be finally noted that the variables capable of being measured at high levels are always better than the variables capable of being measured at lower levels.

Tools of Data Collection

Questionnaires, interviews, rating and attitude scales and tests are the major tools of data collection. In the following sections and sub-sections we shall discuss these research tools.

Questionnaire

'Questionnaire' is a commonly used tool for collecting a variety of data. A questionnaire may include a series of questions pertaining to psychological, social, educational or any such issues which are sent to an individual or a group, with the aim of obtaining relevant data on the topic of research.

Types of questionnaires

Questionnaires can be classified in various ways. Here, we confine ourselves to structured and unstructured questionnaires.

Structured questionnaires are those which pose definite, and concrete questions. These are prepared well in advance and not on the spot. Additional questions may be used only when there is a need to clarify vague or inadequate replies by respondents or when further details are needed. The form of questions may require responses which are either *closed* or *open-ended*.

Closed form of questionnaires are used when categorised data are required. They include a set of questions to which a respondent can reply in a limited number of ways–'yes', 'no', 'no-opinion', or an answer from a short list of possible responses. He/she is asked to put a tick (√) mark in a space provided on the answer sheet or is requested to underline a response. Sometimes he/she is asked to insert brief answers of his/her own. The open-ended responses on the other hand are free and spontaneous expressions by the respondent to the questions posed to him/her. The open-ended responses are used mainly for intensive study of a limited number of cases or preliminary exploration of new problems and situations. At times, the respondent is asked to write a descriptive essay and express his/her viewpoints or report on details and events without restrictions imposed as in the case of closed questions.

Unstructured questionnaires are frequently referred to as interview guides. They also aim at precision and contain definite issues that are covered while conducting an interview. Flexibility is the chief advantage of the unstructured questionnaire. It is designed to obtain viewpoints, opinions, attitudes and to show relationships between various types of information which might escape notice under more mechanical types of interrogation. No predetermined responses are provided: instead, free responses are solicited.

Characteristics of a Good Questionnaire

The characteristics of a good questionnaire can be analyzed by its:

1) *Purpose*

A good questionnaire must serve two purposes. First, it must translate the objectives of an investigation into specific questions, the answers to which will provide the data necessary to test the hypotheses and explore the area defined by the objectives. Each question should relate the corresponding objective so that the response obtained can be analysed and interpreted accordingly. The research objectives and specifications of the data required must precede the construction of questionnaire. Secondly, the questionnaire must motivate the respondents to communicate the required information. It is essential to include a courteous and carefully constructed covering letter to explain the purpose and importance of the study. The covering letter should assure the respondent that delicate information will be held in strict confidence.

2) *Language*

The language of a good questionnaire should be concise and directed towards producing uniformity of understanding among the respondents. The vocabulary should be simple and within the easy grasp of the least intelligent of the group under study. The syntax should be clear and straightforward. Vague phrases and expressions should be avoided. Technical expressions should be used only if the inquiry is directed to a select group which is well-versed in the technical language used. Proverbs and quotations should be avoided. Subjective words, such as 'bad', 'good', 'fair' and the like do not lend themselves to quantitative measurements nor qualitative analysis unless they are used for comparisons on a rating scale.

3) *Frame of Reference*

The respondent's frame of reference influences his/her answers. Complex questions that require the respondent to go through several steps of reasoning before answering are undesirable and have often resulted in misleading information. For example in a question like 'should study centers modernise their teaching', the word 'modernise' may have different connotations for different people.

Questions on controversial issues should be broken down into components, so that the researcher can determine the respondent's feeling about various aspects of the problem, including those which he/she refuses to comment upon. A series of specific questions is needed so as to uncover degrees of intensity of feeling or conviction. For example, questions to understand people's attitude towards the reservation policy have to be broken into issues like equality, equity, equal opportunities, etc.

The required answers should be within the informational domain of the respondents. For example a question 'Do you read 'Times' may not bring the desired responses as many respondents may not know about this magazine. The length of the questions and statements used should be governed by a reliable estimate of the respondents' comprehension level.

4) *Sequence of Questions*

The arrangement or ordering of questions should receive special attention. It should appear logical to the respondents. The questions placed first in the questionnaire should be the easiest to answer. 'Interest-generating' questions should be asked at the beginning. A proper sequence of questions proceeds from the general to specific, from simple to complex one, from those that will create favourable attitude to those that may be somewhat delicate or sensitive.

5) *Length of the Questionnaire*

A questionnaire should not be longer than absolutely absolutely necessary. The total number of questions must not be too large to tire or bore the respondents. If too many questions are asked and the respondent becomes tired, the questions at the end of the series may not be well answered. If it is necessary to include a large number of questions, it is advisable to have separate questionnaires.

6) *Form of Response*

The form in which the responses are recorded must be integrated with the form of the questions. There should be no hesitation in asking for responses in different forms in the same questionnaire, since it is frequently found that one form is better than another for questions about different aspects of the same subject. Questions requiring answers like “Yes” or “No” are subject to least bias. These responses are easy to tabulate. However, they do not always yield sufficient information on the subject under study. In such cases, the use of *multiple-choice responses* is desirable. Questions that present multiple choices to the respondent are effective when the choices are few and easy to follow.

Uses of Questionnaire

1) A questionnaire is a popular means of collecting different kinds of data in research. It is widely used in Social Work research to obtain information about certain conditions and practices and to inquire into opinions of an individual or a group.
2) A questionnaire is administered personally either individually or to a group of individuals or is mailed to them to save a great deal of time and money in travel. In the former situation, the person administering the tool has an opportunity to establish rapport with the respondents, to explain the purpose of the study to the respondents and to explain the meaning of questions which may not be clear to them. In the latter situation, mailed questionnaire is mostly used when the individuals cannot be contacted personally. The range of administration of a mailed questionnaire may be national even international.
3) Questionnaires are used both to initiate a formal inquiry and also to supplement and check data

previously accumulated. They may pertain to studies of economic or social problems, measurement of opinion on public issues or events, studies of administrative policies and changes, studies on the cost of living, consumer expenditure, child welfare, and numerous other issues.

Limitations of Questionnaires

1) A questionnaire cannot be used with children and illiterates.
2) The return of the mailed questionnaires is often as low as 40 per cent to 50 per cent or it could even be lower than that. As a result of this poor response, the data obtained are sometimes of limited validity. The respondents who return the questionnaires may not be representative of the entire group. It will make the sample a biased one and thus vitiate the findings.
3) Sometimes respondents may not like to respond in writing to questions of intimate and confidential nature or to questions involving controversial issues. It is sometimes difficult to formulate the phrase questions on certain complex and delicate problems.
4) There is no check on the respondent who misinterprets a question or gives incomplete or indefinite response.
5) Sometimes the respondent may modify his/her earlier/original responses to the questions when he/she finds that his/her responses to latter questions are contradicting the previous ones.

Rating Scale

'Rating' is a term applied to an expression of opinion or judgement regarding some situation, object, character, or an attribute. 'Rating scale' refers to a 'scale' with a set of points which describe varying degree of an attribute under investigation.

Rating scales are broadly classified into five categories:

i) numerical scales,

ii) graphic scales,

iii) standard scales,

iv) rating by cumulative point, and

v) forced choice ratings.

We discuss them below in the same order.

Numerical scales

In a typical numerical scale, a sequence of defined numbers is supplied to the rater or the observer. He/She assigns to each stimulus to be rated, an appropriate number in line with these definitions or descriptions of the event or the stimulus. For example, the following scale may be used in obtaining ratings of the affective values of colours:

1) Extremely pleasant
2) Moderately pleasant
3) Indifferent
4) Moderately unpleasant
5) Extremely unpleasant

The use of negative numbers is not favoured as those observers or raters who are not well versed in Algebra find it difficult to manage negative members.

Numerical rating scales are the easiest to be constructed. They are also the simplest in terms of handling the results. However, numerical scales have the limitations of biases.

Graphic Scales

The graphic scale is the most popular and the most widely used type of rating scale. In this scale, a straight line is shown, vertically or horizontally, with the various clues to help the rater. The line is either segmented into units or continuous. If the line is segmented, the number of segments can be varied from case to case. Given below is an example of such a scale.

How effective was the tutor in the class?

Very	*Slightly*	*Average*	*Slightly*	*Very*
Effective	Effective	Ineffective	Ineffective	

There are many advantages in graphic scales. They are simple and easy to administer. Such scales are interesting to the rater and require little added motivation. However, scoring in the case of some formats of graphic scale is rather laborious.

Standard Scales

In standard scales, a set of standards is presented to the rater. The standards are usually objects of the same kind to be rated with pre-established scale values. This type is like that of the scales for judging the quality of handwriting. The scales of handwriting provide several standard specimens that have previously been spread over on a common scale by some standardised procedure like equal-appearing intervals. With the help of these standard specimens, a new sample of handwriting can be equated to one of the standards, judged as being between two standards. The 'man-to-man scale' and the 'portrait-matching' scale are the other two forms that conform more or less to the principles of standard scales.

Rating by Cumulated Points

The unique and distinctive feature of rating by cumulative points is its immense use and ease of scoring. The rating score for an attribute object or individual is the sum or average of the weighted or unweighted points. The 'check-list method' and the 'guess-who technique' belong to this category of rating. 'Check list methods' are applicable in the evaluation of the performance of personnel in a job. The weights of 1 and –1 are assigned to every favourable and unfavourable trait, characteristic or attribute and the individual's score is the algebraic sum of the weights. In 'guess-who technique', some statements like "here is the one who is always doing the wrong things to make others sad", are constructed and each individual is asked to list all the members of his/her group who fitted such description, mentioning the same individual as many times as necessary. Each individual scores a point for each favourable or unfavourable description applied to him/her, and the total score is the sum total of all such points.

Forced Choice Ratings

In 'forced-choice rating' methods, the rater is asked, not to say whether the ratee has a certain trait or how much of it the ratee has, but to essentially say whether he/she has some or one trait or another of a pair. For example instead of deciding whether individuals' leadership qualities are superior or above average, it may be asked if the person:

- exerts strong influence on his/her associates,
- is able to make others act, and
- asserts during functions.

Uses of Rating Scales

The uses of rating scales are described below:

i) Rating methods consume much less time than other method of scaling like 'pair comparison' and 'rank ordering'.

ii) Rating methods are quite interesting to the raters, especially if graphic methods are used.

iii) Best ratings can be obtained by presenting one stimulus to a rater at a time.

iv) Rating scales can be used with large numbers of stimuli to a rater at a time.

v) Rating scales can be used with raters who have very little training for the purpose.

vi) Rating methods can be used with large numbers of stimuli.

vii) Rating scales have much wider range of applications and can be used for tutor-ratings, personality ratings, school appraisal, sociological surveys, etc.

Limitations of Rating Scales

Rating scales have several limitations. Some of them are discussed as follows:

i) *Error of leniency:* There is a constant tendency among the raters to rate those whom they know well, higher than they should. Such raters are called 'easy raters'. Some raters become aware of their easy rating and consequently rate individuals lower than they should. Such raters are called 'hard raters'. The leniency error refers to a general and consistent tendency for a rater to rate too high or too low for whatever reasons.

ii) *Error of central tendency:* Most of the raters hesitate to rate the individuals on the extremes of the scales, instead they tend to rate the individuals on the middle of the scale. Obviously, the results get distorted.

iii) *Halo-effect:* Halo-effect is an error which obscures the clusters of traits within an individual. The rater forms a general opinion about the person's merit and his/her ratings on specific traits are greatly influenced by this general impression. It results in a spurious positive correlation among the traits which are rated.

If a learner likes a tutor, he/she will rate the tutor high on all traits without considering the meaning attached to a particular trait.

iv) *The logical error:* The logical error is due to the fact that judges are likely to give similar ratings for traits which they feel are logically related to each other.

v) *The contrast error:* The contrast error is due to a tendency of a rater to rate others in the opposite direction (contrasting) from himself/herself in a trait.

vi) *The proximity error:* It has been seen that adjacent traits on a rating scale tend to inter-correlate higher than the remote ones, their degree of actual similarity being approximately equal. This error may be countered to some extent by placing similar traits farther apart and the dissimilar ones closer.

Attitude Scale

'Attitude' is defined as the degree of positive or negative effect associated with a certain psychological entity. In other words it is the pre-disposition of an individual towards a psychological entity–may be an institution, ideal, symbol, phrase, slogan, job or idea towards which people respond positively or negatively. The inquiry form that attempts to assess the attitude or belief of an individual is known as Attitude Scale.

Types of Attitudes Scales

Various scaling techniques have led to the development of different types of attitude scales which provide quick and convenient measure of attitudes. However, the method of 'equal-appearing intervals' (Thurstone Scales) and 'method of summated ratings' (Likert Scales) have been extensively used in attitude or opinion research. The attitude scales that are developed using these scaling techniques consist of a number of carefully edited and selected items called 'statements'.

The method of 'equal-appearing intervals' was originally developed by Thurstone and Chave (1929). The attitude score of an individual obtained by this method has an absolute interpretation in terms of the psychological continuum of scale value of the statements making up the scale. If this score falls in the middle range of the psychological continuum, the attitude of the individual is described as "neutral". If it falls towards the favourable end of the continuum, it is described as "favourable" and if it falls towards the 'unfavourable' end, it is described as "unfavourable".

In the 'method of summated ratings' developed by Likert, the item score is obtained by assigning arbitrary weights of 5, 4, 3, 2, and 1 for strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD) respectively, for the statements, favouring a point of view. On the other hand, the scoring weights of 1, 2, 3, 4, and 5 are given for the respective responses for statements opposing this point of view. An individual's score on a particular attitude scale is the sum of his/her rating on all the items.

Uses of Attitude Scales

i) Attitude scales are used to measure the degree of positive or negative feeling associated with any slogan, person, institution, religion, political party, etc.

ii) Attitude scales are used in public-opinion-surveys in order to make some important and crucial decisions. Industrial, political, educational and other leaders seek knowledge of public opinions and attitudes. Educationalists, for example, conduct opinion surveys to find out how people feel about educational issues. Business firms make public opinion surveys to find out what type of product, packaging or advertising appeals to the purchasers. Politicians conduct opinion surveys to predict how people will vote or what programmes they are likely to favour.

Limitations of Attitude Scales

The process of assessing attitude with the help of attitude scales has various limitations.

i) An individual may conceal his/her real attitude, and express socially acceptable opinions only.

ii) An individual may not really know how he/she feels about social issues and he/she may never have given the idea a serious consideration.

iii) An individual may not be able to express his/her attitude towards an abstract situation unless he/she actually confronts with it in his/her real life.

Tests

A test, in the narrowest sense, connotes the presentation of a standard set of questions to be answered. We obtain a measure (a numerical value) of a characteristic or attribute of a person pertaining to his/her potential knowledge of, say mathematics, honesty, perseverance, creativity from his/her answers to such a series of questions.

Types of Tests

Tests may be classified in different ways, some of which are described as follows:

A) *On the basis of administration*: We have three categories under this classification:

i) *Power vs. Speed tests:* A 'power test' is a test in which every subject has a chance to attempt each item of the test. It has no time limit and the subject goes on attempting test items till he/she can no longer continue successfully. On the other hand, a 'speed test' is defined as one in which no subject has enough time to attempt all items. Most entrance tests held for admission into various university courses are speed tests. A large number of items are given to be attempted within a fixed time.

ii) *Individual vs. Group tests:* The tests which are administered on one individual at a time are known as 'individual tests'. These tests are useful in situations where a precise and detailed assessment of some characteristics of an individual is desired.

The test which is administered to many subjects at the same time is termed as a 'group test'. These tests are particularly useful when large number of subjects have to be tested at the same time

iii) *Paper-pencil and Performance tests:* 'Paper-pencil tests' require the subject to respond to the item by writing his/her replies. They pose questions in the form of sentences, or designs, and require the subject to record his/her answer either by underlining, ticking or encircling one of the alternative answers or by writing a word, phrase or sentence in the blank space provided for this purpose.

On the other hand, in 'performance tests', problems are presented in a correct form and the subject is required to respond not by writing but by manipulating toys, blocks or picture cards, etc., depending on the level of the test administrator.

B) *On the basis of standardisation:* On the basis of standardisation, tests can be classified into two categories:

i) Non-standardised teacher-made tests and

ii) Standardised tests.

Teachers use their own tests in classroom situations to assess the achievement of learners in different subjects/disciplines. Such tests are designed for specific use and their reliability or validity is not established by careful statistical controls. By contrast, in standardised tests each item and total score are carefully analysed. The content, administration and scoring in these tests are standardised.

C) *On the basis of traits and abilities to be measured:* Tests can also be classified in terms of their purpose, that is, the types of abilities and psychological traits they describe and claim to measure. By this standard, we may distinguish five major classes of tests, each with many sub-classes:

   i) the tests of general mental ability or intelligence,
   ii) the tests of special abilities or aptitudes,
   iii) the tests of creativity,
   iv) the tests of attainment and
   v) the personality measure.

i) Tests of General Mental Ability or Intelligence

Tests of general mental ability measure which enter into performance of all activities and which differs in magnitude from individual to individual. The items in such tests assess the subjects' ability to perceive relationships, solve problems and apply knowledge in a variety of ways. Intelligence tests are classified as verbal and non-verbal tests, paper-pencil and performance tests, speed and power tests and individual and group tests.

ii) Tests of Special Abilities or Aptitudes

Although intelligence tests seek to measure abilities which are valuable in almost any type of mental applications, effective educational/vocational guidance and proper placement calls for tests directed at specialised abilities. Such types of test are called tests of special abilities or aptitudes. These tests are used mainly to predict success in some occupation, academic or training course. For example, for selecting clerks for a bank, clerical aptitude tests have to be administered. Similarly for admitting learners to a social work course, social service aptitude test has to be administered.

iii) **Tests of Creative Thinking**

There are two distinct types of thinking ability: namely, convergent thinking and divergent thinking. Convergent thinking involves the generation of ideas and facts from available information and in test of convergent thinking (tests of general intelligence and aptitude), the subject is asked to define a word, solve an arithmetical problem, find the next number to continue a series, etc. Divergent thinking involves generation of novel responses to situations; responses that are original, unusual and varied. This thinking generally goes by the name 'creativity' and tests which are used to measure it are called tests of creative thinking or creativity. In such tests, the subject is encouraged to generate multiple responses to a problem. The responses are evaluated in terms of fluency (number of responses), flexibility (number of different categories of responses), and originality (number of responses given). For example, the respondents may be asked to name objects that are round in shape. Large and varied responses are expected to this question. Such items are included in a creativity test.

iv) **Tests of Attainment or Achievement**

Tests which are conducted to measure present performance vis-à-vis the skill or knowledge that has been acquired as a result of training are called attainment or achievement tests. They are designed to measure an individual's level of learning in a particular discipline, subject or course at the end of instruction. If an achievement test is developed to assess whether a student possesses required skills in terms of a specified criterion at a particular time, the test is designed as ‘criterion-referenced mastery test’. If, on the other hand, the test is to assess the student’s relative position in a group, the test is called ‘discriminatory or norm-referenced test’

Achievement tests may be classified as traditional or essay-type, and new-type or objective tests. New type or objective tests include multiple-choice, true-false, completion, matching and short answer items.

v) **Personality Measures**

Personality measures are obtained by either projective or non-projective techniques.

Projective techniques are used to make an assessment of various aspects of personality which cannot be measured easily by any other means.

The non-projective techniques of personality measurement include personality inventories, interest inventories, value inventories, etc. An inventory is constructed in the form of a questionnaire. It consists of a series of questions or statements to which subjects respond by answering ‘yes’ or ‘no’, ‘agree’ or ‘disagree’ to indicate preferences that describe their typical behaviour(s).

Uses of Tests

The major role of educational institutions is to facilitate certain types of student learning. The tutor should encourage activities that promote desirable student learning and discourage that do not promote such learning. Tests help in identifying such types of activities.

i) They help in (a) providing knowledge concerning the learners entry behaviour, (b) setting, refining, and clarifying realistic goals for each learner, (c) evaluating the degree to which the objectives have been achieved, and (d) determining, evaluating, and refining the instructional techniques. There are many ways through which we can obtain information about entry behaviour of the learners. Aptitude and intelligence tests provide information about the entry behaviour of learners. Aptitude and intelligence tests provide information concerning the speed and the ease with which a learner can be expected to learn. Achievement tests provide information as to whether a learner is weak or strong in a particular discipline/subject. For more information regarding deficiencies, diagnostic tests are used.

ii) Tests serve various purposes in the process of counselling and guidance. Sometimes test results are used to confirm a learner's ideas about his/her skill, abilities or personality characteristics. Tests may also be used to provide an estimate of the learners probable success in a particular educational or vocational field.

iii) Many uses of psychological tests in business and industry pertain to decisions about personnel. For example, tests may be used for selecting candidates from the among applicants, for placement of workers on jobs, and for determining whether a worker is suitable for promotion. Tests may be used in either of the two ways: (i) to measure an individual's abilities and characteristics in order to predict his/her performance on the new job, or (ii) as proficiency measures to establish whether the individual possesses the knowledge and skills as outlined in the job-specifications. Such tests are also used in training programmes, both as criterion measures and as learning experience. Besides, they may be used to study the nature of jobs, to determine the abilities and characteristics that suit workers on various jobs and how these characteristics influence the different ways the job is performed.

