

9. An Overview of Methods of Data Collection

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9.1 Introduction of Data Collection:

Data is a collection of data collected from various sources, figures, objects, symbols and events. In order to make better decisions, organisations collect data. Without data, organisations would find it difficult to make appropriate decisions, so that data from various audiences are collected at different points in time.

An organisation needs to collect data about product requests, customer preferences and competitors before, for example, a new product is launched. If data are not collected earlier, the newly launched product of the organisation may lead to a failure for many causes, such as lower demand and failure to meet customer requirements.

Data collection is the collection and measurement process of data on variables of interest, in an established system that allows one to answer questions, test hypotheses and evaluate results from research. In all areas of research, data collection is commonplace in physical and social sciences, science, business, etc.

The emphasis on guaranteeing an accurate and honest collection remains the same, although methods vary by discipline. The objective of the collection of all data is to obtain quality evidence, which then results in a comprehensive data analysis and enables a persuasive and credible response to questions.

In order to preserve the integrity of research, accurate data collection is essential, regardless of the field of study or preferences for defining data (quantitative and qualitative). The selection (present, modified or newly developed) of appropriate data collection tools as well as clear guidelines on how to use them correctly reduces the probability of error.

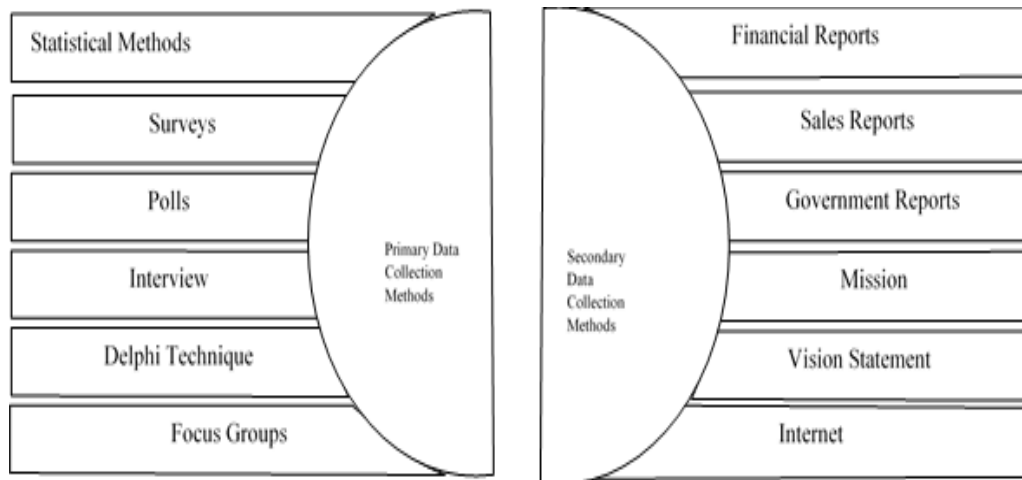


Figure 9.1: Concept of Data Collection

The collection of data is one of the most important phases of research. You can have the world's best research Design, but you will not be able to complete your project unless you can collect the necessary information. Data collection is a very demanding task that requires careful planning, hard work, patience, perseverance and more to successful completion. The collection of data begins with determining what type of data is required and the selection of a specimen from a particular population. Then you have to use a specific tool to collect the data from the sample selected.

9.1.1 Types of Data:

Two broad categories are organized in the data: qualitative and quantitative.

A. Qualitative Data:

Qualitative information is mainly non-numerical and usually descriptive or nominal. This means that the information is collected in words and phrases. Such information often (not always) captures the feelings, emotions or subjective perceptions of something. Qualitative approaches address the program's 'how' and 'why' and tend to explore the subject by using unstructured data collection methods. Qualitative matters are unresolved. Qualitative approaches include focus groups, group debates and interviews. Qualitative approaches are good for further study of the program's effects and unintentional consequences. However, they are expensive and time-consuming. Furthermore, the results cannot be generalised to participants outside the programme and are only indicative of the group. Qualitative methods of data collection play an important part in impact assessments by providing useful information to understand the processes behind observed results and to assess changes in people's understanding of their welfare. Moreover, qualitative methods can be used to improve the quality of quantitative assessments based upon the survey through the generation of assessment hypotheses; strengthen the design of survey surveys and expand or clarify the results of quantitative assessments. The following characteristics characterize these methods:

