



## Data Collection Tools and Methods for Social Science

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Any scientific study involves a systematic process to investigate natural phenomena, solve problems, or answer questions. The different stages in a scientific study are structured to ensure the research is logical, reproducible, and objective. These stages form a cyclical process, as the outcomes of one study often inform the development of new hypotheses and research, advancing the body of scientific knowledge. The stages of scientific study include;

1. **Defining the research problems and question:** The process begins with observing a phenomenon and identifying a question or problem that needs to be addressed. Observations may come from previous research, everyday experiences, or gaps in existing knowledge. A clear, focused, and testable research question is formulated at this stage.
2. **Background research:** Once a question is identified, background research is conducted to understand the context and gather existing information. This step helps refine the question, identify knowledge gaps, and formulate hypotheses. It involves reviewing scientific literature, consulting experts, and analyzing previous studies.
3. **Hypothesis development:** Based on observations and background research, a hypothesis is proposed. A hypothesis is a testable prediction or explanation for the phenomenon being studied. It is typically stated in an "if-then" format and establishes a relationship between variables.

4. **Research design:** Research design is a structured framework that guides the planning, execution, and analysis of a study to ensure that the research objectives are effectively addressed. It serves as a blueprint for the collection, measurement, and interpretation of data, helping researchers maintain consistency, reliability, and validity throughout the process. The research design includes decisions about the research approach (qualitative, quantitative, or mixed methods), sampling strategy, data collection methods (e.g., surveys, experiments, or interviews), and data analysis techniques. It is tailored to the specific research question and goals, ensuring that the chosen methods align with the study's objectives. A well-crafted research design minimizes bias, maximizes the accuracy of findings, and provides a clear roadmap for conducting the study, making it a critical component of any scientific investigation.
5. **Data collection:** It is the process of gathering information systematically to address a research question or test a hypothesis. It involves selecting appropriate methods, such as surveys, interviews, observations, or experiments, based on the nature of the study and its objectives. Ensuring accuracy, reliability, and validity during data collection is essential to obtain meaningful and unbiased results. The process also includes defining the data sources, and tools for measurement. Effective data collection lays the foundation for robust analysis and contributes significantly to the credibility and success of the research.
6. **Data analysis and processing:** It involve organizing, transforming, and interpreting raw data to extract meaningful insights and address the research objectives. This process begins with data cleaning, where errors, inconsistencies, or missing values are addressed to ensure accuracy. Once processed, statistical, computational, or qualitative methods are applied to

analyze the data and identify patterns, trends, or relationships. The results are then interpreted in the context of the research question, enabling informed conclusions and decision-making. Effective data analysis and processing ensure the reliability and relevance of the study's findings.

7. **Conclusion:** Based on the analysis, conclusions are drawn about the validity of the hypothesis. If the hypothesis is supported, it may contribute to the existing body of knowledge. If not, it provides insights for further refinement or alternative approaches.
8. **Replication and further Study:** Scientific studies often lead to new questions and further investigation. Replicating experiments validates findings and ensures their consistency under different conditions or with larger samples.

## **Importance of the data collection stage and its methods & tools**

### ***Purpose of data collection***

The purpose of data collection is multifaceted. First and foremost, data collection serves to *obtain information* that is critical to understanding a particular phenomenon or answering specific research questions. This information forms the basis for analysis, interpretation, and drawing conclusions. Secondly, data collection is crucial to *keep records* of relevant data over time, allowing researchers, policymakers, or organizations to track changes, monitor trends, and reference past findings when needed. Moreover, collected data plays a pivotal role in helping to *make informed decisions* about important issues, whether in scientific research, business strategies, public policy, or other domains, ensuring that choices are based on evidence rather than assumptions. Lastly, data collection allows researchers to *pass information on to others*, whether through reports, publications, or presentations,

