BLOCK 3

SPECIFIC ESSENTIAL ASPECTS IN RESEARCH

UNIT 8- ETHICS IN RESEARCH

Content

Learning Outcomes

After reading this unit, the student will learn to:

- Define the construct of ethics;
- Recognise the distinction between theoretical approaches like utilitarianism (consequentialism) and deontological (non-consequentialism);
- Decode informed consent and describe its relevance in anthropological discourse; and
- Identify knowledge of ethical guidelines

8.0 INTRODUCTION

Research is a continuous and rigorous process. In humanities, social sciences and biological/medical disciplines, the researcher and researched are in close proximity. Anthropology is a holistic science of humankind. In most branches of the discipline, the researcher and the researched (interviewer–interviewee, scientists-subject) share eco-systems, they also often share histories and on occasions ethnic and linguistic identities. In several field situations, researchers occupy a position of power and there is greater possibility that s/he carries her/his prejudices and stigmas to the people that they interact with. When we say position of power, we refer to researcher assuming that he has the right to seek information from anyone. This is not true. Every respondent has the right to refuse and not participate in the research process. It is thus imperative for every researcher to de-construct their selves and go to the field with an ethical perspective. Every student preparing to do research must understand the importance of these fundamentals. In this lesson, you will be introduced to the concept of ethics, best practises in research, ethical guidelines given by premium institutions and procedure for presenting projects to ethical committees. This knowledge is essential for quality research and for becoming a good anthropologist. Ethics is a noun in the English language and is explained as moral principles that govern a person's behaviour or the conducting of an activity. Its common synonymous is moral code, morals, morality, moral principles, moral

values, rights and wrongs.

The Merriam Webster dictionary defines ethics as, "Rules of behaviour based on ideas about what is morally good and bad".

Generally ethics is understood as a branch of philosophy that defines concepts of right and wrong.

It is broadly divided into the following five branches:

a. Meta-ethics- this branch examines the origin of ethical principles and explores why ethical evaluations are important.

b. Descriptive ethics- determines what proportion of a population or a certain group considers a particular thing right or wrong.

c. Normative ethics- defines norms that make certain things right or wrong. It provides a charter for moral values for communities and larger societies.

d. Applied ethics- It examines sensitive and often controversial issues e.g. giving capital punishment, euthanasia, homosexuality, etc.

e. Bioethics- examines critical issues in genome research e.g. gene cloning, test trials of new medicines on human beings etc.

8.1 THEORETICAL APPROACH

There are two theoretical approaches to understand ethics and its relevance for social sciences.

Consequentialism or utilitarianism: its theoretical premise insists that the rightness or wrongness of an act can be judged by its consequences. It implies that all kinds of experimentation and questioning are just, if it achieves the purpose. This perspective justifies testing new medicines or therapies on human subjects without knowing how it would impact their bodies. They argue that if it helps 'experimental subjects' then it serves the purpose of curing million others. But if in the experiment 'subjects' suffer or even die then it is established that the experiment has to be abandoned thus saving millions in financial and human cost. Ethics of this philosophical approach is rooted in cost-benefit analysis.

Deontological or non-consequentialism: This approach is rooted in philosophical understanding of eminent philosopher Emanuel Kant. This approach argues that any kind of deception of respondents is violation of their fundamental human rights. It talks about absolute moral values. Consequentialism talks about "end" being more important than "means". But Deontological approach contests that and reasons that whatever the later benefits may be, protection of subjects is most important as human beings are to be treated as "ends" rather than "means'.

Human experimentation: Any experiment that is conducted on a living human being not as therapy but simply to know how it would affect him e.g. giving growth hormones to young children, just to see, how it would affect them; giving small doses of insulin to a normal person as control group; giving trial medicines to patients just to know its potential curative value, to give electric shock simply to test endurance potential of individuals etc.

History of social and medical research is replete with examples in which 'live human subjects' were subjected to inhuman treatment in the name of research. The most infamous example is that of Nazi Germany, where war prisoners were subjected to inhuman torture and tests, all in the name of the medical experiments. These included "incompatible unsterile blood transfusion, (i.e. Rh positive person given Rh negative blood, prisoners with blood group B given blood of A group etc.) Injections of toxic substances, women forcibly sterilised on the assumption that they are mentally weak and would give birth to mentally sick children disturbing the gene pool of the population and conducting operations without anaesthesia (for details read Wiesel, 2005:1511-1513). Survivors of the holocaust and victims of these experimentations continued to suffer psychological impacts throughout their lives. This brought in the need for informed consent and voluntary participation in all forms of research.

Check Your Progress

1. Define ethics and its various branches.

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2. Distinguish between consequentialism and non-consequentialism.

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3. What was wrong with experiments conducted during Nazi Germany?

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4. Why should researchers be extra careful in conducting experiments on human populations in anthropology?

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8.2 INFORMED CONSENT

The issues that were raised in the previous section, emerged, as people were subjected to these unwarranted tests without seeking their consent. In the previous section, you also learnt possibility of researcher having power over the researched. It was this prerogative that was exercised by those who forcibly took samples for experimentation from war prisoners or innocent civilians. Their participation in these experiments were not voluntary. Purpose of these tests was not explained to them nor their consent sought for taking samples. This is gross violation of fundamental human rights. It was because of these concerns that the need for

seeking formal consent from each respondent was mandated. In this section you will learn about the experiment that forced state administration to formulate ethical guidelines for informed consent.

Babbie (2015: 66) describes informed consent as, "A norm in which subjects base their voluntary participation in research projects on a full understanding of the possible risks involved".

The case that questioned ethics in medical research and necessitated for a National Research Act to be established in the US is called Tuskegee Syphilis Experiments. The US Public Health Services started this research project in the year 1932. It went on till 1972 without ever being questioned for ethical morality. In this study 400 poor African men suffering with Syphilis were denied use of penicillin. By 1932, it was known that penicillin could cure Syphilis. Denial of treatment to these poor black Africans was the hypothesis that if we give treatment to them, we would not be able to understand the process of full progression of the disease. In simple terms, it implies that if you are suffering with an infection for which treatment is available but your doctor denies it to you wanting to observe how you respond to the infection without medicine and observes silently seeing you suffering.

But when the study was exposed in the public domain, then president of the United States, Richard Nixon had to offer a public apology and constitute a commission for deciding the guidelines for future research. The commission submitted a report known as The Belmont Report. It was on the basis of this report that the United States approved the National Research Act in 1974. It became a point of reference for all such future guidelines adopted by different research organisations across the World. The three key principles in this act are:

- Respect for persons: to make research participants aware of the full consequences of experimentation and to protect people who are in confinement and are subjugated.
- Beneficence: to ensure that no harm comes to the research participants and ideally they should benefit from it.
- Justice: benefits of the research should be made equally available to all in the society.

What these principles emphasise is reiteration of the human rights approach. This approach is the crux of all anthropological research that deals with living human beings. It ensures that no harm comes to the subjects/respondents. There is a possibility of inadvertently causing psychological harm to the respondents e.g. on study of rape survivors: if you ask them to recall memories of physical and metal trauma that was caused by that event, they may experience depression. In such an instance one has indirectly caused harm to the respondent.

Sometimes researcher may assume that the questions being posed by her/him are value free and would not encroach on the privacy concerns of their respondents. Respondents may answer the questions but could carry scars or fears of having shared intimate details e.g. a study on HIV positive people may prompt him/her to share individual case history; but in the process may divulge details that encroach their privacy. Even when this information is collected under conditions of anonymity and confidentiality, it may leave them uncomfortable. Revisiting personal trauma and intimate details may impact their mental health

and self-esteem. Researchers exploring sensitive issues like HIV/AIDS, mental health, sexual behaviour or issues of physical or social exploitation must refrain from hurting the sentiments of the respondents; even if they have obtained informed consent.

The following are guidelines for developing an ethical sound study:

- Explain clearly to potential research participants, the purpose of the study and why the study is being conducted;
- Patiently answer all questions raised by them;
- Specify the agency on whose behalf the research is being carried out;
- Explain in simple language (particularly in a language that they are comfortable with) whether the purpose of your research is academic or for any other purpose e.g. marketing research, political opinion survey, mapping of behavioural change etc.;
- Ask their permission to continue. If they decline, then simply withdraw.
- Ensure that their consent is sought in privacy.
- Researchers pursuing programmes in biological anthropology have to be particularly careful in seeking written formal consent. Written formal consent must be obtained before drawing a blood sample or taking physical measurements.

(Guidelines developed with inputs form Guthrie, 2010: 17 and modified by the author)

Remember that these are general and broad guidelines. You have to often evolve and modify these guidelines according to the sensitivity of the situation, cultural profile of the community that is being researched and the techniques to be used in the field. Most of these guidelines are prepared keeping in perspective limitations in medical research. Those students working on socio-cultural issues would often face ethical dilemmas while generating their data in the field. As you gain experience in ethnographic research, you will gradually learn to negotiate the difficulties that occur in empirical research.

Check Your Progress

5. What were the Tuskegee Syphilis Experiments in the United States and why were they unethical?

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6. What were the three key principles that were recommended in the Belmont report?

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7. Briefly explain the guidelines for doing an ethically appropriate study?

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8.3 ANONYMITY AND CONFIDENTIALITY

Anthropological research often involves face-to-face interaction with the respondents. With the exception of archaeology and palaeontology, every other branch of the discipline encourages close contact with the subjects. Physical / biological and forensic anthropologists draw samples from known individuals and socio-cultural anthropologists pursue micro-studies that require meeting and recording of information. Protecting identity of the respondents thus becomes critical of an ethical study. Babbie (2015:68) explains anonymity as something which "is guaranteed in a research project when neither the researchers nor the readers of the findings can identify a given response with a given respondent."

To ensure this, students are advised to use pseudonyms instead of real names of the respondents on the recording sheets. They should give code number to each respondent and keep the entries of interaction in the field diary without names. If respondents volunteer to record the interviews, ensure that their anonymity is maintained at all cost. Every research mandates anonymity but researchers have to be particularly careful while studying HIV+ people, victims of sex abuse, with sick people not wanting others to know the nature of their ailments, with people suspected of being involved in some crimes while doing forensic evaluation, and activists etc.

Maintaining anonymity is easier in mailed survey research. Questionnaires are mailed to prospective respondents and filled questionnaires are mixed for analysis. In the process neither the researcher nor the reader is ever able to ascertain the identity of the person.

But do remember that sustaining anonymity is a difficult task. While writing narrative research, there are moments, when consciously or unconsciously respondent identity is revealed. Researcher has to take extra caution to delete these direct references. In qualitative research breach of anonymity is a real possibility and requires immense monitoring.