- They are generally open and have less structured protocols (i.e. by adding, improved or dropping techniques or informants, investigators can alter the data collected strategy);
- Interactive interviews are more important; respondents can be interviewed several times for follow-up on specific topics, clarify concepts or check the reliability of the data;
- They use triangulation to increase their findings' credibility (i.e. researchers rely on multiple methods of data gathering to check that their findings are authentically);
- Its findings are not generalizable to any particular population in general, instead each case study produces one piece of evidence to seek general patterns between different studies on the same subject.

Regardless of the kind of data involved, it takes a lot of time to collect data in a qualitative study. The investigator must thoroughly, precisely and systematically record any potential useful data using field notes, drawings, audiotapes, photos and other appropriate media. The methods of information collection must respect the ethics of research. The most common qualitative methods used in the assessment can be divided into three broad categories.

- Profound interview
- Methods for observation
- Review of the document

B. Quantitative Data:

Quantitative data are numerical in nature and can be calculated mathematically. The measurement of quantitative data uses different scales, which can be classified as nominal, ordinal, interval and ratio scales. Such data often (not always) include measurements. The 'what' in the programme are quantitative approaches? They use a systemically standardized approach and use techniques like surveys and questions. Quantitative approaches are less costly to use, standardized to enable comparisons to be carried out easily and to generally measure the effect size. However, their capacity to investigate and explain similarities and unexpected differences is limited in terms of quantitative approaches.

It is important that quantitative data collection approaches are often difficult for peer-based programmes for agencies because a lack of resources is commonly experienced, such as a lack of rigorous surveys and often low turnout and loss of monitoring rates.

The methods of quantitative data collection are based on random sampling and structured data collection instruments which fit various experiences into predetermined categories of response. They produce results that can be compared, summarized and generalized easily. The researcher uses probability sampling to determine the number of participants to be generalized from the research participants to a larger population. Typical strategies for quantitative data collection include:

- Clinical trials/experiments.
- Careful observation and recording of events (e.g., counting the number of patients waiting in emergency at specified times of the day).
- Recovery of relevant data from information management systems.

- Close-ended questions management surveys (e.g., face-to face and telephone interviews, questionnaires etc).
- Interviews are more structured than qualitative research in quantitative research (survey investigation). The researcher asks a standard set of questions in a structured interview and nothing else. Concerning face-to-face interviews, the researcher has a distinct advantage that he can relate and thus cooperate with potential participants.

Paper-pencil-questionnaires can be sent to many people and saves time and money for the researcher. People are more truthful, when answering questionnaires, in particular because their responses are anonymous, concerning controversial issues.

C. Mixed Methods:

Mixed methods are used as designs and combined in one research framework both qualitative and quantitative data, techniques and techniques. Mixed approaches may involve several aspects, namely, several different types of methods in a study or at various points within a study or using a mix of qualitative and quantitative methods. Mixed methods involve diverse approaches combining strengths and weaknesses derived from the use of a single research design. Using such a method of data collection and evaluation, validity and reliability of research can be increased. Some of the common areas for the use of mixed methods include:

Initiate, develop, develop and expand interventions;

- Evaluation;
- Enhance the design of research; and
- Corroborating results, triangulation of data or convergence.

A mixed method approach includes some of the challenges:

- Delimitation of qualitative and quantitative complementary research issues;
- Collected and analysed time-intensive data; and
- Decisions on the combining methods of research.

Mixed methods serve to highlight complex research problems, such as health disparities and can transform issues for vulnerable or marginalized populations or research involving community involvement. A mixed method approach is one way to develop creative options for research and evaluation for traditional or single design approaches. Data can be classified in many different ways. The basis for a common classification is who collected the information.