Limitations of Tests

i) Tests of intelligence or special aptitude should not be considered as the absolute measure of pure intelligence or creative thinking because the performance in such tests is partly determined by one’s background and schooling.

ii) Inventories used for personality assessment have low predictive validity especially when the subjects tested are below seventeen years of age.

iii) Tests measuring cognitive processes can hardly measure higher mental processes such as ability to discover scientific laws and principles.

iv) The strength and depth of understanding of individual and appreciative reactions in ethical, social or aesthetic fields are hardly measured by tests.

Conclusion

In this Chapter, we have described the various types of research tools and their uses and limitations.

- Questionnaires, interviews, rating scales, attitude scales, and tests, are the main data-gathering research tools or techniques.
- Questionnaires consist of a series of questions dealing with psychological, social, educational, and other related issues. Questionnaires are either structured or unstructured. A good questionnaire is specific in purpose, simple in language, logical in arrangement of questions and moderate in length. It is administered personally or mailed to individuals.
- Rating scales are used to obtain judgement on a set of points which describe varying degrees of an attribute under observation. Numerical scales, graphic scales, rating by cumulative points and forced choice ratings are the commonly used rating techniques. Leniency

error, central tendency error, halo-effect, logical error, contrast error and proximity error are the major error types which are faced in of using rating scales.

- Attitude scales are used to assess the attitude of an individual towards another individual, slogan, religion, institution, a different mode of teaching etc. they are mostly used in opinion surveys. Thurstone's method of 'equal appearing intervals' and Likert's method of 'summated ratings' are extensively used in the construction of attitude scales.
- A test is a standard set of questions which is used to obtain a measure (a numerical value) of an attribute or a characteristic of a person pertaining to his/her academic achievement, interests, values, personality traits, intelligence, etc.

References

Bailey, Kenneth D. *Methods of Social Research*, London: The Free Press, 1978.

Baker, L. Therese . *Doing Social Research,* New York: McGraw Hill, 1988.

Black, James A. and Champion, Dean J. *Methods and Issues in Social Research,* New York: John Wiley, 1976.

Rubin, Allen & Babbie E.*Research Methods for Social Work*, Belmont, California, Wadsworth, 1989.

Fastener. L. and Katz. D. (Eds.) *Research Methods in the Behavioral Sciences,*New York : The Dryden Press, 1953.

Goode. W.J. and Hatt. P.K. *Methods of Social Research,* New York : McGraw Hill, 1952.

Kerlinger. Fred R. *Foundations of Behavioral Research,* Delhi : Surjeet Publications, 1964.

Kidder, Louise H. *Research Methods in Social Relations,* New York: Holt, 1981.

Kothari, L.R. *Research Methodology,* New Delhi: Vishwa Prakashan, 1985.

Lazarsfeld, Paul. "Problems in Methodology" in Robert K. Merton (ed), *Sociology Today*, New York : Basic Books, 1959

Monette, Duane R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Moser. C.A. and Kalton. G. *Survey Methods in Social Investigation,* London : Heinemann Educational Books, 1975.

Nachmias D and Nachmias C. *Research Methods in the Social Sciences*, New York: St. Martins press, 1981.

Oppenheim, N.A. *Questionnaire Design and Attitude Measurement*, New York: Basic Books, p. 55, 1966.

Sellitz. G. *et. al. Research Methods in Social Relations,* New York: Holt. Rinehart and Winston (3rd edition), 1973.

Stouffer. S.A. *Social Research to Test ideas,* New York: Free Press of Glencoe, 1962.

Thurstone, L.L. "Attitudes Can Be Measured," *American Journal of Sociology*, 33 (January 1928):

Wilkinson, T.S. and Bhandarkar, P.L. *Methodology and Techniques of Social Research*: Bombay: Himalayan, 1977.

Young. P.V.*Scientific Social Surveys and Research,* Englewood Cliff. N.J.Prentice Hall (4th edition), 1953.

11

Interview, Observation and Documents

Introduction

In previous chapter you read about the four important tools of data collection, namely: *questionnaires, attitude scales, rating scales, tests,* and the techniques of collecting relevant data through these tools and their strengths and limitations.

This chapter is a continuation of previous chapter. In this chapter we shall discuss a few more tools of data collection such as, interviews, observations, and documents. Each of these tools and techniques has a specific role in the process of collecting data and has its own uses and limitations.

Through interview schedule, the researcher can explain more explicitly the purpose of the investigation. Observation is a technique used to classify and record in a planned manner the individual responses to real life situations. The documents describe the process of personal/group development or the occurrence of an event in accordance with legal or administrative regulations attached to that event. The documents and records are useful in bringing together data for a given time period for scientific analysis.

Types Of Tools And Their Uses

Interview

Interview is a process of communication or interaction in which the subject or interviewee gives the needed information verbally in a face-to-face situation. In a research situation it may be seen as an effective, informal conversation, initiated for a specific purpose as it focusses on certain specific areas. The main objective may be the exchange of ideas and experiences and eliciting of information.

Types of Interview

Interviews may be classified according to the purpose for which they are used and according to their design and structure.

For purposes of research, an interview may be used, as a tool for gathering data required by the researcher to test a hypothesis or to solve his/her problems. This type of interview is called 'research interview'.

Interviews may vary in design and structure. In some situations, an interviewer may interview one individual at a time. It is called an 'individual interview'. In a 'group interview', a group of individuals is interviewed at one and the same time.

Interviews are also classified as 'structured' and 'unstructured'. A 'structured interview' is one in which the whole situation is carefully structured and pre-empted and the major areas of inquiry are mapped out. However, the interviewee is given considerable freedom to express his/her description of the situation. In this type of interview, the interviewer uses a highly standardised tool and a set of pre-determined questions.

'Unstructured interview' is one where the interviewer does not follow a list of predetermined questions. The interviewees are encouraged to relate their concrete experiences with no or little direction from the interviewer, to dwell on whatever events seem significant to them and to provide their own definition of their social situations. Series of questions to be asked are allowed to emerge from the interview itself along with their form sequence in which the questionnaire to be asked.

Techniques of Interviewing

Although the interview as a research tool can be modified according to the needs of the research situation, there are certain techniques that need to be understood. These techniques deal with preparing for the interview, conducting the interview and recording the information gathered.

1) *Preparation for the Interview*

It is necessary to plan carefully for an interview. The interviewer must decide exactly what kind of data the interview should yield, whether the *structured* or *unstructured* type of interview will be more useful and how the results of interview should be recorded. It is advisable to try out the interview on some persons before using it for actual investigation. This is helpful in revealing the deficiencies or shortcomings that need to be corrected before the interview is carried out. The interviewer must have a clear idea of the sort of information he/she needs, and may accordingly prepare a list of questions in the form of a "schedule". Interview schedule is a device consisting of a set of questions, which are asked and filled in by an interviewer in a face-to-face situation with the interviewee. Since it is administered personally, it provides the researcher an opportunity to establish a rapport with the respondents. This helps the researcher to explain the nature and purpose of investigation and to make the meaning of the questions clear to the respondents in case they misinterpret a question or give incomplete or indefinite responses. The schedule also economises on time and expenses of investigation. The procedure of constructing a schedule is same as that of a questionnaire.

2) *Conduct of Interview*

In the conduct of an interview, a harmonious relationship between the interviewer and interviewee is most essential. A good rapport helps the interviewee to feel at ease and express himself/herself willingly. In order to establish a good rapport, the interviewer should greet the interviewee in a friendly manner so as to help him/her get settled in a relaxed manner. As an interviewer you should observe the following rules in order to elicit effective responses:

i) Ask only one question at a time.

ii) Repeat a question if necessary.

iii) Try to make sure that the interviewee understands the questions.

iv) Listen carefully to the interviewee's answer.

v) Observe the interviewee's facial expressions, gestures, and tone or voice so as to derive meanings from his/ her body language.

vi) Allow the interviewee sufficient time to answer the question, but do not let the interview drag on and on.

vii) Avoid suggesting answers to questions.

viii) Do not show signs of surprise, shock, anger or other emotions if unexpected answers are given.

ix) Maintain a neutral stance or attitude with respect to controversial issues during the interview.

x) Take note of answers that seem to be vague, ambiguous, or evasive.

xi) Use tact and skill in getting the subject back to an area of inquiry if he/she has strayed too far away from the original question.

xii) In the unstructured interview, ask additional questions to follow up clues or to obtain additional information.

The interviewer should try to redirect the interview to more fruitful topics when he/she feels that the required information is not sufficient. He/She should wind up the interview before the interviewee becomes tired.

3) *Recording of the Interview*

The recording of the interview is obviously an essential step in interviewing. The interviewer may use a schedule, a structured format, rating scale or a tape recorder to record the responses of the interviewee. The use of a tape recorder during the conduct of the interview not only eliminates the omissions, distortions, elaboration, and other unwarranted modifications of data usually found in written interview responses, but it also provides an objective basis for evaluating the adequacy of the interview data in relation to the performance of the interviewee. The use of a tape-recorder also permits the interviewer to devote full attention to the interviewee and save much of the time which he/she would otherwise use in writing down the responses during or after the interview. However, if a tape-recorder is not available, the interviewer has to take notes to record the responses.

Uses of the Interview

i) An interview provides an opportunity to the interviewer to ask questions on various areas of inquiry. It permits greater depth in responses, which is not possible through any other means.

ii) An interview is not an entirely exclusive tool of research for gathering information pertaining to feelings, attitudes or emotions. It is supplementary to other tools and techniques. A combination of interviewing, observations, and statistical techniques often yields the best results, but the balance of emphasis shifts with the frame of reference and objectives of the study. Since an interview is a highly flexible tool in the hands of skillful interviewers, it allows a more liberal atmosphere than in the use of other techniques of investigation. Questions not readily grasped by interviewees can be rephrased or repeated with proper emphasis and explanations when necessary.

iii) An interview is an effective tool for a social scientist in the study of human behaviour. Through this technique, a researcher can secure very intimate and personal knowledge about the subject of his/her study, which is denied to the natural scientist, who cannot communicate with the subjects despite all the instruments of precision.

Limitations of the Interview

Inspite of many uses of the interview method, it is not without limitations that may jeopardize its value, even when it is used as a supplementary research technique.

i) Interview is a timeconsuming technique.

ii) The effectiveness of the interview depends greatly upon the skill of the interviewer which everyone does not ordinarily possess. It takes time to master this skill.

iii) There is always a danger of subjectivity on the part of the interviewer.

iv) An interview is very difficult to employ successfully because even in the presence a skilled interviewer some interviewees do not respond freely, frankly and accurately.

v) Since memory and retention are highly selective processes, interviewees generally provide accurate and vivid accounts of the most recent or intense experiences, or of situations that they encounter most frequently. Painful or embarrassing experiences are often forgotten or even consciously avoided by the interviewees. In such cases, the responses lack accuracy.

Observation

Observation may be defined as a process in which one or more persons observe some real-life situation and record pertinent occurrences. It is used to evaluate the overt behaviour of the individuals in controlled and uncontrolled situations.

Types of Observation

Observation may be classified into two types:

a) Participant Observation

b) Non-participant Observation

Participant observation: In the process of 'participant observation', the observer becomes more or less one of the group members and may actually participate in some or the other activity of the group. The observer may play any one of the several roles in observation, with varying degrees of participation: as a visitor, an attentive listener, an eager learner or as a participant observer.

Non-participant observation: In the process of 'non-participant observation', the observer takes a position where his/her presence is not felt by the group. He/She may follow closely the behaviour of an individual or characteristics of one or more groups.

In this type of observation, a one-way 'vision screen' permits the observer to see the subject but prevents the subject from seeing the observer.

Observations may also be classified into the following two categories:

i) Structured observation, and

ii) Unstructured observation.

Structured observation: Structured observation is formal in character and is designed to provide systematic description to test causal hypothesis. It is executed in controlled situations like classrooms or laboratory settings. This type of observation starts with relatively specific formulations. There is not much choice with respect to the content of observation. The observer sets up in advance the categories of behaviour in terms of which he/she wishes to analyse the problem, and keeps in mind the time limit within which he/she has to make the observation.

Unstructured observation: Unstructured observation is associated with participant observation and is often an exploratory exercise. In unstructured observation, it may not be possible to categorise behaviour before the observation. The observer considers aspects of behaviour in terms of their contexts or situations of which they are a part.

Stages in the Process of Observation

As a good research technique, observation needs proper planning, expert execution, and adequate recording and interpretation.

i) Planning for observation

Planning for observation includes definition of specific activities or units of behaviour to be observed; the nature of the groups of subjects to be observed; the scope of observation of the individual or group; determination of the length of each observation period and deciding about the tools to be used in making the observation and recording.

ii) Execution of Observation

The expert execution of observation includes:

a) Proper arrangement of specific conditions for the subject or subjects to be observed,

b) Assuming proper role or physical positions for observing,

c) Focussing attention on the specific activities or units of behaviour under observation,

d) Proper handling of recording instruments to be used, and

e) Utilizing one's training and experience fairly effectively in terms of making the observation and recording the facts.

iii) Recording and Interpreting the Observation

Recording of the observation data should take place either simultaneously or soon after the observation. In the former case, the observer goes on recording his/her observation data simultaneously with the occurrence of the phenomenon observed. In the latter case, the observer undertakes to record his/her observations not simultaneously with the actual event, but immediately after he/she has observed for a certain period of time while the details are still fresh in his/her mind. In viewing, classifying and recording behaviour, the observer must take utmost care to keepout his/her personal influences, biases, attitudes and values from the observation report. The observer should know what he/she is looking for in a given situation and should carefully and objectively record the relevant data. Subjectivity on the part of an observer may partly be due to his/her emotional involvement, his/her selective perceptions and memory. In order to overcome these biases, various mechanical instruments are used to obtain more accurate records of events. The use of cameras, tape-recorders, stopwatches, binoculars, audiometer, one-way vision screens, mirrors, etc., allows behaviour to be observed to a degree of accuracy which cannot be achieved by an unaided human observer. It is worthwhile to develop an "observation schedule" like a question-schedule for making and recording observations. The specific behaviours to be observed and recorded should be listed in this schedule.

Uses and Limitations of Observation

Uses

i) Observation provides a direct method for studying various aspects of human behaviour. Indeed, it may be the only effective way to gather data in a particular situations e.g., behaviours of counsellors in actual counselling sessions.

ii) Observation enables the researcher to record behaviour at the time of occurrence.

Limitations

i) A subject may intentionally attempt to exhibit an artificial behaviour when he/she knows that he/she is being observed.

ii) It is time-consuming and costly.

Documents

Documents are records which describe a process of personal/group development, or the occurrence of an event.

The content of the documents/records are normally reviewed in terms of the research problem before they are actually used by the researcher. Since the data comes ready-made as the contents of the document, they do not depend on a specific investigator or research team's accessibility to the field. The data obtained through observation, tests, questionnaires, and interviews are gathered for a specific purpose and are only drawn from universes in space and time where researchers are sent by the formulators of that design. Documents, on the other hand, bring together data of remote periods and places for scientific analysis.

Types of Documents

Documents may be classified into three categories on a continuum. At one end of the continuum are 'expressive documents' specifying the process of social interaction and at the other end are those like court records, official histories, and proceedings of commissions. In between, are newspaper stories, recounting, etc. which rarely yield sufficient details of the interactive process. Another important type of document is journals. In this section, we will discuss different types of documents.

i) Expressive Documents

Expressive documents include the following categories:

a) personal letters; b) life or case histories in the form of diaries, biographies and autobiographies; and c) accounts of small-group processes.

Personal letters

Personal letters constitute the most frequently available type of expressive documents. The value of letters as expressive documents varies with the cultural background of the writers. Nonetheless, the writer communicates freely his/her views and emotions in personal letters.

Life histories/case histories

Life or case histories in the form of diaries, biographies and autobiographies have been used extensively by historians. They have been identified as the "personal documents par excellence" by psychologists. However, they have not been used much in social or psychological research.

Accounts of small-group processes

Accounts of small group processes are a third category of expressive documents. Since such accounts are rarely written spontaneously, they are not of much use in any large investigation.

The data obtained from expressive documents are recorded with the help of 'document schedules'. In order to secure measurable data, the items included in this type of schedule are limited to those that can be uniformly secured from a large number of case histories and other records. For example, for a study of the records of drop-outs among the adult learners enrolled with a particular Adult Education Centre, items such as the age, financial position of the family, academic performance during the period of enrollment are necessary. A scrutiny of a large number of record of the above items can yield significant results.

Uses of Expressive Documents

i) In certain socio-psychological cases, where the researcher needs to understand the "definition of the situation" of a particular group of participants, expressive documents constitute an invaluable source of scientific information.

ii) Expressive documents are useful in giving the researchers a "feel" for the data and thus produce "hunches" with respect to the most fruitful way of conceptualizing a problem.

iii) Expressive documents are useful in not only identifying the significant variables of a problem but also in suggesting the hypotheses embodying these variables and the verification of the hypotheses.

ii) **Official Records**

Official records provide useful information about the time and occurrence of an event in accordance with legal administrative regulations attached to that event. Such data cover a very wide range comprising extensive records of events, namely: births, deaths, marriages, divorces, institutional attendance (school, college, distance education centre etc.), performance in psychological and educational test, crimes, court actions, prison records, registration, voting, social security payments and benefits, illness/hospital data, production/business records, memberships, census data etc. Official records include legislative, judicial, and executive documents prepared by central or state governments, municipalities, panchayats or other local bodies, such as laws, charters, court proceedings and decisions, the data preserved by missionaries and other religious organisations such as financial records and records of the minutes of the meetings of governing bodies; the information complied by central or state educational departments, special commissions, professional organisations, school boards, universities, administrative authorities, reports of committees and commissions, administrative orders, educational surveys, annual reports, budgets, pictorial records viz. photographs, remains or relics and the like.

The official records are useful in knowing and understanding past events and trends so as to gain perspective on the present and future. They aim at determining and presenting truthfully the important facts about life, character and achievements of great personalities. Records are helpful in studying the legal basis of educational institutions, status of tutors, and finances, in understanding the history of ideas, major philosophies and scientific thoughts.

iii) Journals

Information about new ideas and developments often appear in journals long before they appear in books. There are many journals currently being published covering various aspects of social work

In fact, they are the best sources for reports on recent researches in the area of social work. Journals provide updated treatment to current questions and issues in social work. They also publish articles of local interest that never appear in the book form. Journals are the best sources for determining contemporary opinion and status, present or past.

All those engaged in research in the area of social work should become acquainted with research and professional journals in social work. Knowledge about the editor of a periodical, the names of its contributors, and the associations or institutions publishing it serve as clues in judging the merit of the journal. Abstracts are also available which include brief summaries of the articles. They serve as one of the most useful reference guides to the researcher and keep him/her abreast of the work that is being done in his/her own field and other related fields.

Conclusion

In this chapter, we have discussed interviews, observations and documents as tools of research

- An interview is a process of interaction in which the subject (interviewee) provides the needed information verbally in a face-to-face situation. Preparation, conduct and recording are the main steps in an interview. It may be structured or unstructured. A structured interview is one in which the whole situation is carefully structured. It is also designated as directive interview. In an unstructured interview also designated as "non-directive interview", the interviewer does not follow a system or a sequence of predetermined questions.

- Observation refers to technique in which one or more persons observe what is occurring in some real-life situations. It is used to evaluate the overt behaviour of individuals in controlled and uncontrolled situations. As a good research tool, observations need proper planning. Expert execution and adequate recording. Observations may be either participant or non-participant, structured or unstructured.
- Documents are records which provide data to the researcher for scientific analysis. They may be classified into three categories on a continuum. At one end of the continuum are "expressive documents" specifying the process of social interactions and at other end, there are documents (official records) as court records, official histories, etc. yield sufficiently detailed statements about the interactive processes.
- Journals provide information about new ideas and developments much before they appear in books. They publish articles of temporary, local and limited interests that never appear in the book form.

References

Bailey, Kenneth D. *Methods of Social Research*, London: The Free Press, 1978.

Baker, L. Therese . *Doing Social Research,* New York: McGraw Hill, 1988.

Black, James A. and Champion, Dean J. *Methods and Issues in Social Research,* New York: John Wiley, 1976.

Ruben, Allen & Babe E.*Research Methodology for Social Work*, Belmont, California, Wadsworth, 1989.

Festinger. L. and Katz. D. (Eds.) *Research Methods in the Behavioral Sciences,* New York : The Dryden Press, 1953.

Goode. W.J. and Hatt. P.K. *Methods of Social Research,* New York : McGraw Hill, 1952.