Thus to maintain anonymity, strictly follow the instructions as detailed by Guthrie (2010):

- Interview notes and completed questionnaires should not have the names of interviewees written on them.
- Only a code number should identify interviewees (in a crime survey, we do not even identify individual respondents, but use only household IDs)
- Notes and questionnaires should be kept locked up and not left lying around.
- Never gossip about answers or respondents' personal information with fellow researchers or friends or family. Do not tell funny stories about the people you interview.

- When you write up the report, you might well want to illustrate information about a group of people with some of their individual stories. These stories should be anonymous and written in such a way that readers cannot not identify the person. (Cf. Guthrie, 2010: 20)

Along with anonymity, confidentiality becomes equally critical. Babbie (2015:68) defines confidentiality as "A research project guarantees confidentiality when the researcher can identify a given person's responses but promises not to do so publicly".

To this definition, I would like to add that the premise of ethical research is to protect respondent confidentiality at all expense. There are cases when anthropologists have gone to prison or were threatened with dire consequences for refusing to divulge the source of their data.

Let me share a personal research experience that would help you understand the meaning of confidentiality and why it is essential for anthropological enquiry.

The year was 1975. I was in the middle of data generation, when a state of emergency was declared in the country. My research was on a sensitive issue of communal relations. Some of my respondents were witness to some episodes of communal violence that had occurred in the area. They agreed to give me recorded interviews. One of them was on the police list. One-day police came in search of that respondent, while he had come to my field residence. He escaped but to keep his anonymity and confidentiality, I destroyed all the tapes on which his narratives were recorded. I was pressurised by the state to share my data but to ensure respondent confidentiality, I opted to destroy the respondent's recording rather than share it with the authorities or the state. If I had shared that information, I would have lost trust of all my respondents and would have never been able to go back to the field to complete my study.

Check Your Progress

8. What do you understand by the importance of maintaining anonymity in anthropology?

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9. What steps should you take to protect anonymity of the respondents?

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10. Explain why confidentiality is imperative for protecting respondent identity and what steps are suggested for doing so?

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8.4 DECEPTION

One of my students working on reproductive health was a young unmarried girl. When she went to the field for the first time, women refused to respond to her queries telling her that you are not married and would not understand the problems we have. She struggled for sometime and later decided to present herself to the respondents as a married woman with two small children. After this, she collected excellent data as her respondents wanted to get her advice on health issues, spacing of children and birth control methods. Concealing true identity or true purpose of research in ethical discourse is called 'deception'. Researcher felt that this deception was harmless as it helped her generate better quality data. Here approach to the study was based on theoretical principle of consequentialism in which cost-benefit analysis is carried out individually by the researcher following her/ his own set of values. In such studies all actions are justified believing that it results in greater good.

In many laboratory or controlled experiments also subjects are not informed about the real purpose of their investigations. Researcher often believes that the subject is naïve and would not fully understand the purpose or importance of the study. They also argue that results of the study outweigh, ethical dilemma of informed consent.

Susceptibility to such temptations is significant in biological anthropology. Many times students desirous of collecting blood sample, or anthropometric measurements fudge their identities as professional medicos. Innocent subject seek their help and request for medication for treatment. When a non-medico gives any medication only to collect data, then it amounts to deception that may result in harming the subject. This is wrong and should be completely avoided.

Researchers across the world believe that at times fudging identity or purpose of research is unavoidable. In such situations they advise debriefing after the completion of the study. Debriefing implies going back to the researched population after the study to enquire if the research has had any adverse impact on them. Argument is that if one is not in a position to share the true intent of the experiment before the study, there is no harm in sharing it afterwards. Psychologists and communication studies including reality television often undertake these studies to assess public reactions in an emergency situation. Such experimental studies are called emergency bystander studies. (e.g. reality shows fudging identities to know public reactions to aggression, son preference and misogynistic attitude etc., and revealing true purpose of their experiment later. Some social scientists justify such experimental design for research, as they believe that disclosure after the experiment called debriefing neutralises any harm).

But it is important for you to understand that debriefing may create doubts in the minds of the subject. It may also cause psychological problems, if respondent starts worrying about his responses and if he performed well in the experiment or not. Experimental deception has its pros and cons and should be avoided. Researchers owe responsibility to their researched population and it is important that they share their identity as also the purpose of their research.

Clarke (1999:150) rightly concludes that, "debriefing can be effective in easing the discomfort caused during a study or experiment involving deception, it is insufficient to fully reverse negative feelings experienced by those research subjects who are prone to have negative feelings about themselves, as a result of unexpected revelations about themselves in experiments".

Check Your Progress

11. What do you understand by deception in research and in your opinion is it justified at all?

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12. What is debriefing and what relevance it has in experimental research?

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8.5 REPORTING AND FEEDBACK

Unfortunately over the years, researchers were not obliged to report back their findings to the community or the populations they surveyed. They would use their studies either to submit reports to their institutions, or publish papers in peer-reviewed journals. Some research findings do get reported in local or national newspapers but are not specifically displayed to the communities concerned. Contemporary research and ethical guidelines to research have now acknowledged this mandatory obligation to the communities. For instance, one does a study to examine iron or iodine deficiency in a population but has not shared the results with the people, leaving people to continue to suffer consequences of these deficiencies as they are not even aware. This would now be considered unethical.

In social science research, study results may offend some people and they may question your motive for reporting these details.

Initial surveys on drug abuse in Punjab received adverse response from the community, as they believed it had damaged their reputation and felt that the entire Punjabi population was targeted.

In such a situation, you must accept their response calmly and respond as to why data collected by you arrived at these results. You can then disseminate the information to the community leaders and ask them to discuss it in Panchayat, village or community gatherings. I personally believe that before publication of any empirical data, the findings should be first shared with the community, get their feedback and then report to the peer community, wait for their comments and criticism of the methodology or findings and then take it to a broader platform.

8.6 ETHICAL GUIDELINES

In 1998 American Anthropological Association (AAA) defined ethical guidelines for research in different branches of anthropology that includes archaeology, linguistic, biological and socio-cultural anthropological research. In the five principles of their research code, they state:

- Anthropological researchers have primary ethical obligations to the people, species, and materials they study and to the people with whom they work. These obligations can supersede the goal of seeking new knowledge, and can lead to decisions not to undertake or to discontinue a research project when the primary obligations conflicts with other responsibilities such as those owed to sponsors or clients… Anthropological researchers must do everything in their power to ensure that their research does not harm the safety, dignity, or privacy of the people with whom they work- (Principles A-1 and A- 2)
- To meet challenges of studying communities in which some individuals may desire to share their opinions but others want to remain anonymous, Principle A-3 of AAA suggests that anthropological researchers must determine in advance whether their hosts/ providers of information wish to remain anonymous or receive recognition, and make every effort to comply with those wishes. (For e.g, *some members of Adivasi/ tribal community may share their sacred rituals with the researcher but are not keen to make it public, it is imperative that a researcher must respect their wishes and however important these may be should not report in his/her writing).*
- Discussing challenges that field based research poses, Principle A-4 of AAA recommends, anthropological researchers should obtain in advance the informed consent of persons being studied, providing information, owning or controlling access to material being studied, or otherwise identified as having interests, which might be impacted by the research. (*e.g. When you collect material objects, folklores or even take pictures of their traditional art and craft, costumes and jewellery, prior consent of the community is required. Some products of tribal art and craft blatantly copied and sold in the market without giving them patent or right over profits is unethical. Responsibility of the anthropologists is to take their consent before making any of these collected research material public*). It is understood that the degree and breadth of informed consent required will depend on the nature of the project and may be affected by requirements of other codes, laws, and ethics of the country or community in which the research is pursued. Further, it is understood that the informed consent process is dynamic and continuous; the process should be initiated in the project design and continue through implementation by way of dialogue and negotiation with those studied.
- One of the key components of anthropological methodology is prolonged stay with communities in their villages and communities. Researchers often use Participant, quasi-participant observations as preferred method for data collection/generation. It is important to exercise caution as this method involves developing close relations with key respondents and this requires special obligation to them. Principle A-5 of the AAA code advises: Anthropological researchers who have developed close and enduring relationships (i.e.; conventional relationship) with either individual persons

providing information or with hosts must adhere to obligations of openness and informed consent, while carefully and respectfully negotiating the limits of the relationship. (Excerpts cf. Dooley, 2001:25-26; unit writer's own points are shown in italics)

While anthropologists may gain personally from their work, they must not exploit individuals, groups or, animals, or cultural or biological material. They should recognise their debt to the societies in which they work and their obligations to reciprocate with people studied in appropriate ways.

In addition to this these five principles, AAA's ethical guidelines also explain:

In both proposing and carrying out research, anthropological researchers must be open about the purpose(s), potential impacts, and source(s) of support for research projects with funders, colleagues, persons studied or providing information, and with relevant parties affected by the research. Researchers must expect to utilise the results of their work in an appropriate fashion and disseminate the results through appropriate and timely activities. Research fulfilling these expectations is ethical, regardless of the source of funding. These ethical obligations include:

- To avoid harm or wrong, understanding that the development of knowledge can lead to change, which may be positive, or negative.
- To respect the well being of humans and nonhuman primates.
- To work for long-term conservation of the archaeological, fossil, and historical records.
- To consult actively with the affected individuals or group(s) with the goal or establishing a working relationship that can be beneficial to all parties involved.
- Anthropologists owe special responsibility to public. They must ensure that their research does not harm the safety, dignity and, or privacy of the people with whom they work, conduct research or perform other professional activities.
- They should not deceive or knowingly misrepresent (i.e. fabricate evidence, falsify, plagiarise), or attempt to prevent reporting of misconduct, or obstruct the scientific/ scholarly research of others.

(Accessed and abridged on 2nd February 2019 from s.3.amazonaws.com)

These guidelines tell an anthropological researcher not to approach one's field area blindly or simply because some funding agency is paying money to do research. You have to select not only the research problem but also the people that you are likely to interact with care. You have to assure that the questions that you ask, or blood sample or anthropological measurements that you take do not hurt your respondents. You must always ensure that you take prior consent.

In the domain of Indian anthropology, Indian Anthropological Association drafted a code of ethics and placed it in the public domain for discussion and suggestions. Some of the highlights of the recommendations are:

- Respect for people's rights, dignity, and diversity
- Responsibility towards the research participants

- Maintaining transparency
- Obtaining informed consent
- Confidentiality and anonymity of research participants
- Scholarly obligations towards the discipline and colleagues
- Abiding by the laws and relations with the governments
- Observance of ethics while teaching anthropology

(for details refer to indiananthro.org accessed on 8.02.2019)

However, most researches, in particular medical anthropology and projects in biological anthropology follow ICMR guidelines. In the following section, a brief of these guidelines is given to you as a ready reckoner.