D. Primary Data:

Data collected from first-hand experience are referred to as primary data. Primary data have not yet been released and are more trustworthy, authentic and objective. Primary data have not been changed or modified by humans; its validity is therefore greater than secondary

data. Primary data import: In statistical surveys information from primary sources should be collected and primary data should be processed. The statistical records of women in a country, for example, cannot be based on newspapers, magazines and other printed sources.

A research without secondary data can be carried out but a research based only on secondary data is least reliable and may be distortionary because secondary data is already manipulated by people. One source of this type is old and it also contains limited information, as well as misleading and biased information.

Sources of Primary Data: There are limited sources of primary data and sometimes data can hardly be obtained from the primary source due either to population shortages or lack of cooperation. There are some of the primary data sources below.

Experiments: Experiments need an artificial or natural environment in which logical data collection is carried out. For medicine, psychological studies, nutrition and other scientific studies, experiments are more suitable. The experimenter must monitor the influence of any alien variable on the results during experiments.

Survey: In social science, management, marketing and psychology, surveys are the most commonly used method. Surveys in various methods can be carried out.

Questionnaire: It is the most widely used survey method. Questionnaires consist of an open or closed list of questions for which the respondents provide answers. Questionnaires can be made via telephone, mail, live in public areas or in an institution, by mail or by fax.

Interview: The interview is an interview with the respondent face to face. When the questioner consciously hides information, in the interview the main issue arises, otherwise it is a thorough source of information. Not only can the interviewer record the statements that the respondent speaks, he also observes the body language, expressions and other reactions to the questions. The interviewer can therefore easily draw conclusions. **Observations:** An observation may be performed while informing the observer, or without informing, that he/she is observed. In the natural and artificially created environment observations can also be made.

Advantages of Using Primary Data

- The researcher collects information specific to the studied problem.
- The quality of the data collected is beyond question (for the investigator).
- Additional data can be obtained during the study period if necessary.

Disadvantages of Using Primary Data

i. All data collection has to be addressed by the investigator:

- Decide why, what and how, when to gather;
- Recovery of data (individually or through others); receipt of financing and management of funding agencies;

- Ethical aspects (consent, permissions, etc.).
- ii. The collection of data is ensured to a high standard:
- All requested data is accurately collected and requested in format;
 - No fake/cooked information exists;
 - Not included inappropriate/unnecessary data.
- iii. Data acquisition costs are often the biggest cost in study:

E. Secondary Data:

Data collected from a source published in any form is referred to as secondary information. In any research the examination of literature is based on secondary information. It is gathered for another purpose by someone else (but being utilized by the investigator for another purpose). For example, data from the census are used to analyse the impact of education on career choice and income.

Census, organisation, and data collected through qualitative methodologies and qualitative research are common sources of social science secondary data. Secondary data is important, because a new survey that captures changes and / or developments of the past cannot be carried out appropriately. Secondary data sources: Some ways to gather secondary data are as follows:

- Books
- Records
- Biographies
- Newspapers
- Censuses or other statistical data published
- Files of data
- Articles on the Internet
- Articles by other investigators (journals) Research Databases, etc.

Importance of Secondary Data:

Secondary data may be less valid, but it is still important. Primary data are sometimes difficult to obtain; in these cases it is easier and possible to get information from secondary sources. In such a situation, there are sometimes no primary data that must contain secondary data research. Sometimes primary data is available, but in such cases, the respondents are not prepared to reveal it. For instance, it is difficult to find, if you research the psychology of transsexuals first and second, they might not be willing to provide you with the information you want for your research so that you can collect information from books or other published sources. It is clear that much of the background work that is necessary to use secondary data was already done. For example, there might have been literature reviews, case studies, published texts and data elsewhere, and promotional media and personal contacts used. This abundance of background work means that secondary data

generally have an established degree of validity and reliability that the researcher who re-use such data does not have to re-examine. Secondary data may also be helpful in the research design of subsequent primary research and provide a basis for comparing the collected primary data results. Consequently, any research activity is always wise to start with a secondary data review.

Advantages of Using Secondary Data:

- No data gathering hazards.
- It's less costly.
- The researcher is not personally responsible ('I did not') for the quality of the data.