contributing to the broader knowledge base and enabling others to build upon or apply the findings in different contexts. Ultimately, data collection is a vital tool for both advancing knowledge and supporting effective decision-making across various sectors. While all stages of research are integral to achieving meaningful conclusions, the data collection phase stands out as the most critical, as it forms the foundation for all subsequent processes. The accuracy and reliability of collected data are paramount to addressing research objectives; any errors or biases introduced at this stage can significantly compromise the study's validity and credibility. Unlike later stages, such as analysis or interpretation, which rely on the quality of the collected data, this phase directly determines the integrity of the entire research effort. A meticulously executed data collection process ensures that the information obtained is relevant, complete, and unbiased, facilitating robust analysis and sound conclusions. Conversely, inadequacies in data collection can lead to erroneous findings and diminish the study's overall contribution, underscoring its pivotal role in the research process. Hence reliable and valid data collection tools and methods lie in their role as the foundation for obtaining accurate, reliable, and valid data, which is essential for meaningful research outcomes. Carefully chosen tools and methods ensure that the data collected aligns with the research objectives, minimizes bias, and captures the required information effectively. Appropriate tools, such as surveys, interviews, or observational checklists, combined with suitable methods like quantitative, qualitative, or mixed approaches, enhance the precision and relevance of data collection. They also ensure consistency, standardization, and replicability, which are crucial for the credibility of the research. Without well-designed tools and methods, the collected data may lack reliability and validity, leading to flawed interpretations and undermining the study's overall value.

### *Types of data*

1. **Based on the source of data:** In social research, the two main sources of data are 'people' and 'paper.' 'People' refers to primary data obtained through direct interaction with individuals or groups, often through interviews, surveys, focus groups, or observations. This type of data is invaluable for understanding human behavior, attitudes, experiences, and social dynamics. On the other hand, 'paper' refers to secondary data, which includes documents, records, reports, and other written materials that provide insights into historical, social, or institutional contexts. Both sources complement each other in social research, with 'people' providing real-time, subjective data, and 'paper' offering objective, often historical or institutional perspectives that can help to triangulate findings and build a more comprehensive understanding of the research subject.
2. **Based on the nature of data:** Qualitative and quantitative data are two distinct types of data used in research, each serving different purposes and providing unique insights. Qualitative data is descriptive and non-numerical, focusing on understanding the characteristics, experiences, and meanings behind a phenomenon. It is often collected through interviews, focus groups, or observations and is analyzed thematically to uncover patterns, themes, and narratives. This type of data is particularly useful for exploring complex social issues, behaviours, and emotions. In contrast, quantitative data is numerical and measurable, often gathered through surveys, experiments, or secondary datasets. It involves statistical analysis to quantify variables and identify relationships or trends. Quantitative data is valuable for testing hypotheses, making predictions, and establishing generalizable findings. While qualitative data provides depth and context, quantitative data offers precision and objectivity, and researchers often use both in combination to gain a more comprehensive understanding of a research problem.

### ***Data collection methods and tools: their difference***

Data collection tools and data collection methods are two distinct but complementary components of the data collection process, each serving a specific role in gathering data. Data collection tools refer to the instruments or devices used to collect data. These tools are designed to facilitate the collection of information in a structured, organized manner. Examples of data collection tools include open or closed surveys, questionnaires, interview guides, checklists, and measurement instruments. Each tool is tailored to the type of data being collected, ensuring that the process is efficient and aligned with the research objectives. The choice of tool depends on the nature of the data—whether qualitative or quantitative—and the specific research question. On the other hand, data collection methods refer to the overall approaches or strategies employed to gather data. These methods outline how the data collection process is carried out, including the techniques for data gathering, and managing the information. Common data collection methods include surveys, experiments, case studies, observations, and interviews. The method determines how and where the tools are applied, such as conducting a survey online, through face-to-face interviews, or using a laboratory experiment. The method dictates the scope, scale, and design of the study, ensuring the data collected is appropriate for analysis and supports the research objectives. The key difference between tools and methods lies in their roles within the research process. Tools are the specific instruments used to gather data, while methods define the broader framework within which these tools are applied. A well-chosen method will employ suitable tools that align with the research goals, ensuring both are complementary and contribute to the overall success of the study.