In 2017 Indian Council for Medical research (ICMR) issued national ethical guidelines for biomedical and health research involving human participants. This exhaustive document is a revised version of ethical guidelines that were issued in 1980 for the first time for medical research in India. This document gives explicit guidelines for research in social and behavioural sciences, for health, biological materials, biobanking and datasets, international collaboration and research during humanitarian emergencies and disasters. It has separate sections on responsible conduct of research, informed consent process, vulnerability, and public health. At the outset it explains, While conducting biomedical and health research, the four basic ethical principles namely; respect for persons (autonomy), beneficence, non-maleficence and justice have been enunciated for protecting the dignity, rights, safety and well being of research participants.

It then broadens these four basic ethical principles into 12 general principles and these include:

1) Principle of professional competence
2) Principle of voluntariness
3) Principle of non-exploitation
4) Principle of social responsibility
5) Principle of ensuring privacy and confidentiality
6) Principle of risk minimisation
7) Principle of social responsibility
8) Principle of maximisation of benefit
9) Principle of institutional arrangements
10) Principle of transparency and accountability
11) Principle of totality of responsibility
12) Principle of environmental protection

In addition to these general principles, it is important for you to note and remember the ICMR guidelines for Adivasi/tribal populations of India. Traditionally anthropologists were mostly associated with the study of small-scale Adivasi/ tribal societies but as the discipline expanded, its field of enquiry also diversified. Anthropologists have produced excellent research not only on tribal populations but also on villages and peasantry in India and have also explored several social

problems that urban areas and communities are now experiencing. The AAA (1998) and ICMR (2017) guidelines broadly cover all areas of research but if any one of you decide to work on health or any other biological issues of Adivasi/ tribal people, you must strictly adhere to the following:

- Research on tribal populations should be conducted only if it is of a specific therapeutic, diagnostic and preventive nature with appropriate benefits to the tribal population. (e.g. *study on persistence of fluorosis, prevention of malaria or other epidemics* (portion in italics is unit writer's own examples)
- Due approval from competent administrative authorities, like the tribal welfare commissioner or district collector, should be taken before entering tribal areas.
- Whenever possible, it is desirable to seek help of government functionaries/ local bodies or registered NGOs who work closely with the tribal groups and have their confidence.
- Where a panchayat system does not exist, the tribal leader, other culturally appropriate authority or the person socially acceptable to the community may serve as the gatekeeper from whom permission to enter and interact should be sought. (*Most adivasi communities have Jati Panchayats and they play very important role in decision making, it would thus be important for every researcher to contact the Jati Pramukh (head of the community* (italics unit writer's).
- Informed consent should be taken in consultation with community elders and persons who know the local language/dialect of the tribal population and in the presence of appropriate witnesses.
- Even with permission of the gatekeeper, consent from the individual participant must be sought.
- Additional precautions should be taken to avoid inclusion of children, pregnant women and elderly people belonging to particularly vulnerable tribal groups (PVTG).

(*As you know many particularly vulnerable groups are on the verge of extinction, any contact with outsiders exposes them to infections and further endangers their lives. There are also isolated groups like the Sentineles that shun interactions with outsiders. You must respect their sentiments and must never intrude into their domain, whatever research incentives may be give to you*. (italics unit writer's)

- Benefit sharing with the tribal group should be ensured for any research done using tribal knowledge that may have potential for commercialisation.

(cf. ICMR ethical guidelines (2017) accessed on 6.03.2019)

Most of these guidelines follow by and large the same principles.

Check Your Progress

13. What are the five principles suggested by American Anthropological Association (AAA) for ethical study of research populations in anthropology?

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14. Give salient features of ethical guidelines given by ICMR.

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15. What cautions a researcher must observe while studying particularly vulnerable tribal groups?

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8.7 ETHICS COMMITTEES AND QUALITATIVE RESEARCH

Every research and academic institution is now required to have an ethical committee. Every research project has to be scrutinised by this committee, and it is only after this approval that one can go to the field to collect data. Most international publications also require ethical approval certificates before considering a research paper for publication. It is to be noted that most ethical guidelines take cognisance of bio-medical or experimental research. Even when social or behavioural research is considered, the guidelines outline large quantitative samples and present road map for research that is rooted in positivist mode of analysis.

But there continues to be ambiguity for pursuing ethnographic or qualitative research. Qualitative and ethnographic research requires more flexible settings. When methods like narrative research, in-depth interviews, participant observations or case studies are generated, conforming to pre-tested and ethical committee approved schedules or questionnaires may not suffice. In this kind of research informed consent actually means consent in process. In method of purposive sampling, sample is not collected on the basis of a systematic sampling. Sample gets generated in the field as one moves from one respondent to other. In such situations, it is also not possible to take written consent from each respondent as it may violate their right to privacy. Obtaining written consent from a formally illiterate person is another issue that some researcher may face. Even if researcher attempts to explain, there are occasions, when respondent may not comprehend the purpose. In a recent human genome research study, blood samples were drawn from Jarwa Adivasis living in secluded terrains of Andaman Nicobar Islands. Even when the tribals agreed to give blood sample, they were not aware as to what use that sample was being put. Hence, there was no informed consent involved in it. Recognising these limitations, ICMR in its ethical guidelines observe:

Social and behavioural sciences research approaches are not always positivist and, therefore, articulation of a hypothesis may not be possible at the beginning of the research. Instruments/documents are developed during the course of the research; are reflective; and may keep changing as the research progresses. The EC must be kept informed about these changes and appropriate re-consent taken from participants.

There are problems with the notion of informed consent.

Reflection: MISTAKES WE MAKE

When we start doing research, we assume that whatever we are doing is right. There is also this conviction, that our research is in the best interest of the society and therefore no one should have problems participating in the study. It has been repeatedly asserted in the previous sections that participation in every study should be voluntary. A systematic random sampling in a survey research makes it compulsory to interview marked participants, but the respondents are not willing to allow you entry, never make the mistake of filling the schedule/questionnaire yourself or asking a friend to do so; just mark it: ***marked household is not willing to participate.*** *Some principles of scientific generalisation may tell you that this would impact representation and generalisation of the result but remember falsification of data would distort the reality. Ethics demand that we should not compel people to respond against their will.*

There are practical difficulties in meeting some of these requirements and it is important that every discipline develops its subject specific guidelines. Experts in ethical committees also have to be sensitive to these limitations. In recent debates on the subject of informed consent, several ethnographers have drawn attention to absence of any guidelines on researcher's security. Researchers do face life-threatening situations when enquiring about difficult issues like crime, drug abuse, sexual and domestic violence, war situations, terrorism and even rituals. Ethical guidelines only talk about prevention of harm to the respondents/ subjects and material collected from the field. What is critical for good research is being sensitive to the normative practises of the situation and cultures/ communities that you research.

Reflection: SENSITISATION

Every research in human sciences is located in a social context. Some questions may appear neutral to you, but there is a possibility that it may hurt the sentiments of the other people. If you are working with a community whose cultural values are not familiar to you, you must ensure that you understand these first by following method of grounded theory and then prepare your interview guide/schedule or questionnaire.

8.7 SUMMARY

In this unit you were made aware of ethics in research and how it is important to follow the different ethical norms while conducting research. To make it easier and clearer for you to understand the basics of ethics, this unit, first of all covered the theoretical approach associated with it and then proceeded, to various kinds of ethical considerations we have to involve ourselves with while conducting research. Herein step by step, informed consent, dilemma of confidentiality, issues of deception and finally creating of the report and feedback has been discussed. Institutional ethical guidelines at the global and the local level have been addressed for better understanding. It is hoped that after reading this unit, the student will be careful and sensitive before, while and after designing the proposal, conducting research in the field and laboratory and finally in producing knowledge.

8.8 REFERENCES

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8.9 ANSWERS TO CHECK YOUR PROGRESS

1. See 2nd and 3rd paragraphs of section 8.0
2. See 1st and 2nd paragraphs of section 8.1
3. See 3rd paragraph of section 8.1
4. Same as above
5. See 2nd paragraph of section 8.2
6. See 3rd paragraph of section 8.2
7. See 5th paragraph of section 8.2
8. See 2nd paragraph of section 8.3
9. See 4th paragraph of section 8.3
10. Refer section 8.3
11. See 1st, 2nd and 3rd paragraphs of section 8.4
12. See 4th, 5th and 6th paragraphs of section 8.4
13. See 1st paragraph of section 8.6
14. See 5th, 6th and 7th paragraphs of section 8.6
15. See 7th point in the 7th paragraph of section 8.6

UNIT 9 STATISTICAL ANALYSIS

Contents

Learning Outcomes

After reading this unit, the student will learn to:

- Discuss why statistics is important in Anthropology;
- Explain different types of variables;
- Elucidate various measures of Descriptive statistics;
- Discuss different statistical techniques under Inferential statistics; and
- Converse about SPSS

9.0 INTRODUCTION

Statistical techniques have been used in different branches of anthropology. The branches, social-cultural anthropology, archaeological anthropology and linguistic anthropology employ the statistical tools less frequently but in physical anthropology the use of statistical techniques is quite common because of the use of quantitative data.

Statistics is that branch of science which deals with collection, classification, tabulation, analysis and interpretation of numerical data. In the past, the subjects, statistics and mathematics were closely associated to each other. But gradually the subject statistics gained its independence and now it has become a new branch

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of science. Statistics has been defined differently by different authors. We will find a number of definitions for statistics in various books. However some of the significant definitions are given below:

R.A Fisher, the father of statistics defined it as, "Statistics is a branch of applied mathematics". According to Yule and Kendall, "Statistics means quantitative data affected to a market extent by multiplicity of causes". But Croxton and Cowden defined, "Statistics is a branch of science, which deals with the collection, classification, analysis and interpretation of numerical data". Bowley defines it as "Statistics may rightly be called the science of averages". The modern definition given by Wallis and Roberts is, "Statistics is a branch of science, which provides tools or techniques for decision making in the face of uncertainty (probability). There are mainly two types of decision making situations, i.e., decision making in the face of certainty and decision making in the face of uncertainty

Let us begin by understanding about the variables.

9.1 VARIABLES

Variable is any quantity or characteristic/attribute that may differ for different subjects. Variable differs from person to person or group to group. Eg: height, weight, sex, education, family size etc. Variables are categorised into two groups Qualitative and Quantitative:

Qualitative or Categorical Variable: A variable that cannot be expressed in numerical numbers but can be classified into different categories. Eg: Sex, Education, and Religion.

Quantitative or Numerical Variable: A variable that is measured on a numeric or quantitative scale. Eg: Height, Weight, Head circumference etc. A numeric variable is usually divided into discontinuous/discrete variable and continuous variable.