Kerlinger. Fred R. *Foundations of Behavioral Research,* Delhi : Surjeet Publications, 1964.

Kidder, Louise H. *Research Methods in Social Relations,* New York: Holt, 1981.

Kothari, L.R. *Research Methodology,* New Delhi: Vishwa Prakashan, 1985.

Lazarsfeld, Paul. "Problems in Methodology" in Robert K. Merton (ed), *Sociology Today*, New York : Basic Books, 1959

Monette, Duane R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Moser. C.A. and Kalton. G. *Survey Methods in Social Investigation,* London : Heinemann Educational Books, 1975.

Nachmias D and Nachmias C. *Research Methods in the Social Sciences*, New York: St. Martins press, 1981.

Oppenheim, N.A. *Questionnaire Design and Attitude Measurement*, New York: Basic Books, p. 55, 1966.

Sellitz. G. et. al. *Research Methods in Social Relations,* New York: Holt. Rinehart and Winston (3rd edition), 1973.

Stouffer. S.A. *Social Research to Test ideas,* New York: Free Press of Glencoe, 1962.

Thurstone, L.L. "Attitudes Can Be Measured," *American Journal of Sociology,* 33 (January 1928):

Wilkinson, T.S. and Bhandarkar, P.L. *Methodology and Techniques of Social Research*: Bombay: Himalayan, 1977.

Young. P.V. *Scientific Social Surveys and Research,* Englewood Cliff. N.J. Prentice Hall (4th edition), 1953.

12

Data Collection

Introduction

To carry out a research study, you have to collect the relevant data so that the hypotheses or generalisations you hold tentatively can be verified. This involves selection of samples from the concerned population. In previous chapters, we discussed the concepts of population and sample, various sampling techniques alongwith different data gathering tools and techniques varying in their complexity, design and ways of administration. Each tool or technique is appropriate for collecting a particular type of data or information, which lends itself to a particular type of analysis and interpretation for drawing meaningful conclusions and generalisations. In this chapter, we shall focus on various methods used for collection of data.

The Concept of Data

The information collected from various sources through the use of different tools and techniques generally comprise numerical figures, ratings, descriptive narrations, responses to open-ended questions, field notes, etc. This information is called data. Usually, data are categorised as Quantitative and Qualitative data.

1) Quantitative Data

Quantitative data are obtained by applying various scales of measurement. The experiences of people are collected in a way to fit into standard responses to which numerical values are attached. These data are close-ended and hardly provide any depth or details. Quantitative data are either parametric or non-parametric. Parametric data undergo interval or ratio scale measurement. For example, in measuring reaction time, we make use of ratio scale measurement. The score on a psychological test or inventory is an illustration of interval scale measurement. Non-parametric data are obtained by applying nominal or ordinal scales of measurement. These data are either counted or ranked.

2) **Qualitative Data**

Qualitative data are verbal or symbolic. The detailed descriptions of observed behaviours, people, situations and events, are some examples of qualitative data. For example, the responses to open-ended questions of a questionnaire or a schedule, first hand information from people about their experiences, ideas, beliefs, and selected content or excerpts from documents, case histories, personal diaries and letters are other examples of qualitative data.

Methods of Data Collection

As discussed earlier, there are mainly three methods of obtaining data: (i) one can ask questions; (ii) one can observe the behaviour of persons, groups or organisations, and their products or outcomes or (iii) one can utilise existing records or data already gathered for purposes other than one's research. In all the researcher needs to familiarise himself/herself with the procedures he/she is to adopt for collecting data from *sample, groups* or *records*.

Asking Questions

In the first method, the researcher may use psychological tests, inventories, questionnaires, or schedules. In chapter 10 you have learnt that tests are useful tools of research. They are devised to evaluate and measure behaviour in a standardized way for the purpose of providing data for most experimental and descriptive studies. Tests and inventories yield objective and standardized descriptions of behaviour, quantified in numerical scores. Under ideal situations, intelligence, aptitude or achievement tests measure the best performance of which individuals are capable. The inventories attempt to measure typical behaviour. In experimental studies, a researcher may use test scores to equate the experimental and control groups, to describe relative skill at this task prior to the application of the teaching methods, to assess gains in achievement resulting from the application of the experimental and control teaching methods, and to evaluate the relative effectiveness of teaching methods. Tests and inventories are frequently used to describe prevailing conditions at a particular time in descriptive research studies. For example, achievement tests are used extensively in school surveys in the appraisal of instruction.

In selecting tests or inventories for collecting data in research situations, a researcher must evaluate their validity, reliability and usability. The information about these criteria are available in their accompanying manuals. The researcher should carefully examine the standardized data of the tests/inventories contained in their manuals and extensive analysis of published evaluations of the instruments. It makes the researcher aware about their usefulness and limitations in different test situations.

Ease of administration, scoring, and interpretation, are important factors in selecting a test or inventory. The tests or inventories which are easily and effectively administered, scored, and interpreted should generally be used.

The procedure given in the manual for administering a test or an inventory should be strictly followed to collect dependable data. The cooperation of the subjects must be ensured at each stage of data collection. The subjects should be encouraged to provide objective information The responses of the subjects should be independent of the personal judgement/view of the researcher who is using the test or inventory. The testing conditions should be made interesting and encouranging so as to gain the cooperation of the subjects.

Questionnaires and interview schedules are the other tools of research through which information is sought. The reliability and validity of the data gathered through questionnaires or interview schedules depends not only on their design but also on the manner of administering the questionnaire or the technique of interviewing. The questionnaire is generally sent through mail to the subjects for answering without any further assistance from the researcher. The schedule, on the other hand, is generally filled out by the researcher who can interpret, explain and expand upon the questions whenever necessary. In certain situations when the researcher administers the questionnaire personally it creates an opportunity to establish rapport with the subjects, explain them the purpose of the study, and the meaning of items that may not be clear. The availability of a number of subjects in one place helps in exercising economy of time and expense and provides a high proportion of usable responses. However, subjects who have the desired information cannot always be contacted personally without spending a great deal of time and money in travel. It is in such situations that mailed questionnaires are useful.

The researcher should choose the respondents carefully before administering the questionnaire. It is important that questionnaires be sent only to those who possess the desired information and are interested to respond conscientiously and objectively. It is advisable to send a preliminary letter to respondents individually asking whether the individual would be willing to participate in the proposed study. This is not only a courteous approach but also a practical way of identifying those who will willingly cooperate in furnishing the desired information. The researcher should also consider the possibility of providing for anonymous responses if the desired information is delicate or of confidential nature. This approach is helpful in producing objective and honest responses.

Observation of Behaviour

Direct observation of the behaviour of persons, groups or organisations provides reliable and conceptually meaningful data in field studies as well as in laboratory experimentation. You have already learnt that observation is the technique in which one or more persons observe what is occurring in some real-life situation. This technique, like other research tools and techniques needs proper planning, expert execution, and adequate recording and interpretation. Observation is always directed towards a specific goal. It is neither haphazard nor unplanned. The planning for observation includes definition of specific activities or units of behaviour to be observed, the nature of the groups of subjects to be observed, determination of the length of each observation and recording. Effective execution of observation ensures proper arrangement of specific conditions for the subject or subjects to be observed, objective and effective use of recording tools, and interpretation of observation data. Observation may be either participant or non-participant in structured or unstructured situations. Structured observations are executed in controlled situations like classroom or laboratory settings. Unstructured observations are mainly associated with participant observation and it is often an exploratory technique. The recording of the observation data may either be simultaneous or soon after the observation. In the former case, the observer goes on recording his/her observation along with the occurrence of the phenomena observed. In the latter case, the observer undertakes to record his/her observations not simultaneously with the actual observation process, but immediately after he/she has observed for a unit of time while the details are still fresh in the mind. As discussed earlier in chapter 11, an observation schedule is developed and used for recording and taking notes about the observed behaviours. The specific behaviours to be observed and recorded are listed in this schedule.

Observation is done either directly, as when the observer plays a passive role and observes without intervening in any way or in an interview, where the observer plays a more active role, by asking a series of questions or administering a test, and where he/she observes the behaviour of the subject (interviewee) as well as records his/her responses.

Utilisation of Existing Records or Data

In chapter 11, you read that when the researcher uses the method of observation, either participantly or in a non-participant manner, he/she focuses on those aspects of the behaviour of an individual or individuals which are of interest to him. If he/she uses tests or questionnaires, he/she chooses or frames the tool to suit his/her research needs. He/she uses interviews if he/she needs information on matters of confidential or personal nature. In using these tools, the researcher controls or manipulates the situation according to his/her research objectives. In contrast, the existing data or records/documents bring to the researcher's notice, certain data over which he/she has relatively little control. These come to the researcher readymade. Some other person, either a participant in a social situation or process, the originator of a system of recording, or the creator of an index, has already determined the form of the data. The data obtained through observation, through tests and questionnaires, and through interviews are gathered for a specific purpose. Documents and records, on the other hand, may bring together data for scientific analysis from remote periods and places. These data provide unique access to historical and social situations too, which are otherwise difficult or expensive to observe. Personal letters, life histories, diaries, autobiographies, court records, proceedings of commissions, seminars and conferences, newspaper stories, registration and census records/information pertaining to births, deaths, marriages, divorces, school attendance, drop-out rate, performance on psychological tests, crimes known to police, arrests, court actions, prison records, voting pattern in the parliament and assembly election, automobile registrations, enrolment of distance learners in different study or regional centers etc., are examples of documents and records.

Ensuring the Quality of Data

The adequacy of tool or technique for collection of data is ordinarily judged in terms of the criteria of reliability (consistency), validity and usability. Reliability requires that repeated measurements yield results which are identical or fall within narrow and predictable limits of variability. The criterion of validity demands that measurement be meaningfully related to the research objectives, that is, it should measure what it purports to measure. The requirements of usability ensure objectivity in the use of a tool or technique and economy of time and cost in field situations. A good tool and its objective use in the collection of data ensures quality.

Psychological tests or inventories are likely to gain the cooperation of subjects and conserve the time of all those involved in their administration provided they are administered in a short period of time. The active cooperation of the subjects is likely to enhance the quality of the data. Hence, the researcher should take utmost care in selecting a reliable and valid test from the available standardized tests. These tests are easily and effectively administered, scored and interpreted by the researcher. They should also be interesting and enjoyable for the subjects so as to ensure genuine data. Boring tests that discourage or antagonise the subjects should not be used for collecting quality data. The testing conditions should be favourable; otherwise, the test is not likely to yield useful and quality data.

The collection of data by means of questionnaires or interview schedules is a highly complicated and technical job which demands considerable effort on the part of the researcher. Much of the quality of the data obtained depends on the skill with which the tools are administered.

Now, we shall discuss some guiding principles which a researcher should consider while using questionnaires or schedules.

The researcher should choose the subjects carefully. It is important to know that only those subjects should be selected who possess the desired information and are likely to be keen to respond conscientiously and objectively. A questionnaire or a schedule, unlike a psychological test or inventory, has a very limited purpose. Hence, the question of validity and reliability of these tools is not dealt with as seriously as in the case of psychological tests or inventories. However, the validity of data gathered through questionnaires or schedules is improved considerably by making the language of the questions less ambiguous. The meaning of all the terms used in the questionnaire/ schedule must be clearly defined so that they carry the same meaning for all respondents. The predictive validity of some specific types of questions can also be estimated by follow-up observations of respondent behaviour. The reliability of the responses to the questions can be inferred by a second administration of the tool and comparing the responses with those of the first.

One major problem in interviewing could be due to the inability or unwillingness of the respondent to communicate. His/her involvement in the data in terms of his/her responses and the likelihood of any bias should be looked into carefully by the researcher. It needs to be ensured that the respondent does not withhold or distort facts while communicating them to the researcher. Hence, it is advisable to use other means of data collection to cross-validate the information obtained through a questionnaire or schedule.

Memory bias is another factor that affects the quality of data obtained through interviews. To overcome this problem it is suggested that the research design be carried out over a period of time, applying appropriate tools at reasonable intervals as indicated by the research objectives.

We have already discussed that an interview is a highly flexible tool, provided it is conducted by a skilful researcher. It allows a more liberal atmosphere than in the case of other tools of research. Questions not readily grasped by interviewees should be rephrased, or repeated with proper emphasis and explanations wherever necessary. This is quite useful for handling contradictory statements made by the respondents. It also ensures the quality and consistency of responses. However, questions which are generally vague or obscure should be avoided so as to permit precise answers from the respondents. Sometimes, misunderstandings occur when questions involve usage of technical terms or unfamiliar expressions. Inadequate responses are secured if too many choices are offered during the interview.

For enhancing satisfactory face-to-face relationship between the researcher (interviewer) and the respondent (interviewee), the former should be properly introduced to the latter. General letter of introduction is of little value. The introduction should be personal. The interviewer also needs to chose a 'suitable' time and place for conducting the interview. The most suitable place would be one where it is believed that the interviewee will be utmost ease. Politeness on the part of the interviewer is essential for gaining the confidence of the interviewee. It is helpful in gathering reliable and quality responses from the interviewees. In the initial meeting, after friendly greetings are exchanged, the interviewer should explain the purpose of interview to the interviewee. It should be stated in terms that can be understood by the interviewees easily. There will be no difficulty in getting frank and sincere responses from the interviewees if they are confident that the interviewer has no ulterior motives but seeks information only for scientific/research purpose.

Patience and perseverance are two important traits of a good interviewer. Listening to responses of an interviewee, especially in unstructured situations, is hard work. It requires self-restraint, self-discipline, patience and humility. Ability to listen with understanding, respect, and curiosity is the gateway to meaningful communication. An interviewee is likely to provide truthful data if he/she feels that he/she will not meet with interruption, denial, contradictions, and other harassments from the interviewer. He/She is motivated to communicate when the atmosphere is congenial and permissive. However, mere listening is not sufficient. A quiet listener (interviewer) must at the same time be an analytical researcher. Hence, the questions must not only be precise and wisely formulated, but must also be phrased in such a way that they display concern for the interviewee's problems. Some questions are necessary and often unavoidable in a long interview. At times, the interview 'runs dry' and needs restimulation. The description of some incidents lacks clarity or completeness. Hence, it is essential for an interviewer to clarify the doubts, if any, to an interviewee so that the accurate information is made available.

Blunt questions must be avoided as they cause antagonism and withdrawal. Indirect questions are helpful in seeking co-operation of the interviewees. Direct questions satisfy only the interviewer and the data or information collected through such questions gives rise to unrelated facts or incidents. These data are useless for scientific purposes.

As a data-gathering device, observation also makes an important contribution to descriptive research. A number of devices like check-lists, schedules, rating scales, and score cards are used for collecting and recording observations. Quality of these data mostly depends on the application and use of these devices. The observer should constantly keep in mind that it is easy to become attracted by conspicuous, dramatic and interesting events/ situations. However, the researcher should safeguard himself/herself against merely observing unique and striking events which have hardly any relationship with actual reality. The validity and the reliability of measurements are improved when observations are not hurried and are made at frequent intervals by the same observer, or when several observers record their observations independently. An observer must try to minimise the error of 'halo-effect' when using a rating scale or a score card. The tendency to rate someone with a pleasing personality high on other traits such as intelligence or professional interest should be curbed. The halo effect is likely to increase when the observer is asked to rate too many factors or traits, he/she is not trained to judge. Hence, it is advisable to allow only a small number of traits for rating while making observations.

The quality and veracity of data depends greatly on the selection of the tools and their judicious use by researchers. It requires careful calibration of the individuals involved in data collection and also their orientation for the development of skills in the use of various research tools and techniques.

For the identification of data from various documents and records, the researcher must learn to read them with understanding and insight as a basis for being able to interpret the past, which in turn may help in interpreting present trends and possibly in predicting future events. For this the researcher needs to subject the documents/ records to rigorous evaluation. It will involve the dual processes of establishing the authenticity of the source and validity of its contents. This evaluation is called 'criticism' of information/data provided by the document/ records. The process of establishing authenticity of the data is termed as 'external criticism' and that of establishing the validity of their content is termed as internal criticism. External criticism checks the genuineness and authenticity of the source material. For this, the researcher has to determine whether it is what it appears or claims to be and whether it matches with the original so as to save himself/herself from being the victim of a fraud. Through internal criticism the researcher established the validity, credibility and merit of the contents of the document.

Key Points At A Glance

1) Data are information collected from various sources by using different tools and techniques.

2) Data are either quantitative or qualitative
3) Parametric data are measured on interval or ratio scales whereas non-parametric data are obtained by applying nominal or ordinal scales of measurement.
4) Qualitative data are verbal and symbolic.
5) The three methods of obtaining data in research are: (i) one can ask people questions, (ii) one can observe the behaviour of persons, groups, or organisations, and their products or outcomes and, (iii) one can utilise existing records or data already gathered for purposes other than one's research.
6) In asking people questions, the researcher may use psychological tests, inventories, questionnaires or schedules.
7) Interview schedules provide an opportunity to the researcher to establish rapport with the subjects (interviewees), explain them the purpose of the study and the meaning of the items that may not be clear to them.
8) Observation schedules, rating scales, score cards and check-lists are used for recording data collected through observations.
9) Existing records and documents include personal letters, life histories, diaries, autobiographies, court records, proceedings of commissions, seminars and conferences, newspaper stories, registration and census records etc.
10) Past records and documents provide data for scientific analysis of remote period and place. These data are in a form over which the researcher has little control.
11) A valid, reliable and usable tool ensures quality data.
12) The quality of the obtained data depends on the skill with which the tools are used and administered.

13) The validity of the data gathered through questionnaires or schedules improves considerably by making the language of the questions unambiguous.
14) The reliability of the responses to the questions can be inferred by a second administration of the tool and then comparing the questions with those of the first.
15) The quality of data obtained through interviews mostly depends on the skillful handling of situations by the interviewer. It requires a lot of patience and perseverance on the part of the interviewer.
16) A good interview requires self-restraint, self-discipline, patience and humility.
17) Critical appraisal of the documents helps in establishing the authenticity and veracity of data/documents/records.

Conclusion

In this chapter we elaborated on the concept of data, methods of data collection and the precautions which are needed for ensuring quality data.

1) The information collected from various sources with the help of different tools and techniques generally comprises figures, ratings, descriptive narrations, responses to open-ended questions, field notes, life-histories, proceedings of seminars, conferences, etc. All these are called data.
2) Data are either quantitative or qualitative. Quantitative data are parametric or non-parametric.
3) Parametric data are measured by interval or ratio scales. Non-parametric data are obtained by applying nominal or ordinal scales of measurement. These data are either counted or ranked.

4) Qualitative data are verbal or symbolic materials. The detailed descriptions of observed behaviours, people, situations and events, are some examples of qualitative data.

5) There are three methods of obtaining data in research: (i) one can ask questions by using psychological tests, inventories, questionnaires or schedules, and interviews, (ii) one can observe the behaviour of persons, groups or organizations, and their products or outcomes by using participant or non-participant observation, and (iii) one can utilise existing records or documents like personal letters, life histories, autobiographies, school records, performances or psychological or academic tests, etc.

6) The quality of the data obtained with the help of various tools depends upon their reliability, validity and objectivity in using them.

7) The validity and reliability of the data gathered through questionnaires and schedules are ensured by making the language of questions unambiguous, and also by selecting respondents who possess desired information and are likely to be keen to respond conscientiously and objectively.

8) A good quality data through interviews can be obtained through the willing co-operation of the interviewees.

9) Patience and perseverance, self-restraint and self-discipline, and listening with understanding are important traits of a good interviewer. These traits motivate an interviewee to disclose all the required information with ease and confidence.

10) Checklists, rating scales, score cards and observation schedules are the tools that are used for collecting and recording observations. The quality of these data mostly depends on the application and the objective

use of tools. A good observation is not hurried. It is made at frequent intervals by the same observer or by several observers independently at a given time.

References

Bailey, Kenneth D. *Methods of Social Research*, London: The Free Press, 1978.

Baker, L. Therese . *Doing Social Research,* New York: McGraw Hill, 1988.

Black, James A. and Champion, Dean J. *Methods and Issues in Social Research,* New York: John Wiley, 1976.

Ruben, Allen & Babe E.*Research Methodology for Social Work*, Belmont, California, Wadsworth, 1989.

Festinger. L. and Katz. D. (Eds.) *Research Methods in the Behavioral Sciences,* New York : The Dryden Press, 1953.

Goode. W.J. and Hatt. P.K. *Methods of Social Research,* New York : McGraw Hill, 1952.

Kerlinger. Fred R. *Foundations of Behavioral Research,* Delhi : Surjeet Publications, 1964.

Kidder, Louise H. *Research Methods in Social Relations,* New York: Holt, 1981.

Kothari, L.R. *Research Methodology,* New Delhi: Vishwa Prakashan, 1985.

Lazarsfeld, Paul. “Problems in Methodology” in Robert K. Merton (ed), *Sociology Today*, New York : Basic Books, 1959

Monette, Duane R. et. al. *Applied Social Research: Tool For* *the Human Services,* Chicago: Holt, 1986.