## Forms of data collection methods

In social science research, various data collection methods are employed to gather information, each suited to different types of research questions and objectives. Some of the key methods include:

1. **Observation (Participant and Non-participant):** In the observational research method, the researcher watches and records the behaviour or events as they occur naturally. This method can be either participant or non-participant. In *participant observation*, the researcher becomes actively involved in the group or setting they are studying, gaining an insider's perspective while observing the phenomena. This method provides rich, detailed data but can introduce bias due to the researcher's active participation. In *non-participant observation*, the researcher remains detached and does not engage with the group, which helps maintain objectivity but may limit access to deeper insights. It is used to study social interactions, rituals, or cultural practices and is widely used in ethnographic research, anthropology, and sociology in real-world settings.
2. **Experiments (Lab and Field):** *Lab experiments* are controlled studies conducted in a scientific setting where researchers manipulate variables to observe their effects on the subjects/participants. The controlled environment allows for high precision and reliable results, making it ideal for testing hypotheses. However, the artificial setting may not always reflect real-world conditions. *Field experiments*, in contrast, are conducted in natural settings where the researcher still manipulates variables but in a more organic environment. Field experiments offer greater ecological validity, as they observe behaviours of the people in real-life contexts, but they may be less controlled and susceptible to external variables.

3. **Surveys (Personal Interview, Telephonic, and Electronic Means – Sampling/Census):** Surveys are a widely used method of data collection that involves asking respondents questions to gather quantitative or qualitative information. *Personal interviews* allow for in-depth responses and clarification of questions but are time-consuming and resource-intensive. *Telephonic surveys* are more cost-effective and convenient, though they may limit the depth of responses and accessibility to certain groups. *Electronic surveys* (e.g., via email or online platforms) are efficient, scalable, and convenient for large samples, but they may suffer from lower response rates or sample bias. Surveys can be conducted using sampling (where a subset of a population is studied) or census (where the entire population is surveyed) depending on the scope and resources available.
4. **Case Studies:** Case studies involve an in-depth, detailed examination of a single case or a small number of cases, such as an individual, organization, or event. This qualitative research method allows for a thorough understanding of complex issues within their real-life context. Case studies provide rich insights into specific phenomena but may not offer generalizable findings. They are often used in disciplines like psychology, business, and social sciences to explore new theories or test existing ones in specific situations.
5. **Simulation:** Simulation is a data method that uses models or virtual environments to replicate real-world scenarios and observe how variables interact. It is especially useful for studying complex systems or phenomena that are difficult to observe in real life. For example, social scientists may use simulations to model behaviours in economic markets, traffic systems, or social networks. Simulations allow researchers to manipulate variables and test outcomes without the ethical or



logistical challenges of conducting real-world experiments, but they rely heavily on accurate models and assumptions to produce valid results.

Each of these methods has its strengths and limitations, and the choice of data collection method depends on the research questions, objectives, and resources available. Researchers can use a combination of these methods to provide a more comprehensive understanding of the social phenomena under study.

### **Forms of data collection tools**

Data collection tools refer to the devices/instruments used to collect data such as;

1. **Paper questionnaire:** A paper questionnaire is a widely used and traditional data collection tool that involves respondents answering a set of questions on paper. It is commonly employed in surveys to gather both qualitative and quantitative data from a target population. The questionnaire can consist of a combination of closed-ended questions (which provide predefined options for respondents to choose from, such as multiple-choice or Likert scale questions) and open-ended questions (which allow respondents to provide their own answers in a free-text format). This mixed approach enables researchers to collect both objective, quantifiable data and subjective insights into the respondents' attitudes, experiences, and opinions. The main advantage of paper questionnaires is their cost-effectiveness and simplicity. They do not require special equipment, software, or internet access, making them an accessible option for a wide range of research projects. Additionally, paper questionnaires are particularly useful in settings where electronic devices are not feasible, such as in rural areas or for populations without regular access to technology. However, there are some limitations associated with paper questionnaires. One of the main challenges is the time-

consuming process of data entry and data processing. After the questionnaires are collected, the responses must be manually entered into a digital system for analysis, which can be prone to human error and requires considerable time and resources. Moreover, the return rate of paper questionnaires can be low, especially if respondents are required to return the completed form by mail or in person. There's also the challenge of missing or incomplete responses, as respondents may skip questions or misinterpret instructions.