Discrete variable: A variable is said to be discrete if its values can be written in a sequence Ex: Number of children in different families, Number of live births etc.

Continuous variable: A variable which takes continuous values or fraction values in some class intervals is called a continuous variable. Ex: Age, Height, Weight etc.

9.2 CLASSIFICATION OF STATISTICS

Statistics can be broadly categorised into two divisions, Descriptive Statistics and Inferential Statistics. Normally, anthropological researches collect data on groups of people. To analyse the collected data and to draw conclusions, both descriptive and inferential statistics are necessary.

Descriptive statistics is the branch of statistics that involves the organisation, summarisation, and display of data. In other words descriptive statistics describe the sample by summarising raw data. According to Ferguson (1981) statistical procedures used in describing the properties of a sample, or of population where complete population data are available, are referred as descriptive statistics.

Inferential Statistics is the branch of statistics that involves using a sample to draw conclusions about population. A basic tool in the study of inferential statistics is probability. It includes those methods which can help in drawing valid conclusions (inferences).

The commonly used statistical techniques in anthropology are discussed below:

9.3 DESCRIPTIVE STATISTICS

Descriptive statistics include measures of central tendency, measures of dispersion, Skewness, Kurtosis. The techniques such as Correlation and Regression are also included in descriptive statistics.

9.3.1 Measures of Central Tendency

A measure which measures the concentration of the observations in the central part of the statistical data is known as a Measure of Central tendency or Average.

Check Your Progress

1) What is a measure of central tendency?

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The following are the five measures of central tendency: Arithmetic Mean, Median, Mode, Geometric Mean and Harmonic Mean. However, Geometric Mean and Harmonic mean are less frequently used. Hence Arithmetic Mean, Median and Mode are discussed as below.

Arithmetic Mean (A.M.): It is defined as the sum of the given observations divided by the number of observations; it is usually denoted by x. The following formula is used to calculate Mean

$$\bar{x} = \frac{\Sigma x}{N} = \frac{\text{Sum of all observations}}{\text{Total No. of observations}}$$

The formula to calculate A.M. for a frequency distribution is given below:

$$\bar{x} = \frac{\Sigma fx}{N}$$

Where Σfx = sum of products of variable values (x) and their corresponding frequencies (f).

N= Total frequency

Check Your Progress

2. What is the formula used to estimate the Mean from the frequency distribution data?

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Median: It is the middle value of the data when the data is arranged either in ascending order or in descending order. Median divides the data into two halves; in one half all items are less than median, whereas in the other half, all items have values greater than median.

In the case of discrete frequency distribution, median is defined as the value of the variable corresponds to the less than cumulative frequency just greater than N/2 value, where N is the total frequency. Here the values of the variable must be either in ascending order or in descending order.

In the case of continuous frequency distribution, median is calculated as per the following formula:

$$\text{Median} = L + \left[\frac{\frac{N}{2} - F}{f}\right] C$$

Where L is the lower limit of the class interval in which median lies; N is the total frequency; f= frequency of the medial class; F is the cumulative frequency of the class preceding the median class; and C is the size of the class interval of the median class.

First and Third Quartiles: Just like median, we can define 1st Quartile. It has one quarter of frequencies below and three quarter above it, so the formula will be

$$Q_{1=}\ L + \left[\frac{\frac{N}{4} - F}{f}\right] C$$

Where L is lower class limit of 1st quartile class; N is the total frequency; f= frequency of the 1st quartile class; F is the cumulative frequency of the class preceding the 1st quartile class; and C is the size of the 1st quartile class interval.

Similarly, we can calculate third quartile with the following formula:

$$Q_{3=}\ L + \left[\frac{\frac{3N}{4} - F}{f}\right] C$$

Where L is lower class limit of 3rd quartile class; N is the total frequency; f= frequency of the 3rd quartile class; F is the cumulative frequency of the class preceding the class; and C is the size of the 3rd quartile class interval.

The median can be interpreted as 2nd quartile as well.

Mode: It is the value of the variable which occurs most frequently in the data. A data may have two or more modes. If a data contains two modes then the data is said to be Bi-model data. Similarly there may be Tri-Model data or Multi-Model data. In the case of discrete frequency distribution, Mode is the value of the variable for which the frequency is maximum.

In the case of continuous frequency distribution, mode is given by

$$\text{Mode} = L + \left[\frac{f_1 - f_0}{(f_1 - f_0) + (f_1 - f_2)} \right] C$$

Where, L is the lower limit of the class interval of the modal class, f_1= frequency of the modal class; f_0 = frequency of the class proceeding model class; f_2 = frequency of class succeeding the model class and C= magnitude of model class.

Example:

Twenty one subjects are selected randomly from a population and their weights are found to be 59, 65, 61, 62, 53, 55, 60, 70, 64, 56, 58, 58, 62, 62, 68, 65, 56, 59, 68, 61, 67.

The following is the Mean, Median and Mode for the above data.

Mean:

$$\frac{59, 65, 61, 62, 53, 55, 60, 70, 64, 56, 58, 58, 62, 62, 68, 65, 56, 59, 68, 61, 67}{21}$$

= 61.381

Median: 59, 65, 61, 62, 53, 55, 60, 70, 64, 56, 58, 58, 62, 62, 68, 65, 56, 59, 68, 61, 67

Median =61

Mode: 59, 65, 61, 62, 53, 55, 60, 70, 64, 56, 58, 58, 62, 62, 68, 65, 56, 59, 68, 61, 67

Mode=62

The Mean, Median and Mode for the frequency distribution are as follows:

The same weights are arranged into groups. The Mean, Median and Mode for the grouped data are estimated as under:

Weight	Subjects
50-55	2
55-60	7
60-65	8
65-70	4

Mean

The class intervals of the above data are 50-55, 55-60, 60-65 and 65-70 and the width of each class interval is 5. The midpoints are in the middle of each class (53, 58, 63 and 68). The Mid points (x), Frequency (f) and Midpoint x Frequency (fx) is given in the following table.

Mid point (x)	Frequency (f)	Midpoint x Frequency (fx)
53	2	106
58	7	406
63	8	504
68	4	272
Total	21	1288

Mean (x): 1288/21=61.33

Median

Class interval	Frequency	Cumulative frequency
50-55	2	2
55-60	7	9
60-65	8	17
66-70	4	21

Where L=60; N=21; F=9; f=8 and C=5

$$\text{Median}=60+\left[\frac{\frac{21}{2}-9}{8}\right]5$$

$$=60.94$$

Mode

Class interval	**Frequency**	**Cumulative frequency**
50-55	2	2
55-60	7	9
60-65	8	17
66-70	4	21

Where L=60; f=8;f_1=7;f_2=4 and C=5

$$60+\left[\frac{8-7}{2\times 8-7-4}\right]5 \quad 60+\left[\frac{8-7}{2\times 8-7-4}\right]5$$

=61

9.3.2 Measures of Dispersion

Dispersion means the scatteredness of the observations in the given data. It may be defined as the extent to which the individual values fall away from the mean or from any other measure of central tendency.

A measure which can frequently measure the amount of variation or dispersion in the data is called a 'Measure of dispersion'.

The various measures of dispersion frequently used are:

a). Range, b) Mean Deviation, c) Quartile Deviation, d) Variance, and Standard Deviation

a) **Range:** It is a simple but a crude measure of dispersion. It is defined as the difference between the highest and lowest values in the data.

Range = (largest value – smallest value)

In the case of discrete frequency distribution, Range is defined as the maximum and minimum values of the given variable. In the case of continuous frequency distribution, Range is defined as the difference between the upper boundary of the highest class and the lower boundary of the lowest class.

b) **Mean Deviation (M.D.):** It is defined as the arithmetic mean of absolute deviations, (take all the deviations as positive and ignore the sign) of observations from-an average (Mean, Median or Mode). Thus we have

i) M.D. about Arithmetic mean

ii) M.D. about Median

iii) M.D. about Mode

The formula for computing the MD from an ungrouped data is as follows:

$$\frac{\sum|x|}{N}$$

Where x=X- x= deviation of a raw score from the mean x of the series and the || enclosing x (i.e |x| indicate that the algebraic signs are disregarded in arriving at the sum. Thus, x is always a deviation of score from the mean.

The MD can be computed from the grouped data by the following formula:

$$MD=\frac{\sum|fx|}{N}$$

Where N= number of cases

"*fx*= sum of the products of *f* and *x* over all the class intervals.

c) **Quartile Deviation (Q.D):** It is a measure of dispersion based on the third Quartile (Q_3) and the first quartile (Q_1). It is defined as Q.D: $\left[\frac{Q_3 - Q_1}{2}\right]$

Since it is half of the difference between ranges of quartiles Q_1, Q_2, Q_3, it is sometimes called "Semi-inter Quartile Range". The computation of Q.D. is based on the computations of Q_3 and Q_1.

d) **Variance and Standard Deviation (S.D):** It is defined as the positive square root of the arithmetic mean of the squares of the deviations of given observations from their arithmetic mean. It is usually denoted by ó. The square of the standard deviation is called variance (ó²) of the data.

Standard deviation (S.D):

i) For unclassified data $ó = \sqrt{\frac{\sum(X-\bar{X})^2}{n}}$

Where $\bar{x} = \frac{\sum X}{n}$

Example: Standard deviation for the following data is given below.

59, 65, 61, 62, 53, 55, 60, 70, 64, 56, 58, 58, 62, 62, 68, 65, 56, 59, 68, 61, 67

Arithmetic mean (x) = 61.38

$(x- x)^2=432.68/21=$

$ó = \sqrt{20.61} = 4.5$

Or

ii) For frequency distribution

$ó=\sqrt{\frac{\sum fx^2}{N} - \left(\bar{x}\right)^2}$

Where $\bar{X} = \frac{\sum fx}{N}$

Here, x's are the values of the variable (or mid values of classes).

Example: The following are the class intervals when we arrange the above data into groups.

Weight (class intervals)	Subjects
50-55	2
55-60	7
60-65	8
65-70	4

Mid point (x)	Frequency (f)	Midpoint x Frequency (fx)	Fx^2
53	2	106	5618
58	7	406	23548
63	8	504	31752
68	4	272	18496
Total	21	Σ1288	79414

Mean = 61.33

ó =79414/21-$(61.33)^2$

=3781.61-3761.36

ó = $\sqrt{20.25}$ =4.5

Check Your Progress

3) What is standard deviation?