Moser. C.A. and Kalton. G. *Survey Methods in Social Investigation,* London : Heinemann Educational Books, 1975.

Nachmias D and Nachmias C. *Research Methods in the Social Sciences*, New York: St. Martins press, 1981.

Oppenheim, N.A. *Questionnaire Design and Attitude Measurement*, New York: Basic Books, p. 55, 1966.

Sellitz. G. et. al. *Research Methods in Social Relations,* New York: Holt. Rinehart and Winston (3rd edition), 1973.

Stouffer. S.A. *Social Research to Test ideas,* New York: Free Press of Glencoe, 1962.

Thurstone, L.L. “Attitudes Can Be Measured,” American Journal of Sociology, 33 (January 1928):

Wilkinson, T.S. and Bhandarkar, P.L. *Methodology and Techniques of Social Research*: Bombay: Himalayan, 1977.

Young. P.V.*Scientific Social Surveys and Research, Englewood* Cliff. N.J. Prentice Hall (4th edition), 1953.

13

Data Processing and Analysis

Introduction

In this chapter, we discussed about methods and tools of data collection. Once data are collected the researcher turns his focus of attention on its processing. In this chapter, we will discuss about one of the most important stages of the research process, i.e. data- processing and analysis.

Processing of Quantitative Data

Introduction

Once data are collected, the researcher turns his/her focus of attention on its processing. A researcher has to make his/her plan for each and every stage of the research process. As such, a good researcher makes a perfect plan of processing and analysis of data. To some researchers data processing and analysis is not a very serious activity. They feel many a time that data processing is a job of a computer assistant. As a consequence, they remain contented with the results given by computer assistant which may not help them to achieve their objectives. To avoid such situations, it is essential that data processing is planned in advance and assistant instructed accordingly. In this chapter, we will discuss about data processing and data analysis.

Data processing refers to certain operations such as editing, coding, computing of the scores, preparation of master charts, etc.

Editing of Data

After collection of filled-in questionnaires/interview schedules, editing of entries therein are not only necessary but also useful in making subsequent steps simpler. Many a time, a researcher or the assistant either misses entries in the questionnaires or enters responses, which are not legible. This sort of discrepancies can be resolved by editing the schedule meticulously. Another problem comes up at the time of tabulation of data when researcher asks for tabulation of responses from consecutive questions. In cases where data are not edited there is bound to be inconsistency in the tabulation, the researcher has to be very particular about, consecutive questions where category 'not applicable' exists. In the process of editing, the researcher has to be very careful about consecutive questions having 'not applicable' as a response.

Coding of Data

Coding of data involves assigning of number to each response of the question. The purpose of giving numbers is to translate raw data into numerical data, which may be counted and tabulated. The task of researcher is to give numbers to responses carefully. The coding scheme will vary according to the type of questions. For example, a close- ended question may be already coded and hence it has to be just included in the code book whereas coding of open-ended questions involves operations such as classification of major responses and developing a response category of 'others' for responses which were not given frequently. The classification of responses is primarily based on similarities or differences among the responses.

Usually, in the case of open-ended questions, to classify responses, researcher looks for major characteristics of the responses and puts them accordingly. In case of attitude scales, researcher has to keep in mind, the direction or weightage of responses. For example, a response 'strongly agree' is coded as 'five'. The subsequent codes would be in order. Therefore, if there are responses like 'agree', 'undecided', 'disagree' and 'strongly disagree' they have to be coded as four, three, two, and one. Alternatively, if strongly agree is coded as minus two, the subsequent responses would be coded as minus one, zero, +1 and +4. The matrix questions have to be coded taking into consideration each cell as one variable. For example, if the column of matrix represents employment status, namely, 'permanent' and 'temporary' and row represents employers or type of employer, namely, government and private, the first cell would represent a variable 'government- permanent'. The second cell would represent 'government-temporary' and so on. In order to demonstrate the points discussed above a section of a code book used in a study is reproduced in Table given below.

Table : Code Book

Q.No.	**Variable No.**	**Information Sought**	**Responses**	**Code**
2	V1	Age	Actual	-
3	V2	Designation	Worker Supervisor Manager	1 2 3
4	V3	Establishment	Public Private	1 2
5	V4	Level of Education	Graduate Intermediate High School Middle School Primary Illiterate Other	1 2 3 4 5 6 7

6	V5	Marital Status	Married Unmarried Widow Divorce	1 2 3 4
36	V35	Nature of work	Yes No	1 2
	V36	Duration of work	Yes No	1 2
	V37	Wages	Yes No	1 2
	V38	Promotion	Yes No	1 2
43	V42	Attitude of Employer Preference for male employees	Agree Undecided Disagree	1 2 3

Preparing A Master Chart

After a code book is prepared, the data can be transferred either to a master chart or directly to computer through a statistical package. Going through master chart to computer is much more advantageous than entering data directly to computers because one can check the wrong entries in the computer by comparing 'data listing' as a computer output and master chart. Entering data directly to computer is disadvantageous, as there is no way to check wrong entries, which will show inconsistencies in tabulated data at the later stages of tabulation. A sample of master chart prepared in accordance with the code book is presented in Table given.

Table : Master Chart

Respondent Number	Variable Lables									
	Age	**Designation**	**Establishment**	**Level of Education**	**Marital Status**	**Nature of Work**	**Duration of Work**	**Wages**	**Promotions**	**Attitude of Employer**
					Variable Number					
	V1	**V2**	**V3**	**V4**	**V5**	**V6**	**V7**	**V8**	**V9**	**V10**
1	23	3	4	2	2	3	4	1220	3	4
2	28	2	3	4	1	5	5	1547	3	3
3	23	4	4	4	2	1	4	1922	1	3
4	28	1	3	3	1	2	5	1847	2	5
5	23	3	4	2	2	1	7	2922	1	1
6	24	3	1	1	3	1	1	1220	1	1
7	22	3	1	1	3	1	2	1547	1	1
8	24	2	1	1	3	1	2	1922	2	1
9	45	2	2	1	3	1	2	1847	2	2
10	35	3	1	2	2	2	1	2922	3	3
11	36	1	2	2	2	3	2	1847	4	4
12	34	2	3	1	1	2	3	2922	4	3
13	35	2	4	2	2	2	4	1220	3	2
14	46	1	3	3	1	1	4	1547	3	1
15	45	2	3	3	1	2	5	1922	2	1
16	23	1	4	3	2	3	5	1847	1	1

Analysis of Quantitative Data

The purpose of data analysis is to prepare data as a model where relationships between the variables can be studied. Analysis of data is made with reference to the objectives of the study and research questions if any. It is also designed to test the hypothesis. Analysis of data involves re-categorisation of variables, tabulation, explanation and casual inferences.

The first step in data analysis is a critical examination of the processed data in the form of frequency distribution. This analysis is made with a view to draw meaningful and precise inferences and generalizations.

The process of categorization in accordance with the objectives and hypothesis of the study is arrived at with the help of frequency distributions. Re-categorisation is a process to arrange categories with the help of statistical techniques. This helps researcher to justify the tabulation. We have seen earlier that the responses to a statement may be assigned scores or weightage. These scores or weightage are summated and re-categorised on the bases of high, medium and low. The basic principle in the process of categorisation or re-categorisation is that the categories thus obtained must be exhaustive and mutually exclusive. In other words, the categories have to be independent and not overlapping.

Re-categorization

In data processing, we have discussed about classification of responses very similar to the process of classification in categorization and re-categorization. The process of categorization in accordance with the objectives and hypotheses of the study is arrived at with the help of frequency distributions. Re-categorization is a process to arrange categories with the help of statistical techniques.

This helps researcher to justify the tabulation. We have seen earlier that the responses to a statement may be assigned scores or weight age. These scores or weight age are summated and re-categorized as high, medium and low. The basic principle in the process of categorization or re-categorization is that the categories thus obtained must be exhaustive and mutually exclusive. In other words the categories have to be independent and not overlapping.

Tabulation

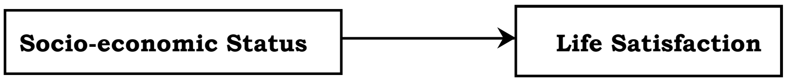
Tabulation is a process of presenting data in a compact form in such a way as to facilitate comparisons and show the involved relations. In other words, it is an arrangement of data in rows and columns. This also helps the researcher to perform statistical operation on the data to draw inferences. Tabulation can be generally in the form of uni-variate, bi-variate, tri or multi-variate Tables. Accordingly, analysis proceeds in the form of uni-variate analysis, bi-variate analysis and tri or multi-variate analysis.

Setting Up the Analytic Model

Before we begin the analysis of data we have to look once again at the objectives of our research study and set up analytic models. These models are diagrammatic presentation of variables and their interrelationships.

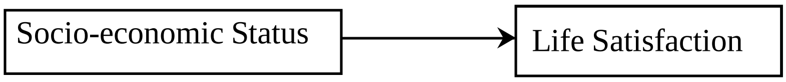
Let us hypothesise that "Life Satisfaction is likely to be associated with Socio-economic Status of elderly".

The two variables in the hypothesis are "Life Satisfaction " and the "Socio-economic Status". The relation between the two variables can be diagrammatically presented as follows:

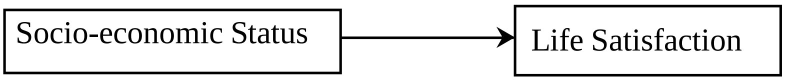


Further it is hypothesised that the bi-variate relationships between the variables are affected by another variable "social support ". Let us suppose that "social support" has been categorised into three , namely , high , medium and low. This can be described as follows :

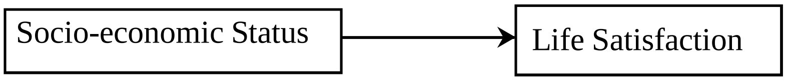
Social Support: High



Social Support: Medium



Social Support Low



With the analytic model described above the researcher can proceed to analyse the data as discussed in the following sections :

Univariate Analysis

Univariate analysis refers to tables, which give data relating to one variable. Univariate tables which are more commonly known as frequency distribution tables show how frequently an item is repeated. Examples of frequency tables are given below. The distribution may be symmetrical or asymmetrical. The characteristics of the sample while examining the percentages, further properties of a distribution can be found out by various measures of central tendencies. However, researcher is required to decide which is most suited for this analysis. To know how much is the variation, the researcher has to calculate measures of dispersion. (The details about all these measures are given in chapter 10.)

Usually, frequency distribution tables are prepared to examine each of the independent and dependent variables. Tables given below present two independent variables and one dependent variable.

Table : Socio-Economic Status of Elderly
(Independent Variable)

Socio-economic Status	**Distribution of Respondents**	
	Frequencies	**Percentage**
High	110	39.3
Medium	106	37.9
Low	64	21.8
Total	280	100.0

Table : Social Support
(Independent Variable)

Social Support	**Distribution of Respondents**	
	Frequencies	**Percentage**
High	142	57.7
Medium	86	30.7
Low	52	14.6
Total	280	100.0

Table : Life Satisfaction of Elderly
(Dependent Variable)

Life Satisfaction	Distribution of Respondents	
	Frequencies	Percentage
High	78	27.9
Medium	134	47.9
Low	68	24.2
Total	280	100.0

A frequency distribution of a single variable is the frequency of observation in each category of a variable. For example, an examination of the pattern of response to variable 'socio-economic status' in Table would provide a description of the number of respondents who belong to 'high', 'medium' and 'low' socio-economic status. Let us consider the frequency distribution (Tables on previous page) which describes the 'socio-economic status', 'social support' and 'life satisfaction' of respondents. The tables have four rows, the first three being the categories of variables, which appear in the left-hand columns and the right hand columns show the number of observation in each category. The last rows are the totals of all frequencies appearing in tables. To analyse the data it is necessary to convert the frequencies into percentages that can be interpreted meaningfully. Note, for instance, while distribution of respondents by 'social support' displayed in Table clearly shows the predominance of respondents who had 'high social support' whereas, distribution of respondents by 'life satisfaction ' in Table given above indicates that the proportions of respondents with 'high' and 'low' 'life satisfaction' are almost equal.

Bivariate Analysis

As a researcher you might be might be interested in knowing the relationships between the variables. To know the relationship between the variables, the data pertaining to the variables are cross-tabulated. Hence, a bivariate table is also known as cross table. A bivariate table presents data of two variables with column percentages or row percentages. An example of a bivariate table is given below:

Table : Levels of Socio-economic Status and Life Satisfaction of the Respondents

Socio-economic	Life satisfaction			Total
	High	**Medium**	**Low**	
High	94 (66.2)	9 (10.5)	7 (13.5)	110 (39.3)
Medium	37 (26.1)	58 (67.4)	11 (21.2)	106 (37.9)
Low	11 (7.7)	19 (22.1)	34 (65.3)	64 (22.8)
Total	142 (100.0)	86 (100.0)	52 (100.0)	280 (100.0)

The table presents data with regard to two variables namely 'socio-economic status' and the level of 'life satisfaction'. First row presents data with regard to respondents who were from high Socio-economic Status. The second row presents data about who were from medium socio-economic status . Similarly, the first column gives data pertaining to respondents who preferred high life satisfaction. The second column presents data of respondents who preferred medium life satisfaction and the last column represents the respondents who preferred low life satisfaction. For example, the first cell (in the left-hand corner) represents 94 respondents who were from high Socio-economic Status and high life satisfaction.

The association between two variables can be explained either by comparing the percentages of respondents column wise or row wise. The relationship between the variables can also be examined by various statistical techniques (The details about all these measures are given in chapter 10.) depending upon the level of measurement of the data. Apparently, the two variables are associated therefore with more people who were from high socio-economic status had high life satisfaction than who were from other socio-economic status.

Trivariate Analysis

Sometimes researcher might be interested in knowing whether there is a third variable which is affecting the relationships between two variables. In such cases the researcher has to examine the bivariate relationship by controlling the effects of third/variable**.** This is performed in two ways. One way of controlling the effects of a third/ variable is to prepare partial tables and examine the bivairate relationship, and the second method of assessing the effects of a third/variable is to compare the co-efficient of partial correlations. Let us take an example. In the above table, if researcher wants to examine whether there is effect of 'social supports' on the bivariate relationship he may prepare three partial tables giving data relating to socio-economic status and life satisfaction for high, medium and low 'social supports'.

Table : Levels of Socio-economic Status and Life Satisfaction of the Respondents

Social Support = High (N = 142)				
Socio-economic Status	**Life satisfaction**			**Total**
	High	**Medium**	**Low**	
High	7 (21.9)	10 (21.8)	3 (9.3)	20
Medium	13 (40.6)	26 (33.3)	9 (28.1)	48
Low	12 (37.5)	42 (53.8)	20 (62.5)	74
Total	32	78	32	142

Table : Levels of Socio-economic Status and Life Satisfaction of the Respondents

Social Support = Medium(N = 86)

Socio-economic Status	**Life satisfaction**			**Total**
	High	**Medium**	**Low**	
High	**8** **(36.4)**	**11** **(25.6)**	**4** **(19.0)**	**23**
Medium	**9** **(40.9)**	**17** **(39.5)**	**8** **(38.1)**	**34**
Low	**5** **(34.9)**	**15** **(34.9)**	**9** **(42.9)**	**29**
Total	**22**	**43**	**21**	**86**

Table : Levels of Socio-economic Status and Life Satisfaction of the Respondents

Social Support = Low (N = 52)

Socio-economic Status	**Life satisfaction**			**Total**
	High	**Medium**	**Low**	
High	**14 (58.3)**	**7 (53.8)**	**7 (46.7)**	**28**
Medium	**8 (33.3)**	**4 (30.8)**	**6 (40.0)**	**18**
Low	**2 (8.3)**	**2 (15.4)**	**2 (13.3)**	**6**
Total	**24**	**13**	**15**	**52**

On examination of these three partial tables, if the researcher finds out that bivariate relationships do not hold good he/she may infer that it is the third variable, social supports which is affecting the bivariate relationship. In the partial tables for higher social support , the proportion of people perceiving high life satisfaction are those who are having high socio economic status. The similar trend can be noticed in the remaining two partial tables. This means that social support does not affect the bivariate relationships between socio economic status and life satisfaction.

In the other method, the researcher tries to find out the effect of third variable on the bivariate relationship with the help of partial correlation. To find out whether the third variable affects the bivariate relationship between socio economic status (X) and life satisfaction (Y), he/she considers social support of respondents.

To examine this, he/she calculates the correlation coefficients between the ‘socio economic status’ and ‘life satisfaction’ keeping ‘social support’ as a constant. The results are presented below.

X_1 = socio-economic status (independent variable)

X_2 = life satisfaction’ (dependent variable)

X_3 = social support (control variable)

$\bullet_{1.2}$ (Correlation coefficient between X_1 and X_2) = .70

$\bullet_{1.3}$ (Correlation coefficient between X_1 and X_3) = .40

$\bullet_{2.3}$ (Correlation coefficient between X_2 and X_3) = .50

The researcher on examination of the results of the partial correlation finds that even after controlling the third variable, the relation between the first two variables socio-economic status and life satisfaction is statistically significant. Thus, he/she concludes that the relationship between socio-economic status and life satisfaction is not spurious.

Multivariate Analysis

When a researcher is interested in assessing the joint effect of three or more variables he/she uses the techniques of multivariate analysis. The most common statistical technique used for multivariate analysis is regression analysis (For this statistical technique reader is advised to refer books listed in For Further Reading at the end of this Unit). In the first step of multivariable analysis, the researcher has to obtain the correlation between the variables which are having statistically significant correlation. These variables are put in the regression analysis. One important point in applying correlation and regression analysis is the data must be measured on ratio or interval level. Another point a researcher has to keep in mind is that these two statistical techniques are based on certain assumptions. Hence, before applying these techniques, the researcher has to see whether the sample selected by him fulfills those conditions.

Conclusion

In this chapter, we discussed various stages of processing and analysis of quantitative data. The main points are as follows:

1) Data processing refers to certain operations such as editing, coding, computing of the scores, preparation of master charts, etc.
2) Many a time, a researcher or the assistants either miss entries in the questionnaires or enter responses, which are not legible. This sort of discrepancies can be resolved by editing the questionnaires.
3) Coding of data involves assigning of numbers to each response of the question. The purpose of giving numbers is to translate raw data into numerical data, which may be counted and tabulated.
4) With the help of a codebook the data can be transferred to a master chart.
5) Tabulation is a process of presenting data in rows and columns in such a way as to facilitate comparisons and show the involved relations.
6) Keeping in view the objectives of research study we set up analytic models which diagrammatically present variables and their interrelationships.
7) Univariate analysis refers to tables, which give data relating to one variable.
8) A bivariate table presents data of two variables in column percentages and row percentages simultaneously.

9) Trivariate analysis is undertaken to know whether there is a third variable which is affecting the relationships between two variables.

10) When a researcher is interested in assessing the joint effect of three or more variables he uses the techniques of multivariate analysis.

References

Bailey, Kenneth, D. (1978), *Methods of Social Research,* The Free Press, London.

Baker, L. Therese (1988), *Doing Social Research,* McGraw Hill, New York.

Blalock, Hubert, M. (1972), *Social Statistics,* Mc Graw Hill, New York.

Doby J.T. (et. al.) (1953), *An Introduction to Social Research,* Harrisburg: Stackpole Co., London.

Kerlinger Fred R. (1964), *Foundations of Behavioural Research,* Surjeet Publications, Delhi.

Lal Das, D.K. (2000), *Practice of Social Research: A Social Work Perspective,* Rawat Publications, Jaipur.

Monete, Duane R. (et. al.) (1986), *Applied Social Research,* Tool For the Human Services, Holt, Chicago.

Nachmias, D and Nachmias, C. (1981), *Research Methods in the Social Sciences,* St. Martins Press, New York.

Sellitz. G. et. al. (1973), *Research Methods in Social Relations,* Rinehart and Winston (3rd edition) *Holt, New York.*

Sjoberg, G. and Nett., B. (1968), *A Methodology of Social Research,* Harper & Row, New York.

14

Descriptive Statistics

**Monika Jauhari*

Introduction

In chapter 13 you learnt about the data processing and data analysis. The aim of this chapter is to introduce various descriptive statistical methods used in data analysis.

If you have a set of data, what will be your next step? You would like to understand that data. Statistics is all about gaining an understanding of data. And what one does to gain understanding – one operates on that data by means of average and graphs. If you look beyond just average and graphs, you will see that data are actually numbers in some context. So you need to do something extra to understand the context.

Knowledge of statistics helps managers in two ways. First, the knowledge allows the managers to be able to analyse the data as per his research objectives and draw inferences which in turn enable him to expand and improve not only the knowledge base of his profession but it also enables him to make his practice effective. Second, as a consumer of research it enables him to understand the analysis of data and appreciate the statistical procedures used in research reports.