2. **Computer assisted interviewing system:** A Computer-Assisted Interviewing (CAI) system is an advanced data collection tool that uses computers and software to facilitate and streamline the process of conducting interviews. In a CAI system, interviewers are guided by a software application that displays the questions on a screen, ensuring that they follow a predefined sequence and script. As the interviewer asks questions, the system records the responses in real time, either by typing the answers directly into the computer or using voice recognition software, depending on the setup. The responses are immediately stored in a digital database, significantly improving the accuracy and speed of data collection. One of the primary advantages of CAI is its ability to increase efficiency in data collection. Unlike traditional paper-based methods, where responses must be transcribed later, CAI systems eliminate the need for manual data entry and minimize the potential for human error. Data is captured directly in electronic form, reducing the risk of inaccuracies or discrepancies caused by manual transcription. This leads to faster data processing and analysis, which is particularly useful in large-scale surveys or studies that involve large volumes of data. Furthermore, CAI systems can handle complex survey designs more effectively. They allow for dynamic question flow based on respondents' previous answers, meaning the software can skip irrelevant questions or ask follow-up questions based on specific responses (referred to as branching or skip logic). This flexibility enables researchers to design more intricate

surveys with tailored questions, ensuring that the interview process is more relevant to each respondent. Additionally, CAI systems can incorporate multimedia elements such as images, audio, or videos, which can enhance the clarity of questions and improve participant engagement. Another key benefit of CAI is its ability to reduce data entry errors. Since responses are automatically recorded by the system, there is less chance of data being incorrectly transcribed, especially for large datasets or responses with complex formatting (e.g., numerical data, dates, or coded answers). Additionally, built-in validation checks can ensure that responses are logical and within expected parameters (e.g., checking for inconsistent answers or missing data), which helps to improve the quality of the collected data. However, while CAI systems offer many advantages, they also require access to computers or mobile devices, and participants need to be familiar with the technology, which may limit their applicability in certain populations or settings. In some cases, ensuring that the system works smoothly in diverse environments, such as remote areas with limited internet access, can present challenges.

3. **PRA Tools (Participatory Rural Appraisal):** Participatory Rural Appraisal (PRA) tools are a set of qualitative research methods designed to engage local communities actively in the process of data collection, analysis, and decision-making. The primary aim of PRA is to empower local people by involving them directly in identifying, analyzing, and prioritizing the issues that matter most to them. These tools encourage the use of local knowledge and community participation, making the research process more inclusive and grounded in the community's lived experiences. PRA tools, such as checklists, mapping, and other participatory techniques, are used to collect data in community-based research. 1) **Checklists:** Checklists are structured lists of questions or criteria used to guide the systematic collection of information. These checklists help researchers gather essential data on various aspects of community life, such as local

resources, social conditions, or environmental issues. They serve as a tool for ensuring that key topics are covered during community meetings or interviews. Checklists can be tailored to address specific issues within the community, such as health, education, or agriculture, and are especially useful in gathering comparable data from multiple participants or across different locations. By using checklists, PRA facilitates consistent and comprehensive data collection while allowing community members to reflect on and share their knowledge on specific topics. 2) **Mapping**: Community mapping is another core PRA tool that involves creating visual representations of local resources, spaces, social networks, and challenges. Community members participate in drawing maps of their village, neighbourhood, or broader landscape, helping them visualize and identify key features such as roads, water sources, agricultural land, schools, markets, and other critical infrastructure. Mapping can also be used to represent social dynamics, such as the distribution of wealth, gender roles, or power structures within the community. This process not only serves as a tool for data collection but also sparks discussions among community members, encouraging them to share their perspectives and identify issues that might otherwise go unnoticed. By highlighting local resources, challenges, and opportunities, mapping provides deeper insights into community dynamics and can help guide development initiatives and interventions. 3) **Other Participatory Techniques**: Beyond checklists and mapping, PRA incorporates various other participatory tools to collect and analyze data. These can include techniques such as **transect walks**, where researchers and community members walk through the landscape to identify resources and problems; **seasonal calendars**, which track changes in farming patterns or weather-related events throughout the year; and **social mapping**, which focuses on the relationships, networks, and power dynamics within the community. PRA also uses **voting exercises** (e.g., ranking

problems by importance) to prioritize issues and help determine the community's collective needs. The strength of PRA tools lies in their ability to engage local people in the research process, allowing them to shape the agenda, share their experiences, and contribute to the analysis. By emphasizing local knowledge and active participation, PRA helps researchers gain a deeper, more understanding of community life, which may not be captured through traditional top-down research tools. Additionally, because PRA emphasizes community ownership of the process, it fosters a sense of empowerment and collaborative action, which can be instrumental in implementing sustainable development solutions based on the data collected.