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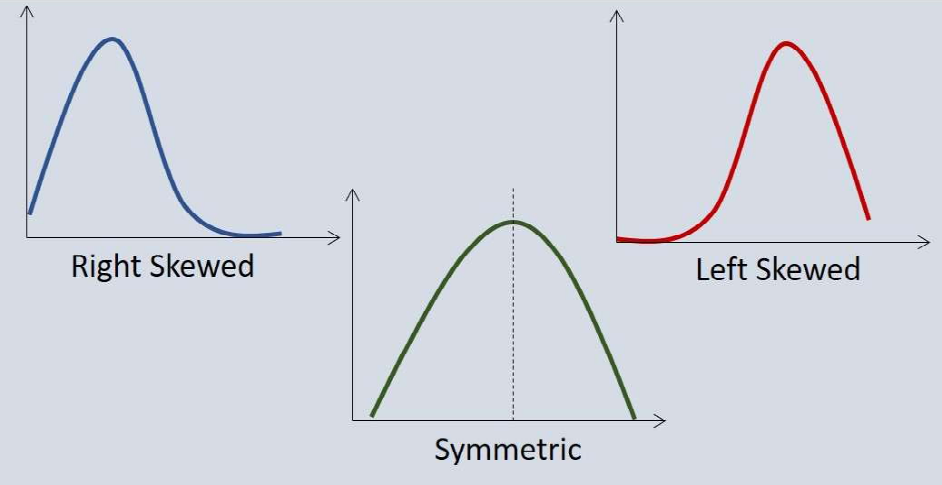
9.3.3 Measures of Skewness and Kurtosis

We also use two measures, Skewnes and Kurtosis which describe the shape of the data distribution (or histogram). These are outlined as below.

Skewness: It is a lack of symmetry in the distribution of data. The distribution of the data set is said to be symmetric if it looks the same to the left and right of the center point (mean). A distribution with a long left tail is said to be *left-skewed* and with a long right tail is referred as *right-skewed*. The distributions for left-skewed and right-skewed are shown in Figure



Source: https://in.images.search.yahoo.com

Skewness is measured by using Karl Pearson's coefficient $S_k = \frac{3(Mean - Median)}{SD}$ and this value can be positive, negative or zero. If the distribution happens to be symmetric then $S_k = 0$ because in that case Mean = Median.

Kurtosis: Kurtosis means the 'convexity of a frequency curve. Kurtosis enables us to understand about the flatness or peakedness of the frequency cure. There are three types of Kurtosis curves namely Leptokurtic, Mesokurtic and Platykurtc. If the curve is relatively more peaked than the normal it is called Leptokurtic curve. A curve which is neither flat nor peaked is called the normal curve or Mesokurtic curve. But the curve is flatter than the normal is called Platykurtic cure.

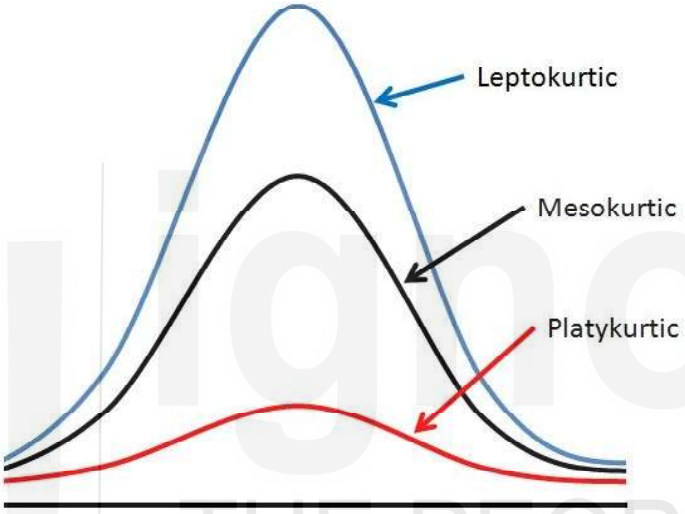


Figure showing three types of curves

(source: (www.bogleheads.org/wiki/Excess_kurtosis)

9.3.4 Correlation

'Correlation' studies the relationship between two or more variables. Correlation analysis involves the various methods which are to be used for studying or measuring the extent of relationship between two or more related variables. If the change in one variable affects a corresponding change in the other variable, then the two variables are said to be correlated variables.

Types of correlation:

Positive Correlation: If the increased change (or decreased change) in one variable results in an increased change (or decreased change) respectively in the other variable, then the correlation is said be Positive correlation. In this case, the two variables move in the same direction. Ex. Correlation between heights and weights, income and expenditure, rainfall and yield of crop, prices and supply of commodity etc., are cases of positive correlation.

Negative Correlation: If the increase change (or decrease change) in one variable results a decrease change (or increase change) in the other variable then the correlation is said to be Inverse correlation or Negative correlation. In this case the two variables constantly deviate in the opposite direction. Eg. Correlation between (i) price and demand of commodity (ii) volume and pressure of a perfect

gas (iii) Sales of woolen garments and the day temperature etc., are cases of negative correlation.

Perfect Correlation: The correlation is said to be perfect correlation when change in one variable is followed by a corresponding and proportional change in the other variable. In case, these changes are in the same direction, we say that there is perfect positive correlation between the two variables. In case such changes are seen in the opposite direction, we say that there is perfect negative correlation between the two variables.

Linear and Non-Linear correlation: The correlation between two variables is said to be linear correlation, if corresponding to a unit change in one variable, there is constant change in the other variable. The correlation between two variables is said to be non-linear correlation or curve linear correlation if corresponding to a change in one variable, the other variable does not change at a constant rate but at fluctuating rate. In such cases we do not get the straight line graph for the data.

Check Your Progress

4) What are the different types of correlations?

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The commonly used methods for studying correlation between two variables are:

Karl Person's Correlation and Sperman's rank correlation coefficient.

Karl Person's coefficient of Correlation: Karl Pearson (1867-1936), a British Biometrician suggested a measure of correlation between two variables which is known as Karl Pearson's coefficient of correlation. It is useful for measuring the degree of linear relationship between the two variables X and Y. It is denoted by r**.** It is also sometimes called product moment correlation coefficient.

The following formula is used to calculate the Karl Pearson's coefficient of correlation.

$$r = \frac{\sum (X - \overline{X})(Y - \overline{Y})}{\sqrt{\sum (X - \overline{X})^2 \sqrt{(Y - \overline{Y})^2}}}$$

Where, $\overline{X} =$ mean of X variable; $\overline{Y} =$ mean of Y variable

Spearman rank correlation: This test is used to measure the degree of association between two attributes. The Spearman rank correlation test does not accept any hypothesis about the allocation of the data and is the appropriate correlation analysis when the variables are assigned ranks.

The formula to calculate Spearman rank correlation is given below:

$$\rho = 1 - \frac{6\sum d_i^{\,2}}{n(n^2-1)}$$

ñ= Spearman rank correlation

di= the difference between the ranks of corresponding variables

n= number of observations

9.3.5 Regression

The term 'Regression' was first used by a British Biometrician Francis Galton (1822-1911) in connection with the inheritance of stature. The literal meaning of regression is "Stepping back towards the average value". Regression analysis in the general sense, means the estimation or prediction of unknown value of one variable (Dependent variable) from the value of the other variable (Independent variable).

In regression analysis, there are two types of variable. The variable whose value is to be predicted is called dependent variable and the variable which influences the values of dependent variable is called an Independent variable.

Regression Equations

Lines of Regression: There are two types of linear regression equations:

Regression equation of Y on X. The standard form of linear regression equation of Y on X is given by

$Y = a' + b'X$

Where Y=Dependent variable, X=Independent variable, a'=Intercept of regression line of Y on X and b'=Slope of the regression line of Y on X.

Regression equation of X on Y:The standard form of regression equation of X on Y is given by

$X = a+bY$

Where X =Dependent variable, Y= Independent variable, a=Intercept of regression line of X on Y and b= Slope of the regression line of X on Y.

There are two types of regression coefficients viz. Regression coefficient of Y on X and Regression coefficient of X on Y.

In the regression equation of Y on X say $Y = a'+b'x$, the slope b' is called regression coefficient of Y on X and is usually denoted by $b'_{yx.}$ It gives us a measure of change in Y for a unit change in X. The regression coefficient is given by:

$$b'_{yx} = r_{xy}\left[\frac{\sigma\gamma}{\sigma x}\right]$$

In the regression equation of X on Y, say $X=a'+b'Y$, the slope b is called regression coefficient of X on Y. It is usually denoted by $b'_{xy.}$ It gives us a measure of change in X for a unit change in Y. The regression coefficient is as follows:

$$b'_{xy} = r_{xy}\left[\frac{\sigma x}{\sigma \gamma}\right]$$

σ_x = standard deviation of X

σ_y = standard deviation of Y

9.4 INFERENTIAL STATISTICS

Inferential statistics is a technique used to draw meaningful conclusions based on a sample collected from a large population, e.g., Estimation methods and tests of significance (t-test, Analysis of Variance (ANOVA), and Chi-square ($\div^2$) test are discussed below:

Before talking about the various tests of significance, a brief note on estimation and hypothesis is presented below.

Estimation

Estimation is a process by which researchers make inferences about a population under study, based on the information collected from a sample.

Population parameters are estimated using sample statistics. Population means are estimated using sample means whereas population proportions are estimated using sample proportions.

Estimation is of two types, Point estimation and Interval estimation.

Point estimation: If the sample mean is x, then it is a point estimate of the population mean ì. also, the sample proportion *p* is a point estimate of the population proportion *P*.

Interval estimation: An interval estimate is defined by two numbers, between which a population parameter is said to lie. For example, $a < x < b$ is an interval estimate of the population mean ì. It indicates that the population mean is greater than *a* but less than *b*.

Hypothesis: Hypothesis is a tentative relationship or testable assumption/ prediction between two or more variables which direct the research activity to test it. In other words, hypothesis is a testable prediction which is expected to occur. It can be false or a true statement that is tested in the research to check its authenticity. In any investigation, there are mainly two types of hypothesis, Null hypothesis (H_o) and Alternative hypothesis (H_1).

Null hypothesis: It is a hypothesis that expresses no relationship between variables. It negates association between variables.

For example, Illiteracy has nothing to do with the rate of unemployment in a society.

Alternative hypothesis: It is a hypothesis in which there is some statistical significant relationship between variables.

For example, economic class of one's parents has an effect on one's educational attainment.

9.4.1 t-test

It is a parametric statistical technique that is mainly used to measure the significance of difference between two group means or sample means. Thus, the assumptions of parametric statistics need to be considered before we use this technique. A t-value is obtained when we compute t-test that can then be interpreted on the basis of tabulated value.

There are three types of t-tests namely, t-test for single sample mean, t-test for the difference of two independent sample means and paired t-test for difference of means.

t-test for single sample mean**: Comparison can be made between the mean of one group with population mean.**

Suppose a random sample of 'n' observations is drawn from a normal population with population mean μ and unknown standard deviation. We want to test:

i. If the given random sample has been drawn from a normal population with specified mean say μ.

ii. If the sample mean differs significantly from the population mean.