Disadvantages of Using Secondary Data:

- Third parties may not be reliable persons in collecting their data, thus reducing their reliability and accuracy.
- Data from one location may not be suitable for the environmental factor of the other due to variable factors.
- The data becomes obsolete and very old over the course of time.
- The collected secondary data may distort research findings. Special care must be taken to modify or change the use of secondary data.
- Secondary data may also raise problems with copyright and authenticity.

With the advantages and inconveniences of data sources required for the research study and time factor taken into consideration, both primary and secondary data sources were chosen.

9.2 Issues to be considered for Data Collection/ Norms in Research:

There are several reasons why adherence to ethical standards in research is important. Firstly, standards promote research objectives such as knowledge, truth and error avoidance. For instance, bans on manufacturing, falsification or misrepresentation of research data support truth and prevent error. Secondly, because research involves many different people in different disciplines, institutions and cooperation, ethical principles foster the values necessary in collaborative activities, such as trust, responsibilities, mutual respect and fairness. Ethical standards are essential. For example, many research ethical standards, such as authorship guidelines, copyright and patent policies, data sharing policies and peer review confidentiality, have been designed to defend and promote collaboration on intellectual propriety interests. Most researchers want credit for their contributions and do not want their ideas stolen or prematurely disclosed. Third, many ethical standards ensure that scientists have public responsibilities. Fourthly, ethical research standards also contribute to the development of public support for research. Individuals who rely more on the quality and integrity of research will finance their research project. Lastly, a variety of other important moral and social values, such as social responsibility, rights and animal welfare, law-enforcement and health and security, are promoted under several research standards. Ethical research deficiencies can significantly affect subjects, students and the public of humans and animals.

For instance, researchers making data in a clinical trial can damage or even kill patients and researchers who fail to comply with radiation or biological safety regulations or guidelines may compromise their health and safety or the safety and safety of staff and students.

Given the importance of Research Ethics, it is no surprise that many professional groups, government agencies and universities have adopted specific codes, regulations and policies relating to Research Ethics. This is an overview and general summary of certain ethical principles covered by different codes:

Honesty: Strive in all scientific communications for honesty. Report honest data, results, processes and publishing status honestly. Do not produce, falsify or incorrect information. Do not mislead colleagues, agencies or the public.

Objectivity: Ensure that there are no biases in experimental design, data analysis, data interpretation, peer review, personnel decisions, grants, expert reporting and other research aspects where objectivity is expected and required. Avoid or minimize prejudice or disappointment. Reveal personal or financial interests that might have an impact on research.

Integrity: Keep your promise and understanding; act sincerely; strive for coherence in thinking and acting.

Carefulness: Avoid careless errors and negligence; examine your own work and your peers' work carefully and critically. Conserving good research records such as data collection, design of research and correspondence with agencies or journals.

Openness: Share data, outcomes, ideas, resources and tools. Be open to new ideas and criticism.

Respect for Intellectual Property: Honor patents, intellectual property and other forms of rights. Do not without permission use unpublished data, methods or results. Give loans when loans are due. Provide proper recognition or credit for all research contributions. Do not always plead.

Confidentiality: Protect confidential communications, such as publication papers or grants, personal records, business or military secrets, and patient records.

Responsible Publication: Publish yourself not just to advance your own career to promote research and research. Prevent rubbish and duplicate publication.

Responsible Mentoring: Supporting student training, mentorship and advice. Promoting their well-being and making their own decisions.

Respect for Colleagues: Respect and deal fairly with your colleagues.

Social Responsibility: Endorse social wellbeing by research, public education and advocacy to prevent or mitigate social harm.

Non-Discrimination: Avoid discrimination based on sex, race, ethnicity and other factors that is not related to their scientific competence or integrity against their colleagues or students.

Competence: Maintain and improve your skills and expertise through lifelong learning; undertake measures to promote scientific expertise as a whole.

Legality: Knowing and complying with applicable legislation and institutional and public policies.

Animal Care: Demonstrate appropriate respect and care for animals in research. Do not conduct animal experiments that are unnecessary or poorly designed.