4. **Interviews:** These are a fundamental data collection tool in qualitative research, where researchers engage directly with individuals or groups to gather detailed information on specific topics. This method allows researchers to explore a participant's experiences, beliefs, attitudes, perceptions, and personal narratives in a way that other data collection tools, such as surveys or questionnaires, might not fully capture. Interviews provide an in-depth understanding of the social, psychological, or cultural aspects of the research subject, making them particularly valuable for exploring complex issues or sensitive topics. Interviews can be categorized into three main types based on their level of structure: **1) Structured Interviews:** In structured interviews, the researcher follows a strict script with a set of predetermined, closed-ended questions. The questions are asked in a specific order, and the responses are typically standardized for easier comparison across participants. This format ensures consistency and helps reduce interviewer bias. Structured interviews are often used when the goal is to collect specific, comparable data, such as in large-scale surveys or quantitative research. However, their rigidity limits the opportunity for exploring deeper or unanticipated aspects of the topic. **2) Semi-structured Interviews:** Semi-structured interviews provide more flexibility, combining a set of

predetermined questions with the opportunity for the interviewer to probe deeper or ask follow-up questions based on participants' responses. This format allows the researcher to maintain a clear focus on the main topics of interest while also exploring unexpected insights. Semi-structured interviews are widely used in qualitative research, as they balance structure and flexibility, allowing for detailed and rich data while maintaining some consistency across interviews. This format is particularly useful for exploring complex topics where a degree of spontaneity is needed. **3) Unstructured Interviews:** Unstructured interviews are the most flexible and informal type. In this approach, the researcher has a general topic or theme in mind but allows the conversation to flow naturally without a fixed set of questions. The goal is to create an open environment where participants feel comfortable sharing their experiences and thoughts in their own words. Unstructured interviews are especially useful for exploring new or poorly understood topics, as they allow for the discovery of unexpected themes or insights. However, this flexibility can also make the analysis of unstructured interviews more challenging, as it requires careful interpretation and identification of patterns within the conversation. One of the key advantages of interviews is their ability to provide rich, qualitative data. Since interviews often involve open-ended questions, participants have the freedom to express themselves fully, providing insights into their thoughts, emotions, and personal experiences that would be difficult to capture through structured surveys or tests. Interviews also offer the opportunity for follow-up questions, allowing researchers to seek clarification or probe deeper into a response, ensuring a more thorough understanding of the participant's perspective. Furthermore, interviews foster a personal connection between the researcher and the participant, which can enhance the depth of the information collected. The researcher can observe non-verbal cues, such as body language or facial expressions, which may provide additional context to the responses. This dynamic

interaction helps build rapport and trust, which is especially important in sensitive research topics, such as health, trauma, or social inequality. Despite their advantages, interviews can be time-consuming, both in terms of data collection and analysis. The process of conducting interviews, transcribing responses, and interpreting the data can require significant resources. Additionally, the interviewer's bias or subjective interpretation can influence the outcomes, making it important for researchers to employ strategies to ensure objectivity and consistency, such as using interview guides and maintaining ethical standards in data handling.

5. **Scales:** Scales are measurement/data collection tools widely used in social research to quantify abstract or subjective concepts in a standardized manner. They enable researchers to assess variables such as attitudes, opinions, perceptions, behaviours, and subjective experiences, making these complex and qualitative constructs measurable and comparable. Scales provide a structured way to quantify these variables, transforming them into numerical data that can be analyzed statistically, facilitating clearer interpretation and more robust conclusions. There are several common types of scales used in social science research, each designed for different purposes: 1) **Likert Scales:** The Likert scale is one of the most widely used tools in social research for measuring attitudes, opinions, or perceptions. It typically consists of a series of statements related to the topic of interest, and respondents are asked to rate their level of agreement or disagreement on a predefined scale, usually ranging from 1 (strongly disagree) to 5 or 7 (strongly agree). Likert scales are highly effective for measuring the intensity of respondents' feelings towards a subject, allowing researchers to gauge the overall sentiment of a population. The scale is often used in surveys measuring attitudes towards social issues, political opinions, customer satisfaction, and organizational behaviour. 2) **Semantic Differential Scales:** The **semantic differential scale** measures respondents' perceptions