For this, we state the null hypothesis as

H_0 : The sample has been drawn from a population with mean (μ)

(or)

There is no significant difference between the sample mean and the populations mean (μ)

To test the null hypothesis, the t-test statistic is given by

$$t = \frac{\left|\bar{x} - \mu\right|}{s/\sqrt{n-1}}$$

Where $\bar{x}$ = sample arithmetic mean = $\frac{\sum x}{n}$

μ = population mean n=size of sample (≤ 30)

Sample standard deviation

Example: Nine students are selected randomly from a school and their weights are found to be 45, 47, 50, 52, 48, 49, 53 and 51 kgs. The assumed population mean is 47.5.

From the data $\sum x = 442; \sum x^2 = 21762; \ \bar{X} = 49.11$

$$s = \sqrt{\frac{21762}{9} - (49.11)^2} = 2.4916$$

$$t = \left[\frac{49.11 - 47.5}{2.4916\sqrt{9-1}}\right] = \left[\frac{1.61 * 2.8284}{2.4916}\right] = 1.8276$$

Degrees of freedom (d.f) = n-1 = 9-1 = 8

t_{cri} = 2.306 for 8 d.f at 5% Level of significance

Since, t_{cal} <we do not reject Ho at 5% Level of significance

Inference: The sample has been drawn from a given population of items with mean 47.5

Check Your Progress

5) What does t-test for single sample mean?

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t-test for the difference of two independent sample means: In this test, comparison can be made between the means of two different samples.

Independent sample: Suppose random samples of sizes n_1 and n_2 respectively are drawn from two independent normal populations with common unknown standard deviation.

We want to test if

a) Two dependent samples have been drawn from the population with some means.

b) The two sample means differ significantly or not.

Here, we state the null hypothesis as

H_0: the given two sample means do not differ significantly.

To test the H_0 we use the following t-test statistic.

$$t = \frac{\left|\vec{X}_1 - \overline{X}_2\right|}{\sqrt{S^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Where $_1$ = First sample mean with size $n_1 = \frac{\sum X_1}{n_1}$

$_2$ = Second sample mean with size $n_2 = \frac{\sum X_2}{n_2}$

$$S^2 = \frac{(n_1 s_1^2 + n_2 s_2^2)}{n_1 + n_2 - 2}$$

Here $s_1^2 = \left[\frac{\sum X_1^1}{n_1} - (\overline{X_1})^2\right]$ = First sample variance

$$S_2^2 = \left[\frac{\sum X_2^2}{n_2} - (\overline{X_2})^2\right] = \text{Second sample variance}$$

Degrees of freedom (d.f) = n_1+n_2-2

For example, ten subjects were randomly selected from a population and were given diet A. The increase in weight (in kgs) during a certain period of time was 10, 6, 16, 17, 13, 12, 8, 14, 15 and 9.

From another population 12 subjects were randomly selected and were given diet B. The increase of weight during the same period were 7, 13, 22, 15, 12, 14, 18, 8, 21, 23, 10 and 17. Test whether the diets A and B differ significantly with regard to their effect on increase in weight.

Solution:

Ho: There is no significant difference between the means increase in weight due to two diets A and B

Sample $n_1=10$

Thus

$$\sum X_1 = 120; \sum X_1^2 = 1560$$

$$\overline{X_1} = \frac{120}{10} = 12$$

$$S_1^2 = \frac{1560}{10} - (12)^2 = 156 - 144$$

$$= 12$$

Sample $n_2=12$

Thus

$$\sum X_2 = 180; \sum X_2^2 = 3014$$

$$\overline{X_2} = \frac{180}{12} = 15$$

$$S_2^2 = \frac{3014}{12} - (15)^2 = 251.17 - 225$$

$$S_2^2 = 26.17$$

$$S^2 = \frac{(10)(12)+(12)(26.17)}{10+12-2} = S^2 = \frac{(120+314.04)}{20} = 21.702$$

$$t_{cal} = \frac{12-15}{\sqrt{21.702\left(\frac{1}{10}+\frac{1}{12}\right)}}$$

$$|t_{cal}| = 1.5041$$

Degrees of freedom= n_1+n_{2-} 2= 12+10-2 =20

t_{cri} = 2.086 for 20 d.f at 5% Level of significance

Since, <we do not reject Ho at 5% Level of significance

There is no significant difference between the means increase in weight due to diet A and diet B.

Paired t-test for difference of means of two dependent means

Students paired t-test is frequently used in medical statistics where one wishes to test the effect of a particular drug or a treatment in curing a disease. If the pairs of sample values are dependent (or correlated), then paired t-test may be used and in such situations, one may take initial measurements of the characteristic before giving treatment and final measurements of the characteristic after giving treatment

Null hypothesis: Ho: There is no significant difference between the means of dependent paired sample observations.

Or

There is no significant effect of treatment in curing in a particular disease.

Test statistic: $t=\left[\frac{\bar{d}}{s_d/\sqrt{n-1}}\right]$

Where, $\bar{d}=\frac{\sum d}{n}=$ Mean of differences between paired sample observations

n = number of pairs of observation

$s_d=\sqrt{\frac{\sum d^2}{n}-(\bar{d})^2}=$ Standard deviation of differences between paired sample observations

Calculated value of t-statistic: t_{cal}

Degrees of freedom: (n+1)

Critical value of t-statistic: t_{cri}

(This can be obtained from the statistical table of t-Distribution for (n-1) degrees of freedom at either 5% or 1% l.o.s.)

Inference: Compare the absolute value t_{cal} with t inference accordingly.

Example:

Ten subjects were randomly selected from a population and their systolic blood pressures (SBP) were recorded. Then the subjects were given a kind of stimulus and again systolic blood pressures were recorded. To test is there any effect of stimulus on the systolic blood pressure?

SBP before stimulus	SBP after stimulus	d= (x-y)	d^2
124	125	-1	1
130	129	1	1
122	125	-3	9
131	128	3	9
118	120	-2	4
128	130	-2	4
140	142	-2	4
129	132	-3	9
140	140	0	0
116	120	-4	16
		-13	57

The table shows that, $\sum d = -13; \sum d^2 = 57$

$$\bar{d} = \frac{-13}{10} = -1.3$$

$$S_d = \sqrt{\frac{57}{10} - (-1.3)^2} \Rightarrow S_d = \sqrt{5.7 - 1.69} \Rightarrow S_d = \sqrt{4.01} = 2.0025$$

$$t = \left[\frac{-1.3}{2.0025/\sqrt{10-1}}\right] = \frac{-3.9}{2.0025} = -1.9476$$

$$|t_{cal}| = 1.9476$$

Degrees of freedom = n-1 = 10-1 = 9

t_{cri} =2.262 for 9 d.f at 5% LOS

Since, <we do not reject Ho at 5% LOS

Inference: There is no significant effect of stimulus on the blood pressure

9.4.2 Analysis of Variance (ANOVA)

This statistical technique can be used to compare the means of three or more sample. We discussed under t- test that it is used to measure the significance of difference between means of two sample sub groups. However, many times when we carry out research, there will be more than two groups, in which case Analysis of Variance (ANOVA) can be used. For example, when we want to find out if significant difference exists in weight of early, middle and late adolescents, then ANOVA can be computed. ANOVA is also a parametric statistical technique and the assumptions of parametric statistics need to be followed. F ratio is obtained when we compute ANOVA , which can then be interpreted on the basis of table value. The computation of ANOVA involves computation of the group means, calculation of the correction sum, followed by calculations of the total sum of square, between- group sum of squares and within- group sum of squares. The

degree of freedom are also worked out. A summary table of ANOVA is then drawn and f-ratio is computed. The formula for F ratio is given below.

$$F = \frac{\text{Mean Sum of Square (MSS) due to the factor}}{\text{Residual MSS}}$$

9.4.3 Chi-square (χ^2) Test

Chi-square statistic is a measure which assesses the extent to which a set of the observed frequencies of a sample depart from the corresponding set of the expected frequencies of the sample. It is a measure of the aggregate difference between the observed frequencies and the expected frequencies in a sample.

The Formula for Chi Square test is

$$\chi^2 = \sum\left[\frac{(\text{Observed}i - \text{Expected}i)^2}{\text{Expected}i}\right]$$

Where:

Σ = sum of over all categories

Example: Data on Blood pressure levels are recorded from 212 subjects and is presented in the following table:

	Hypertensive	Non-hypertensive	Total
Urban	50	60	110
Rural	34	68	102
Total	84	128	212

The Chi-square (χ^2) value estimated for the above data is as follows:

	Observed (O)	Expected (E)	(O-E)	$(O-E)^2$	$(O-E)^2/E$
Urban	50	43.58	6.42	41.21	0.94
	60	66.41	-6.41	41.08	0.61
Rural	34	40.41	-6.41	41.08	1.01
	68	61.58	6.42	41.21	0.66
					3.22

$\chi^2 = 3.22$

9.5 STATISTICAL ANALYSIS SOFTWARE

Computer software packages such as Microsoft EXCEL and Statistical Package for Social Sciences (SPSS) can readily provide the numerical results for all the statistical tests that are discussed above. A brief discussion on Microsoft EXCEL and SPSS is presented.