Statistical procedures have increasingly become a part of the manager's support system. These procedures are used to enhance the effectiveness and the efficiency of the services offered by professionals. One of the significant reasons for this is availability of various statistical packages, which are generally quite easy to perform.

**Dr. Monika Jauhari, New Delhi*

Consequently, in the recent years, there has been a sizable increase in the use of microcomputers by business managers in analysing data about their clients/beneficiaries.

Measures of Central Tendency

It is often essential to represent a set of data by means of a single number which, in its way, is descriptive of the entire set. Obviously, the figure which is used to represent a whole series should neither have the lowest value in the series nor the highest value, but a value somewhere between these two limits, possibly in the centre. Such figures are called measures of typicality or central tendency or simply average. In other words, numerical description of a distribution begins with a measure of its center or average.

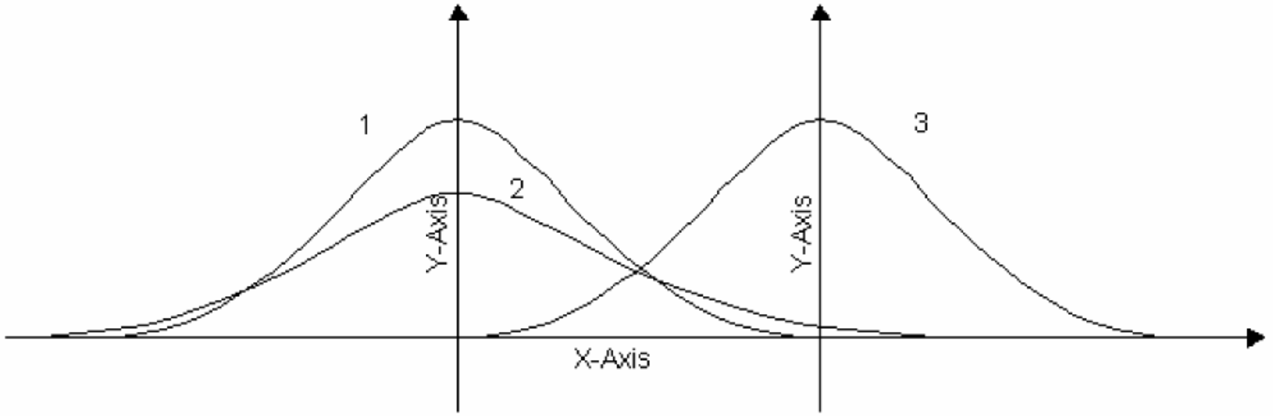
In the above figure you can see three curves, center of curve 3 differs from centers of curve 1 and 2. But although curves 1 and 2 have different shapes their centers are the same. Why is this so? We will explain the first statement here and leave the second statement for section 2.3.

There are three important measures of central tendency used in social work, the mean or arithmetic mean, the median and the mode.

Arithmetic Mean

The arithmetic mean is by far the most common of all the averages. It is relatively easy to calculate, simple to understand and is widely used in social work research. The arithmetic mean is defined as the ratio of the sum of the values of all the items and the total number of items.

In calculating arithmetic mean of a continuous series, we take the mid-value of each class as representative of that class (and it is presumed that the frequencies of that class are concentrated on mid-point), multiply the various mid-values by their corresponding frequencies and sum of the products is divided by sum of the frequencies. The following illustration will explain the method:



Comparison of central tendency of curves

Table : Distribution of Street Children by their Daily Earnings

S.No.	Daily Earnings (in Rs.)	Number of Street Children
1	110-130	15
2	130-150	30
3	150-170	60
4	170-190	95
5	190-210	82
6	210-230	75
7	230-250	23
	Total	**380**

Table

Daily Earnings (in Rs.)	Mid-values (m)	Number of Street Children (f)	Deviation from Assumed Mean 180 (d_x = m−180)	Step Deviation ($d=d_x/20$)	Total Deviation (fd)
110-130	120	15	–60	–3	–45
130-150	140	30	–40	–2	–60
150-170	160	60	–20	–1	–60
170-190	180	95	0	0	0
190-210	200	82	+20	+1	+82
210-230	220	75	+40	+2	+150
230-250	240	23	+60	+3	+69
		N = 380			**∑fd=136**

Assumed Mean = 180

Class Interval (i)= 130 – 110 = 20

Arithmetic Mean $\overline{X} = a + \frac{\sum fd}{n} \times i$

Where 'a' stands for the assumed mean, $\sum fd$ for the sum of total deviations, N for total number of frequencies and 'i' for class interval. Now substituting the values in the formula from the table we get :

Arithmetic Mean $\bar{X} = 180 + \frac{136}{380} \times 20 = 180 + 7.16$

Arithmetic Mean = Rs.187.16 (approximately)

Median

The median is another simple measure of central tendency. Sometimes you would like to locate the position of the middle item when data have been arranged or sometimes you would like to divide a group of students into quartiles (the ones that divide the series into 4 parts) by locating the individuals who have exactly 25 per cent of the class below them, exactly 75 per cent below them etc. These measures are known as positional averages. The median is perhaps the most important of such positional averages. We define the median as the size of the middle item when the items are arrayed in ascending or descending order of magnitude. This means that median divides the series in such a manner that there are as many items above or larger than the middle one as there are below or smaller than it.

In continuous series we do not know every observation. Instead, we have record of the frequencies with which the observations appear in each of the class-intervals as in the following Table. Nevertheless, we can compute the median by determining which class-interval contains the median.

Table: Daily Earning of Street Children

Daily Earnings (in Rs.)	**Number of Street Children (f)**	**Cumulative frequencies (CF)**
110 – 130	15	15
130 – 150	30	45
150 –170	60	105
170 – 190	95	200
190 – 210	82	282
210 – 230	75	357
230 – 250	23	380
	N = 380	

In the case of data given in Table the median value is that value on either side of which N/2 or 380/2 or 190th item lie. Now the problem is to find the class interval containing the 190th item. The cumulative frequency for the first three classes is only 105. But when we move to the fourth class interval 95 items are added to 105 for total of 200. Therefore, the 190th item must be located in this fourth class-interval (the interval from Rs.170 – Rs.190). So the *median class* is the class whose cumulative frequency just exceeds N/2.

The median class (Rs.170 – Rs.190) for the series contains 95 items. For the purpose of determining the point, which has 190 items on each side, we assume that these 95 items are evenly spaced over the entire class interval 170-190. Therefore, we can interpolate and find the values for 190th item. First, we determine that the 190th item is the 95th item in the median class:

$$190 - 105 = 85$$

Then we can calculate the width of the 95 equal steps from Rs.170 to Rs.190 as follows:

$\frac{190-170}{95}$ = 0.21053 (Approximately)

The value of 85th item is 0.2105 × 85 = 17.89. If this (17.89) is added to the lower limit of the median class, we get 170 + 17.89 = 187.89. This is the median of the series.

This can be put in the form of formula:

$$M_e = L + \frac{\frac{N}{2} - PCF}{f} \times i$$

Where M_e = median,

L = lower limit of the class in which median lies

N = total number of items

PCF= cumulative frequency of the class prior to the median class.

f = frequency of the median class

i = class interval of the median class.

Table : Daily Wages of Workers

Daily Earnings (in Rs.)	**Number of Street Children (f)**	**Cumulative frequencies (CF)**
110 – 130	15	15
130 – 150	30	45
150 –170	60	105 = PCF
170 – 190 (L = 170)	95 = f	200
190 – 210	82	282
210 – 230	75	357
230 – 250	23	380
	N = 380	

$$M_e = L + \frac{\frac{N}{2} - PCF}{f} \times i$$

$$Me = 170 + \frac{190 - 105}{95} \times (190 - 170)$$

$$Me = 170 + \frac{85}{95} \times 20$$

= 170 + (0.8947 × 20) = 187-89 (approximately)

Mode

Another measure, which is sometimes used to describe the central tendency of a set of data, is the mode. It is defined as the value that is repeated most often in the data set. In the following series of values: 71, 73, 74, 75, 75, 75, 78, 78, 80 and 82, the mode is 75, because 75 occur more often than any other value (three times). In grouped data the mode is located in the class where the frequency is greatest. The mode is more useful when there are a larger number of cases and when data have been grouped.

Calculation of Mode

Calculation of mode involves two steps. First, the process of grouping locates the class of maximum concentration with the help of grouping method. The procedure is as follows:

i) First the frequencies are added in two's in two ways: (a) by adding frequencies of item numbers 1 and 2; 3 and 4; 5 and 6 and so on, and (b) by adding frequencies of item numbers 2 and 3; 4 and 5; 6 and 7 and so on.

ii) Then the frequencies are added in three's. This can be done in three ways: (a) by adding frequencies of item numbers 1, 2 and 3; 4,5 and 6; 7,8 and 9; and so on. (b) by adding frequencies of item numbers 2,3 and 4; 5, 6 and 7; 8,9 and 10; and so on and (c) by adding frequencies of item numbers 3,4 and 5; 6,7 and 8; 9,10 and 11 and so on.

If necessary, grouping of frequencies can be done in four's and five's also. After grouping, the size of items containing maximum frequencies is circled. The item value, which will contain the maximum frequency the largest number of times, is the mode of the series. This is shown in Tables given below.

After this the value of mode is interpolated by the use of the following formula.

$$M_o = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

Where M_0 stands for the mode, L is the lower limit of the modal class (the class that has the maximum frequency), f_0 stands for the frequencies of the class preceding modal class, f_1 stands for the frequencies of the modal class, f_2 for the frequencies of the class succeeding modal class and *i* stand for the class interval of the modal class.

Illustration: Determine mode of the following distribution.

Table : Monthly Expenditure

Monthly Expenditure (In Rs)	Number of Families
100 – 200	5
200 – 300	6 = f_0
300 – 400 L = 300	15 = f_1
400 – 500	10 = f_2
500 – 600	5
600 – 700	4
700 – 800	3
800 – 900	2
Total	N = 50

Table : Location of Modal Class by Grouping

Monthly Expenditure (In Rs)	f(1)	(2)	(3)	(4)	(5)	(6)
100 – 200	5	11		26		
200 – 300	6		21		31	
300 – 400	15	25				30
400 – 500	10		15	19		
500 – 600	5	9			12	
600 –700	4		7			9
700 –800	3	5				
800 –900	2					

Table : Analysis Table

Column	**Class Containing Maximum Frequency**							
	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900
1			1					
2			1	1				
3		1	1					
4	1	1	1					
5		1	1	1				
6			1	1	1			
No.of times a class occurs	1	3	$\boxed{6}$	3	1			

Therefore 330-400 group is the modal group. Using the formula of interpolation, viz.,

$$M_0 = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

$$M_0 = 300 + \frac{15-6}{2\times15-6-10}$$

$$M_0 = 300 + \frac{9}{14}\times100$$

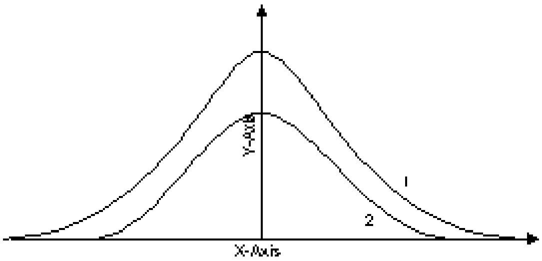
= 300 + 900/14 = 300 + 64.29

= 364.29 (approximately)

Measures of Dispersion

Introduction

In research, one often wishes to know the extent of homogeneity and heterogeneity among respondents with respect to a given characteristic. If you consider a set of data whose values are heterogeneous. Such set of data is characterized by the heterogeneity of values. In fact, the extent to which they are heterogeneous or vary among themselves is of basic importance in statistics. Measures of central tendency describe one important characteristic of a set of data typically but they do not tell us anything about this other basic characteristic. Consequently, we need ways of measuring heterogeneity – the extent to which data are dispersed and the measures, which provide this description, are called measures of dispersion or variability.



Comparison of Dispersion of two curves

The picture above is a representation of the "spread" of the data. Curve 1 has a wider spread than curve 1. In other words, data in curve 1 is more scattered and hence the measure of location is less representative of the data than the one in curve 2. This is the answer to the second statement that we discussed in section 2.2

The important measures of dispersion are range, quartile deviation, mean deviation and standard deviation.

Range

The range is defined as the difference between the highest and lowest values. Mathematically,

$$\text{R(Range)} = m_H - m_L$$

Where m_H and m_L stand for the highest and the lowest value. Thus, for the data set; 10, 22, 20, 14 and 14 the range would be the difference between 22 and 10, i.e., 12. In case of grouped data, we take the range as the difference between the midpoints of the extreme classes. Thus, if the midpoint of the lowest interval is 150 and that of the highest are 850 the range will be 700.

The only advantage of range, the measure that is seldom used, is that it can be easily calculated and readily understood. Despite this advantage, it is generally not a very useful measure of dispersion. Its main drawback is that it does not tell us anything about the dispersion of values, which are intermediate between the two extremes.

Quartile Deviation or Semi-Inter-Quartile Range

Another measure of dispersion is the semi-inter-quartile range, commonly known as quartile deviation. Quartiles are the points, which divide the array or series of values into four equal parts, each of which contains 25 per cent of the items in the distribution. The quartiles are then the highest values in each of these four parts. Inter-quartile range is the difference between the values of first and the third quartiles.

Thus, semi-interquartile range or quartile deviation is calculated by the following formula

$$Q.D. = \frac{Q_3 - Q_1}{2}$$

Where Q_1 and Q_3 stand for first and the third quartiles.

Calculation of Quartile Deviation (QD)

Table : Monthly Expenditure

Monthly Expenditure (In Rs.)	**Number of Families**
100 – 200	5
200 – 300	6
300 – 400	15
400 – 500	10
500 – 600	5
600 – 700	4
700 – 800	3
800 – 900	2
Total	**N = 50**

Table

Sl. No.	**Expenditure (2)**	**Number of Families (3)**	**Cumulative frequency(CF)**
1	100 – 200	5	5
2	200 – 300	6	$11 = c_1$
3	$Q_1 \rightarrow$ 300 – 400	$15 = f_1$	26
4	400 – 500	10	$36 = c_3$

5	$Q_3 \rightarrow$ 500 – 600	5 = f_3	41
6	600 – 700	4	45
7	700 – 800	3	48
8	800 – 900	2	50
	Total	**N = 50**	

For Q_1, Let us calculate N/4 = 50/4 = 12.5, so Q_1 will fall in the class 300–400

$$Q_1 = L + \frac{N/4 - c_1}{f_1} \times i$$

$$Q_1 = 300 + \frac{12.5 - 11}{15} \times 100$$

$$Q_1 = 300 + \frac{1.5}{15} \times 100$$

= 300 + (0.1 × 100)

= 300 + 10 = 310

Similarly for Q_3, Let us calculate 3N/4 = 150/4 = 37.5, so Q_3 will fall in the class 500–600

$$Q_3 = L + \frac{3N/4 - c_3}{f_3} \times i$$

$$Q_3 = 500 + \frac{37.5 - 36}{5} \times 100$$

$$Q_3 = 500 + \frac{1.5}{5} \times 100$$

= 500 + (0.3 × 100) = 500 + 30 = 530

$Q_3 - Q_1$ = 530 – 310 = 220

$$QD = \frac{Q_3 - Q_1}{2}$$

$$QD = \frac{220}{2} = 110$$

Quartile Deviation is an absolute measure of dispersion. If quartile deviation is to be used for comparing the dispersion of series it is necessary to convert the absolute measure to a coefficient of quartile deviation.

Symbolically, coefficient of Quartile Deviation =

$$\frac{Q_3 - Q_1}{Q_3 + Q_1 \big/ 2} = \frac{Q_3 - Q_1}{Q_3 + Q_1}$$

Applying this to the preceding illustration we get, Coefficient of Quartile Deviation,

$$\text{Q.D.} = \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{530 - 310}{530 + 310} = \frac{220}{840} = 0.26\,(\text{approximately})$$

Mean Deviation

Range and quartile deviation suffers from a serious drawback; they are calculated by taking into consideration only two values of a series. These two measures of dispersion are not based on all observations of the series. As a result, the composition of the series is entirely ignored. To avoid this defect, dispersion is calculated taking into consideration all the observations of the series in relation to a central value. The method of calculating dispersion is called the method of averaging deviations (Mean Deviation). As the name suggests, it is the arithmetic average of the deviations of various items from a measure of central tendency.

Calculation of Mean Deviation

Table : Monthly Expenditure

Monthly Expenditure (In Rs.)	**Number of Families**
100 – 200	5
200 – 300	5
300 – 400	15
400 – 500	10
500 – 600	5
600 – 700	4
700 – 800	3
800 – 900	3
Total	N = 50

Table : Monthly Expenditure

	Monthly Expenditure (In Rs)	**Mid Value**	**Number of (f)**	**Comulative frequency Families**	**Deviation from median 400 |d|**	**f |d|**
	100-200	150	5	5	250	1250
	200-300	250	5	10 = C	150	750
Median	300-400	350	15 = f	25	50	750
Group	400-500	450	10	35	50	500
	500-600	550	5	40	150	750
	600-700	650	4	44	250	1000
	700-800	750	3	47	350	1050
	800-900	850	3	50	450	1350
			N = 50			**7400**

Step I : Calculate the median of the distribution:

$$M_e = L + \frac{\frac{N}{2} - C}{F} \times i$$

$$M_e = 300 + \frac{\frac{50}{2} - 10}{15} \times 100$$

$$M_e = 300 + \frac{25 - 10}{15} \times 100$$

$$M_e = 300 + \frac{15}{15} \times 100$$

= 300 + (1 × 100) = 300 + 100 = 400

Median = 400

Step II : Find mid-points of each class

$$Midpoint = \frac{100 + 200}{2} = \frac{300}{2} = 150, ...$$

Step III : Find absolute deviation |d | of each midpoints from median (400)

|d| = | 150 – 400 | = 250, ...

Find total absolute deviation by multiplying the frequency of each class by the deviation of its mid – points from the median (*f* |d|) = 5 × 250 = 1250, . .

Find the sum of products of frequency and deviations ∑(*f*|d|) = 7400

Compute Mean Deviation= λ (X)

$$\lambda(X) = \frac{\sum f \, |d|}{N} = \frac{7400}{50} = 148$$

Coefficient of Mean Deviation

To compare the mean deviation of series the coefficient of mean deviation or relative mean deviation is calculated by dividing the mean deviation by that measure of central tendency about which deviations were calculated. Thus,

Coefficient of Mean Deviation = $\frac{\lambda(X)}{M_e}$

Applying this formula to the previous example, we have,

Coefficient of Mean Deviation = $\frac{\lambda(X)}{M_e} = \frac{148}{400} = 0.37$

Standard Deviation

The most useful and frequently used measure of dispersion is standard deviation or root-mean square deviation about the mean. The standard deviation is defined as the square root of the arithmetic mean of the squares of the deviations about the mean.

Symbolically.

$$\sigma = \sqrt{\frac{\sum fd^2}{N} - \left(\frac{\sum fd}{N}\right)^2} \times i$$

Where 'i' stands for the common factor or the magnitude of the class-interval. The following example would illustrate this formula;

Table : Monthly Expenditure

S.No.	Monthly Expenditure (In Rs)	Number of Families(f)
1	100 – 200	5
2	200 – 300	6
3	300 – 400	15
4	400 – 500	10
5	500 – 600	5
6	600 – 700	4
7	700 – 800	3
8	800 – 900	2
		N = 50

Table

S. No.	Monthly Expenditure (In Rs.)	Mid values (m)	Number of Families (f)	Step deviation from assum Average 450 (d)	fd	d^2	fd^2
1	100 – 200	150	5	-3	-15	9	45
2	200 – 300	250	6	-2	-12	4	24
3	300 – 400	350	15	-1	-15	1	15
4	400 –500	450	10	0	0	0	0
5	500 –600	550	5	+1	5	1	5
6	600 –700	650	4	+2	8	4	16
7	700 –800	750	3	+3	9	9	27
8	800 - 900	850	2	+4	8	16	32
			N = 50		$\sum fd = -12$		$\sum fd^2 = 164$

Step	Procedure	Application to Table 13
1	Find the mid-points of the various classes	$Midpoint = \frac{100+200}{2} = \frac{300}{2}$ = 150, ...
2	Assume a mid-points as average, preferably at the centre	450 = assumed average.
3	Take the difference of each mid-point from the assumed average (450) and divide them by the magnitude of the class interval to get step deviation (d)	(1) 150 – 450 = –300/100 = –3...
4	The deviations are multiplied by the frequency of each class (fd)	(–3) (5) = –15 (–2) (6) = –12...
5	Find the aggregate of products of step 4 (∑fd)	∑fd = –12
6	Square the deviations (d^2)	(–3) (–3) = 9, . . .
7	Squared deviations are multiplied bythe respective frequencies (fd^2)	9 x 5 = 45, . . .
8	Find the aggregate of products of step 7 (∑fd)	$\sum fd^2$ = 164
9	Compute standard deviation with the help of the formula	$\sigma = \sqrt{\frac{\sum fd^2}{N} - \left(\frac{\sum fd}{N}\right)^2} \times i$ $\sigma = \sqrt{\frac{164}{50} - \left(\frac{-12}{50}\right)^2} \times 100$ $\sigma = \sqrt{3.28 - 0.0576} \times 100$ $\sigma = \sqrt{3.2224} \times 100$ =1.795 ×100 = 179.51 (approximately)

Coefficient of Variation

The standard deviation represents measure of absolute dispersion. It is also necessary to measure the relative dispersion of two or more distributions. When the standard deviation is related to its mean, it measures relative dispersion.