of a concept by asking them to rate it on a scale between two opposite adjectives. For example, a respondent might be asked to rate a product on a scale from "good" to "bad," or a political candidate from "trustworthy" to "untrustworthy." The scale typically uses a 7-point or 5-point format, allowing participants to select a position on a bipolar scale that reflects their subjective assessment. This type of scale is particularly useful for measuring **attitudes** towards concepts that have strong emotional or evaluative components, such as branding, political candidates, or public policies. 3) **Visual Analogue Scales (VAS):** **Visual analogue scales** are often used to measure subjective experiences or feelings, such as pain, mood, or satisfaction. This scale consists of a continuous line, usually 10 cm long, with two endpoints representing extremes (e.g., "no pain" and "worst pain imaginable"). Participants are asked to mark a point on the line that best represents their experience. The VAS is particularly useful in health research and psychology, as it allows individuals to express their subjective feelings or sensations along a continuous range. It provides a more granular measure of experience compared to categorical or discrete scales. 4) **Other Types of Scales:** Beyond these well-known examples, there are other specialized scales used in social research, such as the **Guttman scale** (a cumulative scale that arranges items in increasing order of intensity) and the **Thurstone scale** (a method for measuring attitudes based on agreement with pre-defined statements). These scales are used for more specific research needs, such as measuring hierarchical patterns of attitudes or scaling responses to sensitive or complex issues. The main strength of using scales is their ability to quantify abstract concepts, allowing researchers to transform subjective opinions, emotions, or perceptions into objective, analyzable data. By assigning numerical values to responses, scales facilitate statistical analysis, which can reveal patterns, correlations, and differences between groups. This transformation of qualitative data into quantitative formats makes it easier to compare



responses across different populations, track changes over time, and conduct large-scale surveys. However, scales also have limitations. The precision of the data depends on the validity and reliability of the scale itself. For instance, a poorly designed Likert scale may fail to accurately capture the true intensity of respondents' feelings or may introduce bias if the statements are leading. Furthermore, scales that rely on self-reporting can be influenced by respondents' tendencies to give socially desirable answers or their inability to accurately express their true feelings. Researchers must therefore be mindful when choosing or designing scales to ensure they are valid, reliable, and appropriate for the specific context of the study.

**Quality of data collection tools:**

The quality of data collection tools is crucial for ensuring that research findings are accurate and trustworthy, and it can be assessed in terms of validity and reliability. Validity refers to the extent to which a tool measures what it is intended to measure. For example, a questionnaire designed to assess attitudes toward climate change must accurately capture the respondents' beliefs and perceptions about climate change, not their knowledge of scientific facts. Validity can be further classified into different types, such as content validity (ensuring the tool covers all relevant aspects of the concept), construct validity (confirming the tool measures the theoretical construct it is intended to measure), and criterion-related validity (testing how well the tool correlates with other established measures of the same construct). On the other hand, reliability refers to the consistency and stability of the tool's measurements over time and across different conditions. A reliable tool will yield the same results when used repeatedly under similar circumstances. Common methods to assess reliability include test-retest reliability (measuring consistency over time), inter-rater reliability (ensuring consistency between different researchers or raters), and internal consistency (assessing whether items within a tool are measuring the same construct). Both validity and reliability are critical for ensuring the

quality of a data collection tool. If a tool is not valid, it may collect data that is irrelevant or inaccurate, leading to flawed conclusions. Similarly, if a tool is unreliable, it may produce inconsistent results, undermining the robustness of the research. Ensuring that a tool is both valid and reliable strengthens the research process and helps ensure that findings are credible and trustworthy. Researchers must carefully design and test their data collection tools, conducting pilot studies and applying statistical methods to evaluate both validity and reliability before fully implementing them in a study. This rigorous process ensures that the data collected is accurate, meaningful, and contributes to a sound understanding of the topic being researched.

### **Further Reading**

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