9.5.1 Microsoft Excel (MS Excel)

MS Excel is a Window-based spreadsheet package designed to perform calculations, create graphs and to make reports. This is a member of the MS-

Office family. Before understanding Excel we have to understand the idea of a spreadsheet. A spreadsheet is an electronic sheet that contains horizontal and vertical lines that help in data storage and calculations. It is also called a Worksheet. Excel is a big spreadsheet. We can enter any type of data in Excel and carry out analysis. A database file can be created in Excel by opening the worksheet and typing the data in the rows and columns of the sheets. The Microsoft Excel spreadsheet is given in figure 1 bleow:

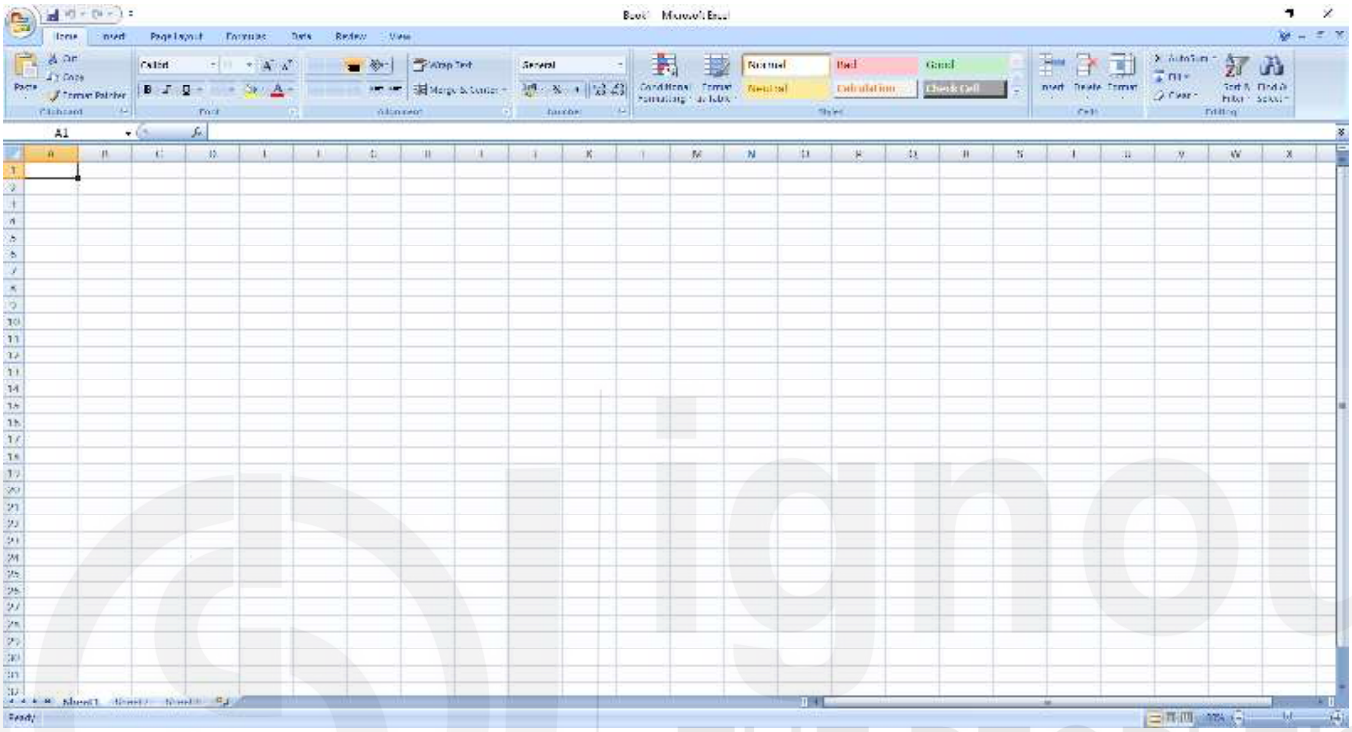

Figure 1: Excel Sheet

9.5.2 Statistical Package For Social Sciences (SPSS)

Statistical Package for Social Sciences (SPSS): SPSS is a powerful statistical software, which was earlier known for its applications in social sciences only. It is Windows-based and shares all the facilities with other Windows applications. It is a comprehensive integrated system for statistical data analysis. SPSS has all major analytical tools for handling large volumes of data as well as complicated multivariate analyses. Working knowledge in one of the statistical packages like SPSS is a must for contemporary research analysis. We can also write custom oriented statistical procedures by using SPSS language and syntax. The help features of SPSS are very useful to the user in understanding the utility of various statistical tools. In fact the user can take the help from SPSS help files to know what a tool is and where it is applied. The SPSS output is very conveniently arranged in the form of tables so that they can be copied and pasted in MS-Word or MS-Excel for documentation. We can also export the output to distant clients by Internet communications.

Main menu of SPSS

The menu of SPSS (Figure 2) explains the following features each concerning to one precise feature.

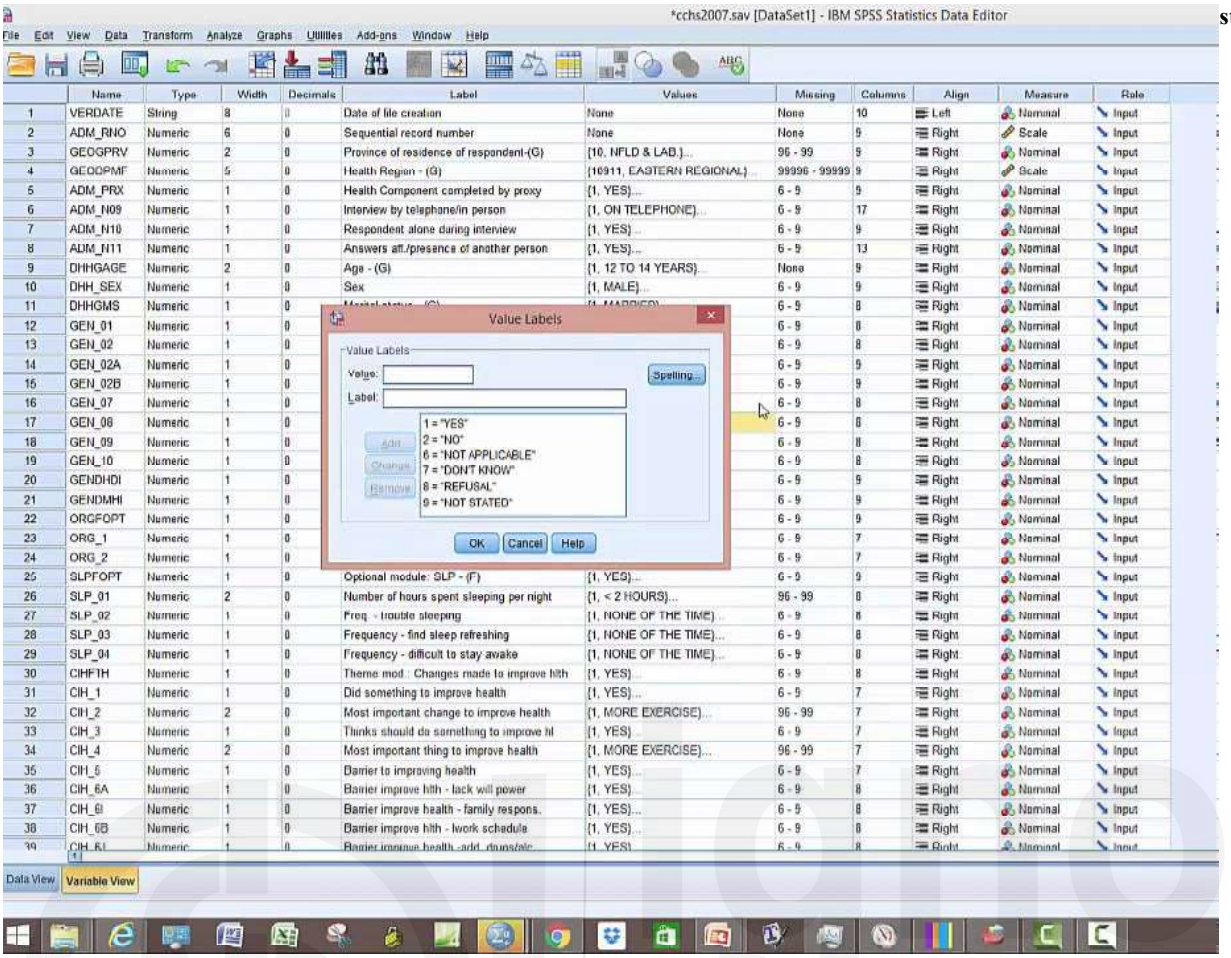

Figure 2: SPSS Menu

The menu items and their applications are briefly outlined below:

Menu	Application
File	File Operations like New, Open, Save, Save As, Print etc.
Edit	Cut, Copy, Paste and Find operations
View	Status Toolbars, Labels, Grid lines etc.
Transform	Compute, Recode, Categorise, Create Time Series, Missing Values etc.
Analyze	Statistical Aspects like frequencies, Descriptive Statistics, Comparison of Means, Correlation, Regression, Classify,, Non-Parametric tests, Time series, Survival Analysis etc.
Graph	Preparation of statistical charts like Pie, Bar, histogram, Control charts, Box Plot, P-P Plot, Q-Q Plot, Time series etc.
Utilities	Information on variables, file menu editor etc.
Add-ons	This contains links to information about additional functionality of SPSS
Help	A detailed help on every feature of SPSS is shown in this menu.

9.6 SUMMARY

Statistics is a branch of science of that deals with the collection, organisation, and interpretation of numerical data. Use of statistics is quite frequent in most of social science and science disciplines because of quantitative data. Statistical techniques can be broadly divided into two categories: Descriptive statistics and Inferential statistics. Descriptive statistics organises and summarises the data whereas Inferential statistics uses sample data to draw inferences about population from which sample was drawn. In this unit, a brief account of both Descriptive statistics and Inferential statistics was presented. A brief discussion on statistical softwares, MS EXCEL and SPSS is also presented.

9.7 REFERENCES

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9.8 ANSWERS TO CHECK YOUR PROGRESS

1. A measure which measures the concentration of the observations in the central part of the statistical data is known as a Measure of Central tendency or Average.

2. $\bar{x} = \frac{\Sigma fx}{N}$

3. Standard Deviation is defined as the positive square root of the arithmetic mean of the squares of the deviations of given observations from their arithmetic mean. It is denoted by ó.

4. There are four types of correlations: Positive correlation, Negative correlation, Perfect correlation and Linear & non-linear correlation.

5. **T-test for single sample mean is the one, where comparison is made between the mean of one group with population mean.**

UNIT 10 ANALYSIS OF DATA

Contents

Learning Outcomes

After reading this unit, the student will learn to:

- Define analysis of data from the field;
- Describe the various kinds of analysis practiced by researchers; and
- Use the processes to analyses her/his own data.

10.0 INTRODUCTION

This unit calls for a discussion on the issue of data analysis and will continue with a discussion on the issue of writing the research report in the next unit. However, these two halves are intricately linked to each other. What is presented in the form of a research report is actually the results that researchers arrive at through analysing the data. Writing a research report is actually the representation of the data that has been processed using various tools, techniques, and ideas of analysis. Analysing data actually requires digging into the meaning of the collected data. As researchers we want to know what data says. We are not only interested in collecting data but want to know what it speaks about the questions that we seek to answer. For example, it has been argued that anthropology as a discipline only got established in the mid nineteenth century in Europe, however, data in the form of ethnographies and human physical and cultural variations were available in abundance since the fifteenth century. A question then can be asked that, why then do we trace the emergence of the discipline only from the mid-nineteenth century. Historians of the subject believe that not until the mid-nineteenth century the data available about the human physical and cultural variations was put to a 'scientific' analysis.