Karl Pearson has worked out a simple measure of relative dispersion, which is generally known as the coefficient of variation.

$$C.V.\ or\ V = \frac{\sigma}{\overline{X}} \times 100$$

The mean & coefficient of variation for the problem in Table 2.13 are:

$$\overline{X} = 450 + \frac{-12}{50} \times 100$$

$$= 450 + (-12) \times 2 = 450 - 24 = 426$$

$$C.V.\ or\ V = \frac{\sigma}{\overline{X}} \times 100 = \frac{179.51}{426} \times 100$$

$$= 0.42138 \times 100 = 42.138 \text{ per cent (approximately)}$$

Conclusion

1) Measures of (i) central tendency, (ii) variability, and (iii) relationship are the three types of descriptive statistical measures.
2) Mean, median and mode are the three measures of central tendency.
3) Mean is the arithmetic average of a distribution. It is obtained by dividing the sum of all values of observation by the total number of values.

4) Median is a point in an array, above and below which one half of the values or measures fall. If the values are ungrouped and their number is small, the values are arranged in order of magnitude and the middle value is determined by counting up half, the value of N. When the number of values is odd, the mid-value is the median. When the number of values is even, the median is the mid-point between the two middle values.

5) Mode is the most frequently occurring value in a distribution. If only one value occurs a maximum number of times, the distribution is said to have one mode (uni-modal). A two-mode distribution is bi-modal, and more than a two-mode distribution is called multi-modal.

   In a simple ungrouped series of measures or values, the crude mode is that single measure or value which occurs most frequently.

6) The range is the difference between the two extreme values or measures in a distribution.

References

Baker, L. Therese. *Doing Social Research,* New York: McGraw Hill, 1988.

Black, Allen & Babbie E. *Research Methodology for Social Work*, Belmont, California, Wadsworth, 1989.

Blalock, H.M.*Social Statistics*, Auckland. Mc Graw Hill, 1988.

Elhance, D.N. *Fundamental of Statistics*, Allahabad, Kitab Mahal, 1984.

Festinger. L. and Katz. D. (eds.) *Research Methods in the Behavioural Sciences,* New York : The Dryden Press,1953.

Freud, J.E. *Modern Elementary Statistics*, New Delhi, Prentice Hall, 1977.

Garret, H.E. *Statistic in Physical & Education*, Bomb: Vakils, 1966.

Gupta, S.P. *Statistical Methods*, New Delhi, S.Chand, 1980.

Kidder, Lauise H. *Research Methods in Social Relations,* New York: Holt, 1981.

Krishef, Curtis H. *Fundamentals Statistics for Human Services and Social Work*, Boston: Duxbury Press, 1987.

Lal Das, D.K. (2000), *Practice of Social Research: A Social Work Perspective,* Rawat Publications, Jaipur.

Levin, Richard I. *Statistics for Management* Delhi : Pearson Prentice Hall, 2005.

Monette, Duana R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Nachmias D and Nachmias C. *Research Methods in the Social Sciences*, New York: St. Martins press, 1981.

Ostle, B. and Mensing R.W. *Statistics in Research*, New Delhi, Oxford, 1975.

Philip, A.E. et. al. *Social Work Research*, and The Analysis of Social Data, Oxford: Peragon Press, 1975.

Sanders, D.H. et. al. *Statistics A Fresh Approach*, New Delhi: Mc Graw Hill, 1975.

15

Inferential Statistics

**Monika Jauhari*

Introduction

In chapter 14 you have learnt about descriptive statistics. The aim of this unit is to ponder upon various inferential statistical methods. Till now you have learnt about univariate distributions (involving one variable only). In practice, you may often come across certain series where you may be interested in measuring two characteristics e.g. educational level and intelligence quotient of staff of a consultancy firm. Such type of distribution is called a bivariate distribution. In such situations one is interested in whether there is any relation between the two variables (Correlation). The measure of the average relationship between two variables is Regression.

Another important aspect here is the study of tests of significance, which enables us to decide about the population parameters on the basis of observed sample results. Chapter 15 discusses these aforesaid methods.

Measures of Relationship

So far, you have learnt about various statistical methods concerned with the description and analysis of a single variable. In research, you often wish to know the relationship among two or more variables in the data with one another. One may wish to know, for instance, whether the expenditure on research and development (R&D) is somehow related to the companies' profits. In other words, one may be interested in ascertaining whether a change in one variable is associated with change in another variable.

**Dr. Monika Jauhari, New Delhi*

For example, whether the higher expenditure R & D is associated with higher profits; whether the salary of executives is correlated with their work performance. The most frequently used measure of estimating association among variables is the coefficient of correlation (r).

The correlation coefficient (r) to be discussed here was introduced by Karl Pearson and is often referred to as product – moment correlation. Coefficient of correlation is calculated to identify the extent or degree of correlation between two variables.

Karl Pearson's Coefficient of Correlation

The formula to compute the degree and direction of correlation of Karl Pearson's is as under;

$$r = \frac{\tfrac{1}{N}\sum d_x d_y - \left(\frac{\sum d_x}{N}\right)\left(\frac{\sum d_y}{N}\right)}{\sqrt{\frac{\sum d_x^2}{N} - \left(\frac{\sum d_x}{N}\right)^2} \times \sqrt{\frac{\sum d_y^2}{N} - \left(\frac{\sum d_y}{N}\right)^2}}$$

Where d_x is the deviation of various items of the first variable from assumed average and d_y the corresponding deviations of the second variable from assumed average and N stands for the number of pairs of items. We explain the application of the formula in the following example.

Table : Marks Obtained in Research and Dissertation

Sl.No	Research	Dissertation
1	40	42
2	26	29
3	70	66
4	32	24
5	52	58
6	30	28
7	48	46
8	48	50
9	42	44
10	62	66

Table :Calculation of Karl Pearson's Coefficient of Correlation

Sl.	**Research**	**Deviations from ass. Average (d_x=x–48)**	**dx^2**	**Dissertation**	**Deviations from ass. Average (d_y=y–46)**	**d_y^2**	**$d_x.d_y$**
1	40	-8	64	42	-4	16	+32
2	26	-22	484	29	-17	289	+374
3	70	+22	484	66	+20	400	+440
4	32	-16	256	24	-22	484	+352
5	52	+4	16	58	+12	144	+48
6	30	-18	324	28	-18	324	+324
7	48	0	0	46	0	0	0
8	48	0	0	50	+4	16	0
9	42	-6	36	44	-2	4	+12
10	62	+14	196	66	+20	400	+280
	$\bar{X}$	$\sum d_x$ =	$\sum d_x^2$=	$\bar{Y}$=	$\sum d_y$=	$\sum d_y^2$=	$\sum d_x d_y$
N=10	=45	–30	1860	45.3	–7	2077	1862

Table

Step	**Procedure**	**Application to Table 2**
1	Assume average of variable X and Y. (Preferably in the neighborhood of X)	Ass. Ave (X) = 48 Ass. Ave (Y) = 46
2	Find deviations of item values of X and Y from assumed averages (d_x) and (d_y)	e.g. for (X) 40–48=–8 (Y) 42 – 46 = – 4
3	Squared up the deviations ($d_x{}^2$ and $d_y{}^2$)	(–8) (–8) = 64 (–4) (–4) = 16
4	Find the product of deviation (d_x. d_y)	(–8) (–4) = 32
5	Find the aggregates of d_x, d_y, $d_x{}^2$, $d_y{}^2$ and d_x. d_y	$\sum d_x$ = – 30 $\sum d_y$ = – 7 $\sum d_x{}^2$ = 1860 $\sum d_y{}^2$ = 2077 $\sum d_x\ d_y$ = 1862

6 Compute coefficient of correlation by the formula as explained below.

$$r = \frac{\frac{1}{N}\sum d_x d_y - \left(\frac{\sum d_x}{N}\right)\left(\frac{\sum d_y}{N}\right)}{\sqrt{\frac{\sum d_x^2}{N} - \left(\frac{\sum d_x}{N}\right)^2} \times \sqrt{\frac{\sum d_y^2}{N} - \left(\frac{\sum d_y}{N}\right)^2}}$$

$$r = \frac{\frac{1}{10}\times 1862 - \left(\frac{-30}{10}\right)\times\left(\frac{-7}{10}\right)}{\sqrt{\frac{1860}{10} - \left(\frac{-30}{10}\right)^2} \times \sqrt{\frac{2077}{10} - \left(\frac{-7}{10}\right)^2}}$$

$$r = \frac{186.2 - (-3)\times(-0.7)}{\sqrt{186 - (-3)^2} \times \sqrt{207.7 - (-0.7)^2}}$$

$$r = \frac{186.2 - 2.1}{\sqrt{177} \times \sqrt{207.21}}$$

$$r = \frac{184.1}{13.3 \times 14.39}$$

= 0.962 (Approx.)

Calculation of the Coefficient of Correlation by Rank Differences

(Spearman's Rho 'ρ')

One applies this method to calculate the coefficient of correlation when the direct quantitative measurement of the phenomenon under study is not possible, for example efficiency, intelligence etc. Pearsonian coefficient of correlation between the ranks of two such traits is called the rank correlation between these traits. The formula for computing rank correlation is:

$$\rho = 1 - \frac{6\sum D^2}{N\left(N^2 - 1\right)}$$

Where ρ denotes coefficient of rank correlation between paired ranks, D denotes the differences between the paired ranks and N stands for the number of pairs. The following example would illustrate the above formula:

Table : Ranking of Social Workers According to their Efficiency by Two Different Judges

Social Worker	Ranking by Judge A	Ranking by Judge B
A	3	4
B	9	7
C	6	6
D	5	8
E	1	1
F	2	3
G	4	2
H	7	5
I	8	10
J	10	9

Table 3.5

Social Worker	Ranking by Judge A (R_1)	Ranking by Judge B (R_2)	D = (R_1-R_2)	D^2
A	3	4	-1	1
B	9	7	+2	4
C	6	6	0	0
D	5	8	-3	9
E	1	1	0	0
F	2	3	-1	1
G	4	2	+2	4
H	7	5	+2	4
I	8	10	-2	4
J	10	9	+1	1
N = 10				$\sum D^2 = 28$

$$\rho = 1 - \frac{6\sum D^2}{N\left(N^2 - 1\right)}$$

$$\rho = 1 - \frac{6 \times 28}{10\left(10^2 - 1\right)}$$

$$\rho = 1 - \frac{168}{10\left(100 - 1\right)}$$

$$\rho = 1 - \frac{168}{10 \times 99}$$

$$\rho = 1 - \frac{168}{990} = 1 - 0.1696969 = 0.83 \text{ (approximately)}\chi$$

Chi-square Test

The χ^2 (Greek letter χ^2 and pronounced as Ki-square) test provides us with a method to evaluate whether or not frequencies, which have been empirically observed, differ significantly from those, which would be expected under a certain set of theoretical assumption. For example, suppose categories of employees and preference of performance appraisal have been cross classified and the data summarized in the following 2 × 3 contingency table:

Table : Relationship between Categories of Employees and Preference of Performance Appraisal

Nativity of Students	Preference of Performance Appraisal			Total
	Self	Immediate Supervisor	HOD	
Executives	38	20	12	70
Non-Executives	10	26	6	42
Total	48	46	18	112

The proportions of executives are 38/48 = 0.79, 20/46 = 0.34, and 12/18 = 0.67 (rounded to two decimals) for three raters. We would then want to know whether or not these differences were statistically significant.

To this end, we can assume null hypothesis: that there are no differences between categories of employees and preference of performance appraisal. This means that the proportions of executives and non-executives should be the same in each of the three types of appraisal. On the basis of the assumption that the null hypothesis is correct we can compute a set of frequencies that would be expected given these marginal totals. In other words, we can compute the number of executives who prefers self-appraisal and would be expected to be executives and compare this figure with that actually obtained. If the null hypothesis is true, we can compute a common proportion as:

$$\frac{38+20+12}{48+46+18}=\frac{70}{112}=0.625$$

With this estimate we would expect 48 × (0.625)=30 executives opting for self appraisal 46 × (0.625) = 28.75

executives opting for Immediate Supervisor and 18 × (0.625) = 11.25 executives opting for Head of the Dept. from 70 executives. Subtracting these figures from the respective sizes of the three samples, we find that 48 – 30 = 18opting for self appraisal, 46 – 28.75 = 17.25 opting for Immediate Supervisor and 18 – 11.25 = 6.25 opting for Head of the Dept from 42 non-executives.

These results are shown in the following table, where expected frequencies are shown in parentheses.

Table

Categories of Employees	**Preference of Performance Appraisal**			
	Self	**Immediate Supervisor**	**HOD**	**Total**
Executives	38 (30)	20 (28.75)	12 (11.25)	70
Non-Executives	10 (18)	26 (17.25)	6 (6.75)	42
Total	48	46	18	112

To test the null hypothesis we compare the expected and observed frequencies. The comparison is based on the following χ^2 statistics.

$$\chi^2 = \Sigma\left(\frac{(O-E)^2}{E}\right)$$

Where O stands for observed frequencies and E stands for expected frequencies.

Table : Computation of χ^2

O	E	O – E	(O – E)^2	$\frac{(O-E)^2}{E}$
38	30.00	8.00	64.0000	2.1333
10	18.00	8.00	64.0000	3.5555
20	28.75	8.75	76.5625	2.6630
26	17.25	8.75	76.5625	4.4384
12	11.25	0.75	0.5625	0.0500
6	6.75	0.75	0.5625	0.0833
112	112.00			χ^2 = 12.9237

Before going into further details of the test the reader is introduced to certain terms used in this connection.

Level of Significance

As stated earlier, the Chi-square test is used to evaluate whether the difference between observed and expected frequencies is due to the sampling fluctuations and as such insignificant or whether the difference is due to some other reason and as such significant.

Before drawing the inference, that the difference is significant, researchers set up a hypothesis, often referred as a null hypothesis (symbolized as (H_0) as contrasted with the research hypothesis (H_1) that is set up as an alternative to H_0. Usually, although not always, the null hypothesis states that there is no difference between several groups or no relationship between variables then the probability of the occurrence of such a difference is determined. The probability indicates the extent of reliance that we can place on the inferences drawn. The table values of chi-square are available at various probability levels. These levels are called levels of significance. We can find out from the table the values of chi-square at certain levels of significance. Usually, the value of chi-square at 0.05 or .01 levels of significance from the given degrees of freedom is seen from the table and is compared with observed value of Chi-square. If the observed value of χ^2 is more than the table value at 0.05, it means that the difference is significant.

Degree of Freedom

To use the chi-square test, the next step is to calculate the degrees of freedom. Suppose we have a 2 × 2 contingency table like the one in Figure given below.

	Column 1	Column 2	
Row 1	P	X	R_{t1}
Row 2	X	X	R_{t2}
	C_{t1}	C_{t2}	

Row Totals

Column Totals

When one know the row and the column totals $r_{t1,}$ r_{t2} and c_{t1} and $c_{t2.}$ respectively, then the number of degrees of freedom can be defined as the number of cell values that one can freely specify. In Fig.given below, once you specify the one value of Row 1 (denoted by check in the figure) the second value in that row and the values of second row (denoted by X) are already determined; you are not free to specify these because you know the row totals and column totals. This shows that in a 2 × 2 contingency table you are free to specify one value only. The following example would illustrate the concept:

Table

	Affected A	**Non affected**	**Total α**
Inoculated **B**	AB 14 (20)	αB 26	40
Non inoculated β	Aβ 16	αβ 4	20
Total	30	30	60

Let us suppose that the two attributes A and B are independent then the expected frequency of the cell AB would be

$$\frac{40 \times 30}{60} = 20$$

Consequently, the frequencies of remaining three cells are automatically fixed. Thus for cell ab expected frequency must be 40 – 20 = 20, similarly for the cell Ab it must be 30 – 20 = 10 and for αβ it must be 10. This means that for 2 × 2 tables you have one choice of your own and in remaining three cells you have no freedom. Thus, degrees of freedom (*df*) can be calculated by the formula: ***df = (c – 1) (r – 1)***

Where *df* stands for the degrees of freedom, *c* for the number of columns and *r* for the number of rows. Thus in 2 × 3 table (above Table):

$$\boldsymbol{df = (3 - 1)(2 - 1) = 2 \times 1 = 2}$$

χ^2 (table value) (Level of significance 0.05, and degree of freedom 2) = 5.99

Inference

Since calculated value of χ^2 (=12.923669) is more than the table value of χ^2 (5.99) at 0.05 level of significance for 2 degree of freedom and hence the null hypothesis (H_0 = No difference among executives and non-executives with respect to their preference for performance appraisal) is rejected. We therefore, conclude that there is association between categories of employees (executives and non-executives) and their preferences for performance appraisal.

Regression Analysis

In this section, you will learn about how to calculate the regression line, using an equation that relates the two variables mathematically. The equation for a straight line where the dependent variable Y is determined by the independent variable X is:

$$\mathbf{Y = a + bX}$$

Where Y - dependent variable
X - independent variable
a – Y intercept
b – slope of the line

Table: Monthly Expenditure on Education and Academic Performance

Family No.	**Monthly Expenditure on Education (In '000) (X)**	**Academic Performance Scores (Y)**
1	5	31
2	11	40
3	4	30
4	5	34
5	3	25
6	2	20

Table

Family No.	**Monthly Expenditure on Education (In '000) (X)**	**Academic Performance Scores (Y)**	**XY**	**X^2**
1	5	31	155	25
2	11	40	440	121
3	4	30	120	16
4	5	34	170	23
5	3	25	75	9
6	2	20	40	4
	∑X=30	∑Y=180	∑XY=1000	$\sum X^2$ =200

$$\overline{X} = \frac{\sum X}{N} = \frac{30}{6} = 5$$

$$\overline{Y} = \frac{\sum Y}{N} = \frac{180}{6} = 30$$

$$b = \frac{\sum XY - N\overline{X}\overline{Y}}{\sum X^2 - N\overline{X}^2}$$

$$b = \frac{1000 - (6)(5)(30)}{200 - (6)(5)^2} = \frac{100}{50} = 2$$

$$a = \overline{Y} - b \quad \overline{X} = 30 - (2)(5) = 30 - 10 = 20$$

So we can substitute these values a and b into equation

Y = a + bX = 20 + 2 X

Using the estimation equation, we can predict what the academic performance score would be from the amount spent monthly on education. If the family spends 8 thousand, it can expect to score approximately 36 in academic performance:

Y = 20 + 2 (8)=20+16= 36

Measures of Difference

This section deals with parametric tests specially the 't' and 'f' tests. Parametric tests are based on the assumption that the population is normally distributed. In addition these tests use higher measurement levels, i.e. intervals and ratio.

t- Tests

There are two types of t –tests; one is called t –test for independent samples, the other one is called paired t-test. The first test is used for the scores of one group and is independent of the scores of the other group. That means there are no logical relationships between the scores that have been obtained for one group when compared with other group. However, both the tests are used to assess significance of difference.

The Paired t – test

The data for this example is taken from an NGO in the social sector. The President wants to test the effects of a training programme for social workers to improve their performance. A group of 10 social workers are randomly selected from the NGO. A rating scale was administered before the training programme to assesses the performance of social workers. The scale has a scoring range from 5 to 15. After the training programmes the same rating scales was administered. The pre- training and post- training scores are shown in the Table.

The President establishes a null hypothesis that there is no difference between pre- training and post- training scores to test whether there is a statistically significant difference. The research hypothesis is that post- training scores will show improvement in performance over pre-training.