Human Subjects Protection: If you conduct research on human subjects, minimize harms and risks and maximize benefit; respect human dignity, privacy and independence; deal with vulnerable populations with special precautions; and try to fairly share the benefits and burdens of research. Research ethics training should help researchers tackle ethical dilemmas by introducing researchers to the key concepts, tools, principles and methods needed to resolve those dilemmas. The issues have indeed become so important for research training.

9.3 Methods of Primary Data Collection:

You collect the data yourself with qualitative and quantitative methods in the primary data collection. The key point here is that you and your research are the only ones who collect data and nobody else has access to them until you publish them. The primary data collection methods are numerous.

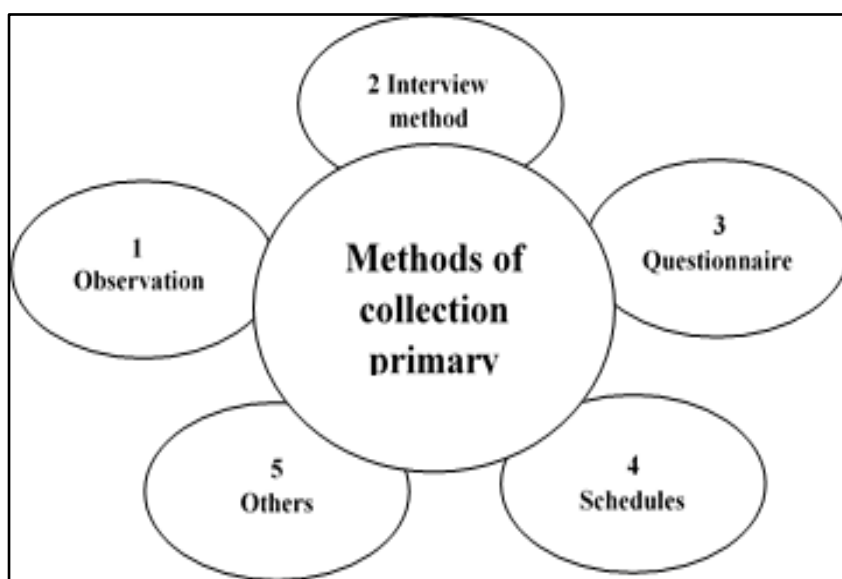


Figure 9.2: Methods of Primary Data Collection

The most important methods are:

- Questionnaires
- Interviews
- Interviews with Focus Group
- Observation
- Survey
- Case-studies
- Diaries
- Technical activity sampling
- Study of Memo Motion
- Analysis of the process
- Analysis of links
- Study of Time & Motion
- Method of experimenting
- Method of statistics, etc.

9.4 References:

1. Kabir, S. M. S. and Jahan, I. (2009). Anxiety Level between Mothers of Premature Born Babies and Those of Normal Born Babies. *The Chittagong University Journal of Biological Science*.
2. Kabir, S. M. S., Amanullah, A. S. M., and Karim, S. F. (2008). Self-esteem and Life Satisfaction of Public and Private Bank Managers. *The Dhaka University Journal of Psychology*.
3. Kabir, S. M. S. (2013). Positive Attitude can Change Life. *Journal of Chittagong University Teachers' Association*.
4. Kabir, S. M. S. and Mahtab, N. (2013). Gender, Poverty and Governance Nexus: Challenges and Strategies in Bangladesh. *Empowerment a Journal of Women for Women*.
5. Teherani A, Martimianakis T, Stenfors-Hayes T, Wadhwa A, Varpio L. Choosing a qualitative research approach. *J Grad Med Educ*. 2015; 7 4: 669– 670.
6. Wright S, O'Brien BC, Nimmon L, Law M, Mylopoulos M. Research design considerations. *J Grad Med Educ*. 2016; 8 1: 97– 98.
7. Stalmeijer RE, McNaughton N, Van Mook WN. Using focus groups in medical education research: AMEE Guide No. 91. *Med Teach*. 2014; 36 11: 923– 939

List of Chapters

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