Table : Performance Scores of 10 Social Workers

Social Workers	Pre-Training Scores (X)	Post-Training Scores (Y)	D=(Y–X)	D^2
1	9	12	3	9
2	8	10	2	4
3	15	15	0	0
4	12	14	2	4
5	8	14	6	36
6	4	11	7	49
7	6	10	4	16
8	3	8	5	25
9	3	8	5	25
10	2	8	6	36
	N = 10		$\sum D = 40$	$\sum D^2 = 204$

The procedure for calculating 't' is given below:

Table

Step	Procedure	Application to above Table
1	Find out the difference (D) between the post training and pre training scores	D = Y – X = 12 – 9 = 3 10 – 8 = 2 ....
2	Compute Mean Difference	$\bar{X} = \frac{\sum D}{N} = \frac{40}{10} = 4$
3	Compute square of difference	$D^2 = (3)^2 = 9, (2)^2 = 4$ . . . . . .
4	Find the sum of squares of difference	$\sum D^2 = 204$
5	Compute sum of squares (SS)	$SS = \sum D^2 - \frac{(\sum D)^2}{N}$ $= 204 - \frac{(40)^2}{10}$ = 204 – 160 = 44
6	Find out degree of freedom(df)	df = n – 1 = 10 – 1 = 9

7	Compute variance (S^2)	$S^2 = \frac{SS}{df} = \frac{44}{9} = 4.89$
8	Compute 't' by using the formula given above	$t = \frac{\bar{X} - \mu}{\sqrt{S^2 / N}} = \frac{4-0}{\sqrt{4.89 / 10}}$ $= \frac{4}{0.489} = 5.7225$

Now that the value of the paired t – test has been calculated, we have to see if the null hypothesis can be rejected. It is assumed that the, training is likely to improve the post-training scores. That means there is directionality in the data. Hence we will use one-tailed test. As such, we refer to critical value (Refer a text book on Statistics). Looking at the .05 level of significance for one tailed test we go down to the intersect of 9 degree of freedom (df). The calculated value of 't' (5.7225) is greater than the critical value (1.833), hence, the null hypothesis can be rejected and we can say that there is statistically significant difference in social workers performance after the training.

The t–test for Independent Samples

The t – test for two independent samples examines the difference between their means to see how close or apart they are. Let us consider the data given in the Table. The data compares performance of social workers working on two programmes .

President of the organisation is interested in studying whether there is significant difference among the performance of social workers. The data at the interval level of measurement are presented in the Table.

Let us call the performance of social workers of programme A as X and the performance of social workers of programme B as Y. The first step in calculating t – test for two independent samples is to square the values of X and Y columns to get X^2 and Y^2 values.

The next step is to sum up the columns to find out $\sum X$, $\sum Y$, $\sum X^2$ and $\sum Y^2$. This is followed by calculation of means of X and Y columns, that is X and Y.

Table

S.No.	**Performance of social workers of programme A (X)**	**X^2**	**Performance of social workers of programme B (Y)**	**Y^2**
1	8	64	12	144
2	11	121	9	81
3	9	81	6	36
4	12	144	5	25
5	16	256	8	64
6	10	100	12	144
7	7	49	11	121
8	16	256	10	100
9	6	36	10	100
10	5	25	7	49
N = 10	**$\sum X = 100$**	**$\sum X^2 = 1132$**	**$\sum Y = 90$**	**$\sum Y^2 = 864$**

The procedure for calculating ‘t’ is given below;

Table

Step	**Procedure**	**Application to Previous Table**
1.	Square the scores of X and Y column to get X^2 and Y^2 values.	= $(8)^2 = 64$, $(11)^2 = 121$, $(9)^2 = 81$,.. = $(12)^2 = 144$, $(9)^2 = 81$, $(6)^2 = 36$,..
2.	Find the sums of columns X, Y, X^2 and Y^2	$\sum X = 100$ $\sum Y = 90$ $\sum X^2 = 1132$ $\sum Y^2 = 864$
3.	Compute Mean Scores for column X and Y	$\overline{X} = \frac{100}{10} = 10$ $\overline{Y} = \frac{90}{10} = 9$
4.	Compute Variance sum of square for X and Y column (SS_x and SS_y)	$SS_x = \sum X^2 - \frac{\left(\sum X\right)^2}{N} =$ $1132 - \frac{\left(100^2\right)}{10}$ = 132
5.	Find out the sum of squares	$SS_c = SS_x + SS_y$ = 132 + 54 = 186
6.	Find out the degrees of freedom for two sets of data (df_c)	$df_x = n - 1 = 10 - 1 = 9$ $df_y = n - 1 = 10 - 1 = 9$ $df_c = df_x + df_y = 9 + 9 = 18$
7.	Compute combined variances S^2_c	$S^2_c = SS_c / df_c = 186/18 = 10.33$
8.	Compute 't' by using the formula	$t = \frac{\overline{X} - \overline{Y}}{S_c\sqrt{\frac{1}{n_x} + \frac{1}{n_y}}}$

$$t = \frac{10-9}{\sqrt{10.33} \times \sqrt{\frac{1}{10} + \frac{1}{10}}}$$

$$t = \frac{1}{3.214 \times 0.4472} = \frac{1}{1.43} = 0.699$$

Before we take the decision we have to check whether the performance scores of social workers on two programmes show any directionality. Since there is no indication that either set of data has influence over other, hence this is non-directional hypothesis. Thus we will have to look for critical value of t for two tailed tests at 0.05 level of significance for 18 degree of freedom. (Refer a text book on Statistics) we find the critical value of 't', which is equal to 2.101. Since, our calculated value 0.699 is not larger than the critical value of 2.101 the null hypothesis cannot be rejected. That means there is no significant difference between the sales of two stores.

The One-Way Analysis of Variance

The analysis of variance (some times obtained as ANOVA) determines whether there is a statistically significant difference between more than two sets of data on the basis of their means. There are two variances that are calculated in F – test procedure. The first variance is obtained from between the groups and the second variance is obtained from the values within each of the groups. Let us take the number of cases handled by three social workers of an organisation. Chief functionary of the organisation wants to see whether there are significant differences between the performances of three social workers.

Table : Number of Cases Handled by Three Social Workers

Month	**No. of Cases handled by Social Worker A**	**A^2**	**No. of Cases handled by Social Worker B**	**B^2**	**No. of Cases handled by Social Worker C**	**C^2**
January	14	196	38	1444	34	1156
February	20	400	42	1764	40	1600
March	22	484	24	576	30	900
April	18	324	12	144	48	2304
May	30	900	40	1600	58	3364
	$\sum$**A = 104**	$\sum$**A^2= 2304**	$\sum$**B = 156**	$\sum$**B^2= 5528**	$\sum$**C = 210**	$\sum$**C^2= 9324**

$n_1 = 5, n_2 = 5, n_3 = 5, n = n_1 + n_2 + n_3 = 5 + 5 + 5 = 15$

$\sum T = \sum A + \sum B + C = 104 + 156 + 210 = 470$

A null hypothesis is formulated stating that there are no differences between the performances of three social workers. The procedure of calculating 'f' test is as under;

Table

Step	**Procedure**	**Application to Table 13**
1.	Find out the squares of scores in each of the three column	$A^2 = (14)^2 = 196, (20)^2 = 400,$ .... $B^2 = (38)^2 = 1444, (42)^2 = 1764,$... $C^2 = (34)^2 = 1156, (40)^2 = 1600,$.....
2.	Find the sums of values in each of the three column & similarly sum of squares	$\sum A = 104$ $\sum A^2 = 2304$ $\sum B = 156$ $\sum B^2 = 5528$ $\sum C = 210$ $\sum C^2 = 44100$
3.	Add the sums of the values of each of the three columns	$\sum T = \sum A + \sum B + \sum C$ $(\sum T) = 104 + 156 + 210 = 470$
4.	Compute $\sum T^2$	$\sum T^2 = \sum A^2 + \sum B^2 + \sum C^2$ $= 2340 + 5528 + 44100 = 51968$

5. Compute sum of square of total scores (SST)	$SST = \sum T^2 - \left(\frac{\left(\sum T\right)^2}{n} \right)$ $SST = 51968 - \left(\frac{\left(470\right)^2}{15} \right)$ = 51968–14726.667 = 37241.333
6. Compute sum of squares between the scores (SSB)	*SSB* = $\frac{\left(\sum A\right)^2}{n_1} = \frac{\left(\sum B\right)^2}{n_2} + \frac{\left(\sum C\right)^2}{n_3} - \frac{\left(\sum T\right)^2}{n_t}$ *SSB* = $\frac{\left(104\right)^2}{5} + \frac{\left(156\right)^2}{5} + \frac{\left(210\right)^2}{5} - \frac{\left(470\right)^2}{15}$ = 2163.2+ 4867.2+8820–14726.667 = 15850.4–14726.667= 1123.733
7. Compute Error SS_W = SST – SSB	= 37241.33–1123.733= 36117.597
8. Prepare a summary table	Table 15

Table: Summary Table

Source of Variation	df	SS	Mean Squares
Between measurement	K–1=3–1=2	1123.733	561.8665
Within measurement	N–K=15–3=12	36117.597	3009.8
Total	N–1=15–1=14	37241.33	

K=Number of Groups

N=Total Number of Observations

$$F\ Ratio = \frac{SS_B}{SS_W}$$

$$F_{2,12} = \frac{1123.733}{36117.597} = 0.031$$

Since calculated value of F is not larger than the critical value (Refer a text book on Statistics) we cannot reject the null hypothesis. Hence, we infer that there is no statistically significant difference between the performances of three social workers.

Testing of Hypothesis

The Steps in Testing Hypothesis

1) State the Research Hypothesis (H_1)
2) Formulate the Null Hypothesis (Ho)
3) Choose a statistical Test
4) Specify a significance level.
5) Compute the statistical test
6) Reject/accept the Ho
7) Draw the inference i.e. accept/reject H_1

Step 1 : State the Research Hypothesis (H_1)

H_1 Employees' salary and level of job satisfaction are likely to be interdependent.

Step 2 : Formulate the Null Hypothesis (Ho)

Ho Employees' salary and level of job satisfaction are independent.

Step 3 : Choose a statistical Test

Let us suppose that we have decided to use Chi-Square statistic (χ^2) to test the interdependence between the variables considered in the research hypothesis.

Step 4 : Specify a significance level

Further we suppose that we would like to test our hypothesis at .05 level of significance.

Step 5 : Compute the statistical test.

In this step the researcher has to cross-tabulate his data and compute chi-square test. On computation of the test, let us say that the test yielded a value of 6.78, df = 1.

Step 6 : Reject/accept the Ho

Since the calculated value of chi-square is more than the critical value we reject the null hypothesis .

Step 7 : Draw the inference i.e. accept/reject H_1

We accept the research hypothesis because the null hypothesis has been rejected. Hence, we can infer that employees' salary and level of job satisfaction are interdependent.

Conclusion

Product Moment correlation and rank-difference correlation are the commonly used measures of relationship between any two variables. When the data are available in ordinal (rank) form of measurement and the size of the sample is small, then we compute rank-difference correlation. You have studied bivariate distributions and learnt methods to find relationship between two characterstics. Finally you have endeavoured into inferential methods and learnt about chi-square test, t-tests and F-test. This chapter will thus provide you with a base in your pursuit in Statisitcs.

References

Baker, L. Therese .*Doing Social Research,* New York: McGraw Hill, 1988.

Black, Allen & Babbie E. *Research Methodology for Social Work*, Belmont, California, Wadsworth, 1989.

Blalock, H.M.*Social Statistics*, Auckland. Mc Graw Hill, 1988.

Elhance, D.N. *Fundamental of Statistics*, Allahabad, Kitab Mahal, 1984.

Festinger. L. and Katz. D. (eds.) *Research Methods in the Behavioural Sciences,* New York : The Dryden Press,1953.

Freud, J.E. *Modern Elementary Statistics*, New Delhi, Prentice Hall, 1977.

Garret, H.E. *Statistic in Physical & Education*, Bomb: Vakils, 1966.

Gupta, S.P. *Statistical Methods*, New Delhi, S.Chand, 1980.

Kidder, Lauise H. *Research Methods in Social Relations,* New York: Holt, 1981.

Krishef, Curtis H. Fundamentals Statistics for Human Services and Social Work, Boston: Duxbury Press, 1987.

Lal Das, D.K. (2000), Practice of Social Research: A Social Work Perspective, Rawat Publications, Jaipur.

Levin, Richard I. *Statistics for Management* Delhi : Pearson Prentice Hall, 2005.

Monette, Duana R. et. al. *Applied Social Research: Tool For the Human Services,* Chicago: Holt, 1986.

Nachmias D and Nachmias C. *Research Methods in the Social Sciences*, New York: St. Martins press, 1981.

Ostle, B. and Mensing R.W. *Statistics in Research*, New Delhi, Oxford, 1975.

Philip, A.E. et. al. *Social Work Research*, and The Analysis of Social Data, Oxford: Peragon Press, 1975.

Sanders, D.H. et. al. *Statistics A Fresh Approach*, New Delhi: Mc Graw Hill, 1975.

16

Reporting of Research

Introduction

Every research activity is concluded by presenting the results and discussions. The reporting of a research study depends on the purpose with which it was undertaken. One might have conducted a study as a personal research, as an institutional project, as a project funded by an outside agency or towards fulfilling the requirement for the award of a degree.

Research studies, when reported, follow certain standard patterns, styles and formats for maintaining parity in reporting and for easy grasp by others who are concerned with those studies. The present chapter is devoted to this aspect of research: How to write a research report? It starts with the objectives of writing a research report, followed by the components of the report itself (the beginning, the main body, and the end).

Why and How to Write A Research Report

Once you complete your research project, you are expected to write the report. A research report is a precise presentation of the work done by a researcher while investigating a particular problem. Whether the study is conducted by an individual researcher by a team or by an institution, the findings of the study should be reported for several reasons. These are:

- People learn more about the area of study,

- The discipline gets enriched with new knowledge and theories,
- Researchers and practitioners in the field can apply, test and retest the findings already arrived at,
- Other researchers can refer to the findings and utilise the findings for further research and
- Findings can be utilized and implemented by the policy makers or those who had sponsored the project.

The final report of a research exercise takes a variety of forms.

- A research report funded by an educational institution may be in the form of a written document.
- A research report may also take the form of an article in a professional journal.
- The research reports of students of M.A., M.S.W., M.Sc., M.Ed., M Phil. or Doctoral Programme take the form of a thesis or dissertation.

In the following sections we shall discuss the main components of a research report. The entire research report is mainly divided into three major divisions: the beginning, the main body and the end (please see box).

Beginning	**Main Body**	**End**
• Cover/Title Page • Second Cover	• Introduction • Review of Literature	• Bibliography/ References
• Acknowledgements	• Designs of Research	• Appendices
• Contents	• Analysis and Interpretatiopn of Data	
• List of Contents	• Main Findings and Conclusions	
• List of Tables	• Summary	

The Beginning

The beginning of a report is crucial to the entire work. The beginning or the preliminary section of the research report contains the following items, more or less in the order given below:

- Cover or Title Page
- Acknowledgements
- Table of Contents
- List of Tables
- List of Figures and Illustrations
- Glossary

Let us describe in brief each of the above six items of the preliminary section of a report.

i) Cover or Title page

The cover page is the beginning of the report. Though different colleges, universities and sponsoring institutions prescribe their own format for the title page of their project report or thesis, generally, it foloows the downward vertical order:

- title of the topic,
- relationship of the report to a degree, course, or organisational requirement,
- name of the researcher,
- name of the supervisor,
- name of the institution where the report is to be submitted, and
- the date of submission.

The title page should carry a concise and adequately descriptive title of the research study. The title should briefly convey what the study is about. Researchers tend to make errors in giving the title by using too many redundant and unimportant words.

Here, we have drawn a list of a few titles of research reports and doctoral theses:

a) A Critical analysis of Textual Material for Principles of Accounting and its Translation for Distance Education

b) Developing Self-Instructional Material

c) Planning Design and Development of one Self-Instructional Unit in print

In title (b), it is not clear at which level the researcher is developing self-instructional material.

The title should be written either in bold letters or upper-lower case and be placed in the central portion of the top of the cover page. Here, we have reproduced the cover page of a research report in Box 1.

Box 1 : Example of the Title Page of a Research Report

Evaluation Scheme of Assistance To Organisations For the Disabled
Sponsored By:
Ministry of Social Welfare Government of India
Director
Dr. D.K. Lal Das
Principal
College of Social Work (ICSW)
Red Hills, Hyderabad - 500004
March, 2002

Note the other points mentioned on the cover page. Also observe the placement of these points.

ii) Preface or/and Acknowledgement

Preface is not a synonym for either a Acknowledgement or a Foreword. A preface should include the reasons why the topic was selected by the researcher. It may explain the history, scope, methodology and the researcher's opinion about the study. The preface and acknowledgements can be in continuation or written separately. This page follows the inner title page. It records acknowledgement with sincerity for the crucial help received from others to conduct the study. The acknowledgement should be non-emotional and simple.

iii) Table of Contents

A table of contents indicates the logical division of the report into various sections and subsections. In other words, the table of contents presents in itemized form, the beginning, the main body and the end of the report. It should also indicate the page reference for each chapter or section and sub-section on the right hand side of the table.

Sample table of contents is given below:

Box 2 : Table of Contents

	Contents	**Page**
Acknowledgement		i
Table of Contents		ii
List of Tables		iii
Chapter I	Introduction	1-16
Chapter II	Methodology	7-16
Chapter III	The Profile of the Respondents	17-37
	i) Beneficiaries	18
	ii) Non-Beneficiaries	28
Chapter IV	The Organisations for the Disabled	40-95

	i) Physical Setting	40
	ii) Administration and Organisation	43
	iii) Finance	49
	iv) Opinion of Community People	94
Chapter V	Evaluation of the services under the Scheme	96-107
	i) The Services	97
	ii) Opinion of Beneficiaries	97
	ii) Opinion of Non-Beneficiaries	103
	iv) Grant-in-Aid System	106
Chapter VI	Major Findings	107
Chapter VII	Conclusions and Suggestions	108-134
Bibliography		135
Appendixes		
I Voluntary Organisation 138		
II Interview Schedule for Administrator		142
III Interview Schedule for Beneficiaries		145
IV Interview Schedule for Non-Beneficiaries		150
V Interview Guide for Authorities/Community People		153
VI List of Voluntary Organisations		154

iv) **List of Tables**

The table of contents page is followed by the page containing a list of tables. The list contains the exact title of each table, table number and the page number on which the table has appeared. We provide you in Box 3 an example of a list of tables.

Box 3: Example of a List of Tables

Table	Title	Page
1	Population of Disabled	2
2	Age of the Beneficiaries	18
3	Level of Education	20
4	Sex of the Beneficiaries	21
5	Occupation of the Beneficiaries	22
6	Caste of the Beneficiaries	23
7	Marital Status	24
8	Size of the Family	25
9	Income of the Family	26
10	Nature of the Disability	27
11	Age of Non-Beneficiaries	28
12	Level of Education of Resident Beneficiaries	30
13	Sex	31
14	Caste	32
15	Marital Status	33
16	Size of the Family	34
17	Income of the Family	35
18	Nature of Disability	37
19	Staffing Pattern	46
20	Year-wise Distribution of grants-in-aid	51
21	Age and Opinion of Beneficiaries on Utility of the Services Provided under the Scheme	59

v) List of Figures and Illustrations

The page' List of Figures' comes immediately after the 'List of Tables' page. You will observe in the following example that the list of figures is written in the same way as the list of tables.

Box 4: Example of List of Figures

vi) **Glossary**

A glossary is a short dictionary, explaining the technical terms and phrases which are used with special connotation by the author. Entries of the technical termed are made in alphabetical order. A glossary may appear in the introductory pages although it usually comes after the bibliography. An exemplar glossary is given below.

Algorithm : A step-by-step procedure consisting of mathematical and/or logical operations for solving a problem.

Artificial Intelligence (AI): The study of computer techniques that mimic certain functions typically associated with human intelligence.

Back-up : Duplication of a program or file on to a separate storage medium so that a copy will be preserved against possible loss or damage to the original.

Benchmark	:	A measured point of reference from which comparisons of any kind may be made, often used in evaluating hardware and software, in comparing them against one another.
Command	:	An instruction to the computer which is not a part of a program.
Cybernetics	:	The field of science involved in comparative study of the automatic control or regulation of and communication between machine and man. These studies include comparisons between information-handling machines and the brains and nervous systems of animals and humans.
Data	:	Input in to a computer that is processed by mathematical and logical operations so that it can ultimately become an intelligible output.
Data Processing	:	The input, storage, manipulation and dissemination of information using sequences of mathematical and logical operation.

Electronic Spreadsheet	:	Software that simulates a worksheet in which the user can indicate data relationships. When data are changed, the program has the ability to instantly recalculate any related factors and save all the information in memory.
Graphics Package	:	A programme that helps draw graphs.
Hard Copy	:	Output of information in permanent form, usually on paper, as opposed to temporary display on a CRT screen.
Ink Jet Printer	:	A type of printer in which dot matrix characters are formed by ink droplets electrostatically aimed at the paper surface.
Laser Printer	:	A printer that uses a laser beam to form images on photo-sensitive drums. Laser printers are now used as output devices for computers.
Megabyte (MB or M-Byte)	:	A unit of data storage in a computer, such as 1024 kilobytes or 10241024 bytes.
Personal Computer	:	A moderately priced computer, designed principally for a single user in a home or small-office environment.

Source: Balagurusamy E: Selecting and Managing Small Computers.

ii) List of Abbreviations Italics

To avoid repeating long names again and again, a researcher uses abbreviations. Since abbreviations are not universal, it is necessary to provide the full form of the abbreviations in the beginning. An exemplar list of abbreviation is given below.

Abbreviations

AIMA	All India Management Association
AIR	All India Radio
APPEP	Andhra Pradesh Primary Education Project
AVRC	Audio Visual Resource Centre
ATI	Administrative Training Institutes
BEL	Bharat Electronics Limited
BEO	Block Education Officer
BRC	Block Resource Center
BSE	Board of Secondary/Senior Secondary Education
CABE	Central Advisory Board of Education
CBT	Computer-Based Training
CEO	Circle Education Officer
CIET	Central Institute of Educational Technology
CRC	Cluster Resource Center
CSS	Centrally Sponsored Scheme
DIET	District Institute of Educational Technology
DIT	District Institute of Training
DD	Doordarshan
DOE	Department of Electronics

DoSpace	Department of Space
DOT	Department of Telecommunication
DPEP	District Primary Education Program
DPEPII	District Primary Education Program: Phase II
EMRC	Education Media Resource Centre

The Main Body

The main body of the report presents the actual work done by an investigator or a researcher. It tells us precisely and clearly about the investigation/study from the beginning to the end. The ‘methodology’ section of the final report should be written in the past tense because the study has been completed. The report categorically avoids unnecessary details and loose expressions; we shall examine this point in detail in this section. At this stage, you may again look at the Box on page 361. You will find that the table of contents for the report outlined of six section/chapters in the main body. These are:

- Introduction
- Review of Literature
- Design of the Study
- Analysis and Interpretation of Data
- Major Findings
- Conclusions and Discussions
- Summary

Besides the logicality of sections/chapters in the main body, there are certain other important aspects which need our attention. These are the style of writing, the design and placement of references and footnotes, the typing of the report, and the tables and figures.

Let us elaborate these points in the following sub-sections.

Chapters and their Functions

We will discuss the chapterisation of a thesis or a research report under six heads as noted above. Let us begin with introduction which is usually the first chapter.

Introduction

This is the first chapter of a research report. It introduces the topic or problem under investigation and its importance. The introductory chapter:

- Gives the theoretical background to the specific area of investigation,
- States the problem under investigation with specific reference to its placement in the broader area under study,
- Describes the significance of the present problem,
- Defines the important terms used in the investigation and its reporting,
- States precisely the objective(s) of the study,
- States precisely the important terms used in the study that would be tested through statistical analysis of data, and
- Defines the scope and limitations of the investigations.

Although these sub-sections are common, it is not necessary to follow the given order strictly; there may be variation in the order of the sub-sections. Sometimes the review of literature related to the area under investigation is also presented in the first chapter and is placed immediately after providing the theoretical background to the problem. Many researchers use review to argue the case for their own investigation. In experimental research it becomes essential to review related studies to formulate the hypotheses.

Review of Literature

The second chapter of a research report usually consists of the review of important literature related to the problem under study. This includes the abstraction of earlier research studies and the theoretical articles and papers of important authorities in the field. This chapter has two functions. Firstly, while selecting a problem area or simply a topic for investigation, the researcher goes through many books, journals, research abstracts, encyclopaedia, etc. to finally formulate a problem for research in order to decide on a specific problem for investigation. The review of literature is the first task for a research in order to decide on a specific problem for investigation. It also helps in formulating the theoretical framework for the entire study. Secondly, such a review helps the researcher to formulate the broader assumptions about the factors/variables involved in the problem and later develop the hypothesis/ hypotheses for the study.

Besides these, the review also indicates the researcher's grasp over the area under investigation, and also his/her efficiency to carry out the study. While reviewing literature in the area concerned, you have to keep in mind that (reviewed) literature has to be critically analysed and summarized in terms of agreements and disagreements among the authors and researchers in order to justify the necessity for conducting your investigation. Researchers may make two types of errors in their review exercises. Many researchers simply report the findings of one study after another in a sequential order without showing how the findings are connected with one another. Others report on studies that are at best only marginally related to their own hypothesis.

The design of a study is usually described in the third chapter of the report. Broadly speaking, this chapter provides a detailed overview of "how" the study was conducted. The various sub-section include:

i) description of the research methodology,

ii) variables: the dependent, independent and intervening variables with their operational definitions;

iii) Sample: defining the population, and the sampling procedure followed to select the sample for the present study;

iv) listing and describing various tools and techniques used in the study, like questionnaires, attitude scales, etc., whether these have been adopted or developed by the investigator, their reliability, validity, item-description, administration and scoring, etc.;

v) describing the statistical technique used in the analysis of data including the rationale for the use and method of data analysis.

Analysis and interpretation of data

This is fourth chapter of the research report. It is the heart of the whole report, for it includes the outcome of the research. The collected data are presented in tabular form and analysed with the help of statistical techniques– parametric and non-parametric. The tables are interpreted and if necessary, the findings are also presented graphically. The figures do not necessarily, repeat the tables, but present data visually for easy understanding and easy comparisons. Data may be presented in parts under relevant sections. The analysis of the data not only includes the actual calculations but also the final results. It is essential that at each stage of analysis the objective(s) of the study and their coverage is taken care of. This chapter also presents the details about the testing of each hypothesis and the conclusions arrived at. This gives the reader a clear idea regarding the status of the analysis and coverage of objectives from point to point.

Main findings and conclusion

This is usually the fifth chapter in a research report. The major findings of the study analysed and interpreted in the preceding chapter are precisely and objectively stated in this chapter. The fourth chapter contains such presentations as only a specialist or a trained researcher can understand because of the complexities involved; but in the fifth chapter the major findings are presented in a non-technical language so that even a non-specialist such as a planner or an administrator in the field can make sense out of them.

The main findings are followed by a discussion of the results/findings. The major findings are matched against the findings of other related research works which have already been reviewed in the second chapter of the report. Accordingly, the hypotheses formulated in the first chapter are either confirmed or discarded. In case the null-hypotheses are rejected, alternative hypotheses are accepted. If the findings do have any discrepancy in comparison with those of other researches or if the findings do not explain sufficiently the situation or problem under study or if they are inadequate for generalisations, explanations with proper justification and explanation have to be provided.

The implications should suggest activities for and provide some direction to the practitioners in the field. Unless these implications are clearly and categorically noted, it becomes difficult for the practitioners to implement them on the one hand, and on the other, research findings do not get utilised at all even if they have been recorded in a report.

The implications follow a presentation/listing of the limitations of the study on the basis of which suggestions are made to carry out further investigation or extend the study from where it has reached.

Summary

Some researchers include a summary alongwith the research report (as the last chapter) or as a pull-out to the report itself. If sums up precisely the whole of the research report right from the theoretical background to the suggestions for further study. Sometimes researchers get tempted to report more than what the data say. It is advisable to check this tendency and be always careful to discuss the report only within the framework provided by the analysis and interpretation of data, i.e., within the limits of the findings of the study.

Writing Style

The style of writing a research report is different from other writings. The report should be very concise, unambiguous, and presented meaningfully. The presentation should be simple, direct and in short sentences. Special care should be taken to see that it is not dull and demotivating.

Statements made should be as precise as possible – they should be objective and there should be no room for subjectivity, personal bias and persuasion. Similarly, over generalisation must by avoided. There is no place for hackneyed, slang and flippant phrases and folk expressions. The writing style should be such that the sentences describe and explain the data but do not try to convince or pursuade the reader. Since the report describes what has already been completed, the writing should be in the past tense.

In the case of citations, only the last name of the author is used, and in all cases, academic and allied titles like, Dr., Prof., Mr., Mrs., etc. should the avoided. Some authors recommend that the use of personal pronouns like "I", "We" etc., should be avoided, however, there is no hard and fast rule in this case. Similarly, a large number of research reports use passive voice which is strongly discouraged by the linguists. Similarly, abbreviations of words and phrases – like IGNOU, DDE, NIRD, etc. – should be used to avoid long names repeatedly inside the text, as well as in figures, tables, and footnotes.

Special care should be taken while using quantitative terms in a report, such as *few* for number, *less* for quantity etc. No sentence should begin with numericals like "40 students", instead it should start as "Forty students". Commas should be used when numbers exceed three digits –1,556 or 523,489, etc.

Language, grammar and usage are very important in a research report, the *Roget's Thesaurus Handbook of Style* by Campbell and Ballon (1974), and a good dictionary would be of much help. MS-Word software provides good support to

— Spelling and Grammar
— Thesaurus
— Auto Correct
— Auto Summarise

A researcher is advised to use these features on the MS-Word to make the report error-free. It is always advisable to show the report to learned friends or language experts for correction before it is finally typed. Revision is an important feature of good report writing – even experienced researchers with many publications revise their reports many times before giving them for final typing.

References

Articles, papers, books, monographs, etc. quoted inside the text should always accompany relevant references, i.e., the author and the year of publication e.g., (Mukherjee, 1998). If a few lines or sentences are actually quoted from a source, the page number too should be noted e.g., (Mukherjee, 1998:120-124). Besides, full reference should be placed in the Reference section of the report (see section Bibliography and References).

In preparing the references, another factor to be considered is the abbreviations of words and expressions and their right placement. While writing a research report, abbreviations may be used to conserve space in references. If a researcher is not familiar with the abbreviations, he/ she should consult the relevant literature as and when required. In the following table a comprehensive list of abbreviations has been given for ready reference (the Latin abbreviations have been italicised).

Table : List of some important Abbreviations used in Footnotes and Bibliographies

Words	**Abbreviation**
About (approximate)	c. (*cireca*)
Above	*supra.*
And the following	*et seg.*
And the following	*f.,ff.*
And others	*et. al.*
Article, articles	art., arts.
Article, articles	*infra.*
Book, books	bk., bks.
Chapter, chapter	chap., chaps.
Column, columns	Col., Cols.
Compare	*cf.*
Division, division	div., divs.
Editor, editors	ed., eds.

Edition, editions	ed., eds.
For example	*e.g.*
Figure, figures	fig., figs.
Here and there (scattered)	*passim*
Illustrated	Ill
Line, lines	l. ll.
Manuscript	ms.
Mimeographed	mimeo.
No date given	n.d.
No name given	n.n.
No place given	n.p.
Number, numbers	no., nos.
Page, pages	p., pp.
Part, parts	pt., pts.
Paragraph in length	(….)
Paragraph, Paragraphs	par., pars
Previously cited	*op. cit.*
Revised	rev.
Same person	*idem.*
Same reference	*ibid.*
Section, sections	sec., secs.
See	*vide*
The place cited	*loc. cit*
Thus	*sic.*
Translated	trans.

Typing of dissertations, research reports, project reports etc. needs greater care than other typed documents. In a research report, one does not expect overwriting, strikeovers, erasures and insertions.

Before typing the report, it is necessary to check whether the handwritten report, i.e., the manuscript is in a proper shape. Whether the manuscript of the report is typed by a typist or by the researcher himself/herself, a clear and comprehensible manuscript makes typing easy. Too many additions and corrections make the manuscript crammed., and a crammed manuscript makes typing difficult and time consuming. Only one side of the paper should be typed and typing should be double spaced. Space should be left on each side of the paper as follows:

- left side margin
- right side margin
- top margin
- bottom margin

If there is a lengthy quotation, it should be indented and typed in single space. At the end of each line, words should be divided as per convention. A dictionary which shows syllabification should be consulted if words are to be broken at all. Unlike the lengthy quotations, short quotation of three/four lines may be included in the text within quotation marks.

Subject to access to a computer and word processing software, it is better to prepare the report on a computer. It has several advantages, for example, you can

- edit time and again without incorporating new errors which is what happens when you use a manual typewriter,
- define your margin – top, bottom, left and right easily,
- define pages in landscape or portrait size, particularly for tables and diagrams,
- choose out of about 70+ fonts, shapes of letters and type-sizes from the smallest 8 point to the large 72 point,
- check spelling, grammar, synonyms and antonyms,

- choose illustrations from the clip-art file, and
- can index (alphabetical order) the references automatically.

Tables and Figures

Tables: Preparation and appropriate placement of tables in the text are equally important. They need careful attention from the researcher. Tables help the readers to get a quick view of the data and comprehend vast data at one go. However, tables should be presented only when they are necessary. Too many tables may confuse the reader, instead of facilitating his/her reading. As such you need to be selective in placing tables in the report. If data are too complicated to be presented in one table, several tables, may be used to give a clear picture of the data in proper sequential order. Tables, if small, may accompany the textual material, and if large, should be put on one full page without mixing them with the text. All the tables should be numbered serially in the text, so that they may be quoted or referred to with the help of those numbers conveniently.

If a table is large, it should continue on the next page with the table title repeated on the top of the next page; otherwise, tables can be typed in smaller fonts like 8 point or 9 point to accommodate them on the same page. The table itself is centred between the two margins of the page, and its title typed in capital letters and is placed in pyramid size. The title of the table should be brief but self-explanatory.

Figures: Figures are necessary when the data is to be presented in the graphic form. They include charts, maps, photographs, drawings, graphs, diagrams, etc. The important function of a figure is to represent the data in a visual form for clear and easy understanding. Textual materials should not be repeated through figures unless very necessary.

Figures should be as simple as possible and the title of each figure should precisely explain the data that has been presented. Usually, a figure is accompanied by a table of numerical data. Again, figures are presented only after textual discussion and not the other way round. The title design of figures should be followed consistently throughout the report. Every first letter of a word of the title should be in capitals, and figures should be numbered in Indian numerals like 1, 2, 3 etc. And the title, unlike for tables, is presented below the figure.

The End

The end of the report consists of references and appendix/ appendices. References come at the end after the last chapter of the report. The last section labelled as references appears at the top of a new sheet of paper. The reference section is a list of the works that have been cited in the report/thesis. All references quoted in the text are listed alphabetically according to the last name of the authors. The works of the same author should be listed according to the date of publication with the earliest appearing first.

Bibliography and References

Research reports present both bibliographies and references. Although many researchers use these terms interchangeably, the two terms have definite and distinct meanings. A bibliography is a list of titles – books, research reports, articles, etc. that may or may not have been referred to in the text of the research report. References include only such studies, books or papers as have been actually referred to in the text of the research report. Whereas research reports should present references, books meant for larger circulation may be listed in bibliographies that should include all such titles as have been referred to.

There are mainly two style manuals detailing general form and style for research reports. These are:

- American Psychological Association, *Publication Manual,* 3rd ed. Washington, DC: American Psychological Association, 1983.
- *The Chicago Manual of Style, 13th* rev.ed., Chicago University of Chicago Press, 1982.

Style of Referencing

There are mainly two types of referencing:

1) arranging references in alphabetical order where the researcher has cited the name of the author and year of publication/completion of the work in the text.
2) arranging references in a sequence as they appear in the text of the research report. In this case, related statement in the body of the text is numbered. However, most research reports use alphabetical listing of references.

For example, entries in a reference section may look like the following:

Gannicott, K. and Throsby, D. (1994), *Educational Quality and Effective Schooling*, UNESCO, (Book), Paris.

Koul, B.N., Singh, B. and Ansari, M.M. (1988), *Studies in Distance Education*, IGNOU & AIU, New Delhi.

Kumar, K.L. (1995), *Educational Technology*, New Age Publishers, New Delhi.

Ministry of Human Resource Development, DPEP: *Guidelines* (1995), Department of Education MHRD, Government of India, New Delhi.

Mukhopadhyay, M. (ed.) (1990), *Educational Technology: Challenging Issues*, Sterling Publishers, (Edited Book), New Delhi.

Mukhopadyay, M. (1998), "Teacher Education and Distance Education: The Artificial Controversy", in Buch, Piloo M., (ed.) *Contemporary Thoughts on Education*, SERD, (Chapter in Book), Baroda.

Parhar, M. (1993), Impact of Media on Student Learning, Unpublished Doctoral Dissertation, Jamia Millia Islamia, (Thesis), New Delhi.

Sachidananda, Tribal Education: New Perspectives and Challenges, *Journal of Indian Education*, New Delhi: NCERT, 1994. (Article in a Journal)

Selltiz, Claire et. al. (1959), *Research Methods in Social Relations*, Rinehart & Winston, Holt, New York.

Dhanarajan, Gajaraj, "Access to Learning and Asian Open Universities: In Context"in the 12th Annual Conference of Asian Association of Open Universities, (1998) "*The Distance Learner*" The Open University of Hong Kong, Hong Kong SAR, China, 4-6 Nov., (Conference Paper).

You would notice the following:

- All studies are arranged in alphabetical order
- The names of the authors are recorded by title and initials (not full name).
- To indicate two or three authors, 'and' is used between the first and the second, ',' between first and 'and' between second and third author.
- In case of more than three authors, only the name of the first author is mentioned followed by *et al.* (*et allibi*) or others.
- In case of a chapter in a book, after the author and

chapter title and the name of the author or editor of the book.

- Titles of printed books, names of journals are highlighted by using 'italics' or by underlining (in case of manually typed material).
- Place of publication of a book precedes the name of the publisher separated by a ':'(colon).
- Names of journals are following by the relevant volume and issue numbers usually in the form 10(3) –Volume 10, Number 2 and page numbers.
- Unpublished thesis or dissertation titles are not highlighted and the word 'unpublished' is mentioned.

Referring Web-Based Documents

Computers have brought revolution in all sectors of development including education. Computers were conventionally used for data storage, processing and retrieval. Through internet, information can be accessed from any part of the world. As researchers, reviewing the relevant literature related to the problem under study is almost magnum opus. These days internet is a rich academic and professional resource. World Wide Web (WWW) is the easiest and most popularly used browsing mechanism on the Internet. Here we will very briefly explain as how to write the references when we quote from any Web Site.

Citing E-Mail

E-Mail communications should be citied as personal communications as noted in APA's publication Manual http://www.apa.org/journals/webref.html. Personal Communications are hot cited in the reference list. The format in the text should be as:

Citing a Web Site

When you access the entire Web site (not a specific document on the site), you just give the address of the site in the text. It is not necessary to enter in the reference section.

For example,

http://www.ignou.ac.in (IGNOU's website)

http://www.webct.com/ (This site provides tools for development of web-based courses)

Citation of specific document on a web site has a similar format to that for print. Here, we give few examples of how to cite documents. The Web information is given at the end of the reference section. The date of retrieval of the site should be given because documents on the Web can change in content or they may be removed from a site.

Example

Duchier, D. (1996), Hypertext, New York: Intelligent Software Group. [Online] http://www.isg.sfu.ca/duchier/misc/hypertext - review/chapter4.htm]Accessed on 25/1/99].

Flinn, S. (1996), Exploiting information structure to guide visual browsing and exploratory search in distributed information systems [Online] http://www.cs.ubc.ca/reading-room/[Accessed June 1998]

If you have to cite some specific parts of a web document, indicate the chapter, figure, table as required.

Appendices

Usually, the appendices present the raw data, the true copy of the tools used in the study, important statistical calculations, photographs and charts not used inside the text. These are ordered serially like Appendix-1, Appendix-2, or they can be serialised with capital letters (Appendix A, Appendix B) etc. to facilitate referencing within the text. The appendices provide reference facilities to readers and others interested in that particular field of investigation.

Conclusion

In this chapter, we focused on research reporting as a professional activity. The purpose of writing the report depends on the reason behind undertaking the research study. It could be for obtaining a degree, or as a project report to be submitted to the funding agency, etc. Once submitted, the funding agency and the educational managers could utilise the findings and recommendations to achieve their objectives; other researchers may seek guidance from it and lastly, the findings may be used for developing new theories in the discipline concerned.

A research report has three parts: the beginning, the main body and the end. The beginning includes: cover or the title page, acknowledgements, table of contents, the list of tables and the list of figures. The main body normally contains an introduction, review of the relevant literature, objectives, hypotheses, research design (research methodology, population and sample, tools, procedure of collecting data), analysis and interpretation of data, the main findings and conclusion (that also includes its educational implications and suggestions for further studies). While discussing the main body, we have talked about the style of writing the report, style and placement of footnotes and reference, the typing process and the format and placement of tables and figures. We closed the discussion with notes on the style, arrangement and placement of references and appendices which constitute the end of a research report.

References

Baker, L., Therese (1988), *Doing Social Research,* McGraw Hill, New York.

Black, James A. and Champion, Dean J. (1976), *Methods and Issues in Social Research,* John Wiley, New York.

Kerlinger, Fred R. (1964), *Foundations of Behavioral Research,* Surjeet Publications, Delhi.

Kidder, Louise H. (1981), *Research Methods in Social Relations,* Holt, New York.

Lal Das, D.K. (2000), *Practice of Social Research : A Social Work Perspective,* Rawat Publications, Jaipur.

Monette, Duane R. et. al. (1986), *Applied Social Research: Tool For the Human Services,* Holt, Chicago.

Nachmias D and Nachmias C. (1981), *Research Methods in the Social Sciences*, St. Martins Press, New York.

Rubin, Allen & Babbie E. (1989), *Research Methodology for Social Work*, Belmont, Wadsworth, California.