If anthropology is labelled as the study of human physical and cultural variations then these variations were for a very long time attributed to the divine creation. It is contended that only after the publication of Darwin's book- *On the Origin of Species*- that the human cultural variation was put into the perspective and analysed from the theoretical premise of evolutionism. This also gave rise to the

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emergence of the first theoretical perspective in anthropology. It is also with the emergence of a 'scientific' perspective to understand the available data that a discipline called anthropology was born. More simply it can be stated that the discipline of anthropology emerged in mid-nineteenth century because it was only at this time that the data collected in the form of travellers' accounts, missionary accounts, etc., were put to analysis through the theory of evolutionism. Broadly and more generally we can state that if data is discrete then analysis is a process that tries to see a pattern in this otherwise discrete data. In social sciences especially, this pattern is deciphered using one or more theoretical premises. Therefore data analysis is intricately linked to anthropological theories. We will return to this aspect in a more detailed manner in the later section of this unit.

We should not only restrict our understanding of the term 'analysis' to some statistical procedures that give results but should extend our understanding to a more broader level where analysis means 'making sense of the data.' In other words we can also state that analysis is a process that tries to see the essence of the data. More generally in the age of information technology, social media in the form of WhatsApp groups, Facebook, Twitter etc., data means our likes, dislikes, attitudes, opinions about a product or a political party, our aspirations, etc. Everyone right from the big corporate houses to the media managers of big political parties need this kind of data. Through analysing this data they get to know the general mood of the public regarding a commercial product in the market or they get to know the larger opinion regarding a policy decision. Political parties especially are interested to know the issues that are emotional and can be taken advantage of in order to win elections. Analysing the data on social media can give them a lot of clues that they can exploit. Similarly a lot of our personal data is also being collected and some scholars and legal experts are of the view that such data can breach the privacy of the individual and has the power to convert the state into a 'surveillance state.' To what extent this is going to affect us, only time will tell.

The above discussion tells us the importance of data and its analysis, not only in research but also this issue is linked closely to our daily lives and lived experiences of the everyday.

Now before we begin to understand the analysis of data, we should have some idea of the nature and kind of data itself. Data can be in the form of height and weight of individuals or otherwise in the form of opinion of people as told to the researcher. Data also comprises of the observations that are made by the researcher while living in a community. Data that takes the form of numbers are labelled as quantitative and the ones that are represented in words are called qualitative. However Bernard (2006) is of the view that analysis of the data is always qualitative in nature. This is true as we want to know what the numbers say in words. But it is equally possible to put qualitative data to quantitative analysis. For example we may be interested to know that which particular word in a text appeared how many times. Every year Google comes up with the most searched words on the search engine. This gives us some idea about what the world is thinking and looking for. Therefore data and its analysis, both qualitative and quantitative can be understood with the help of the following chart.

Table 10.1: Data and Analysis Matrix

		Data	
		Qualitative	Quantitative
Analysis	Qualitative	a	b
	Quantitative	c	d

Source- Bernard, 2006

By reading the above chart we may say that cell 'a' represents a possibility of qualitative analysis of qualitative data, cell 'b' represents the possibility of qualitative analysis of quantitative data, cell 'c' represents quantitative analysis of qualitative data and cell 'd' represents quantitative analysis of quantitative data. Whenever we think of data analysis in research, more generally it is the cell 'd' kind of analysis that we have in mind where the quantitative data is reduced further into frequencies, medians, modes and percentages. This kind of reduction of data requires further interpretation in the light of theories and concepts. This further means that without qualitative analysis of quantitative data the quantitative analysis of quantitative data becomes sterile and superficial.

The phrase 'analysis of data' to me, at least has two meanings. At one level it means a stage in the entire process of research where the researcher already has the data that she collected from the field and now the task is to arrange and analyse it and at the other level analysis of data also represents an intellectual exercise that begins from the very moment we think of doing research on a particular area or topic. At the second level, the data that is analysed may not be collected by the researcher from the field but may comprise of the readings that the researcher might have done on the particular topic or her/his previous experience on a particular issue. In this sense analysis is not a stage but a process that is spread throughout the research activity right from the conception of a research till the presentation of it in a bound form as a dissertation or a thesis. In this sense the hypothesis that we make in the beginning of a research is a result of the analysis that we do after reading various literatures on the topic of research. Having said this however in this unit we will restrict ourselves more to the first meaning that has been attributed to analysis and that is as a stage in the process of research where the data collected is arranged and put to analysis.

Most of the books on research methodology in general and in anthropology in particular deal with the issue of data analysis in two different heads or chapters namely- qualitative data analysis and quantitative data analysis. However, H. Russell Bernard (2006) in his book- *Research Methods in Anthropology: Qualitative and Quantitative Approaches*, introduces the subject of analysis with a general introduction to both quantitative and qualitative data analysis before writing specific chapters on each type of analysis. In the general introduction to analysis Bernard suggests that one of the most important concepts in any kind of data analysis is the **data matrix.** It is a matrix of variables in which we try to find the relationship between variables. For example we collect a lot of information regarding age, sex, educational qualification, caste, religion, region, income etc. Now it will be interesting to know that how income relates with other variables like sex, educational qualification, caste, etc. This kind of analysis is the most basic kind in any research and gives us a relational understanding of various variables in our research. The data matrix is also known as the **profile matrix**

and the analysis is known also by the name of **profile analysis.** A data matrix or a profile matrix may look something like this:

Table 10.2: Profile Matrix

Respondent	Age	Sex	Education	Caste	Religion	Income
1						
2						
3						
4						

Adapted with modifications from Bernard, 2006

Check Your Progress

1) How is analysis of data understood historically in anthropology?

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2) Who penned the book, *On the Origin of Species*?

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3) What is quantitative and qualitative data?

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4) Explain **Data Matrix**.

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10.1 ANTHROPOLOGY'S ANALYTICAL MONTAGE

Anthropology as a discipline and as a philosophy is based on the premise of plurality. It celebrates pluralism. Eric Wolf once stated that 'it is less a subject matter than a bond between subject matters.' For Franz Boas, anthropology is a holistic discipline that includes cultural, biological, archaeological and linguistic dimensions. This makes one thing very clear from the outset that the kind of data with which an anthropologist deals with may take many different forms and this calls for different strategies for its analysis. For example, the archaeologist is busy excavating the earth and finding artefacts which then is analysed not only in isolation but also in the context of other artefacts. This kind of a contextual analysis may be called as **embedded analysis.** It means that the meaning of a particular artefact like a terracotta figurine, its possible use and importance in the life of people can only be understood after analysing it **spatially** i.e., where was the figurine found and what other artefacts were found along with the figurine. Another kind of analysis that archaeologists do is that they ascertain the possible use of an artefact by looking at its contemporary use. This kind of analysis may be labelled as a **comparative analysis.**

A linguistic anthropologist similarly deals with different kinds of languages. She may ask questions regarding the origin and development of a particular language. This kind of a question leads to a **historical analysis or evolutionary analysis** of a language. An anthropologist may be interested in two or more languages and may want to know the similarities and differences in these languages. This kind of analysis again is a **comparative analysis.** A very interesting example of such a linguistic analysis is presented by Trautmann (2007). He contends that in the early phase of the British rule in India, the British found much similarity between Sanskrit and other European languages. This finding led them to conclude that the British and the Indian populations are somehow related to each other and they thought that they have indeed found their long lost brothers and sisters. This was labelled as the **Indo-manic** phase of the British rule in which a lot of Sanskrit texts were translated into English and other European languages. Besides this an anthropologist may be interested in the usage of a particular language. An anthropologist may ask questions about how words mean differently in different contexts? How the meaning of the word changes with the tone (sound) of the words and the person who is using the word? This kind of analysis is interested in knowing the meaning in relation to other words and sentences and the context. Such an analysis of language is labelled as the **structural analysis.** It tries to understand, what underlying structures are represented in the everyday usage of the language? How a particular language becomes dominant and the other becomes subordinate? What kinds of languages are prohibited in public and what kinds of languages are politically correct? And what are the gender differences in the usage of language?

Biological anthropologists on the other hand deals with a different set of data. Their data comprises of mostly numbers like height, weight, blood pressure, pulse rate, measurements of human and animal bones, various measurements on human body, etc. Traditionally biological anthropologists were interested in classifying the human population throughout the world on the basis of some measurements of the body. Their analysis thus led to classification of human

population into various racial groups. However, on further analysis of the genetic constitution of various human groups it was realised that instead of racial categories we can actually talk of gradations of physical and genetic characters of the human population that are called as clines.

Social anthropologists conversely deal with data that comprises mostly of words and anthropologists' own observations of the social settings. This kind of data needs a different kind of treatment and a different form of analysis. This is known as ethnographic data and the following analysis is known as **ethnographic analysis**.

From the above discussion, it can be said that the analysis of the data depends on two factors:

a) The kind the data itself. Either the data comprises of words or numbers, depending upon this the analysis will be **qualitative** or **quantitative** respectively.

b) The questions that we ask from the data. We may ask a quantitative question from a qualitative data (as discussed in the introduction).

This brings us to know more about the process of both qualitative and quantitative analysis. The following sections will deal with each kind of analysis separately.

Check Your Progress

5) What is embedded analysis?

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6) Explain structural analysis.

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7) Describe ethnographic analysis.

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10.2 QUALITATIVE ANALYSIS

This is also known as **textual analysis.** A great amount of data in anthropology, especially in social anthropology comes in the form of texts. Collection of textual data has been an integral part of anthropology. Anthropological data collection was guided by the premise that the kind of societies studied by anthropologists will soon disappear owing to the fast changes occurring all around them and therefore it was necessary to collect all the cultural data before it was lost forever. This kind of ethnography was known as **salvage ethnography.** Thus a huge amount of cultural data had to be analysed. This led to the emergence of the great anthropological tradition of textual analysis. Within this tradition there is no one method of textual analysis but there are a battery of methods. This includes interpretive analysis, performance analysis, content analysis and grounded theory.

10.2.1 Data Management: Coding, Memoing and Concept Mapping

However, even before we embark on the task of analysis we need to process our data to some extent. We cannot work with the amount of data in the form of text without organising it. This is the first step in any kind of analysis. We may also name this step as the **data management** phase of the analysis. Now-a-days this step is being carried out with the help of various softwares that help in organising the data. However, for the sake of simplicity and to understand the process we assume that we attempt a manual management of data. The very first step in organising the data before analysis begins is **coding.** The data collected needs to be categorised under various heads. These categories are actually the concepts that will be used later for analysis. For example a data on social movement can be labelled in terms of history of the movement, important events in the progress of the movement, movement and national politics, movement and human rights, etc. Separate files and folders can be made in which such data can be stored with labels. Next in the process that follow coding is **memoing.** In memoing, the researcher writes short memos related to codes and theories that might be used in the analysis. Memoing can be described as writing notes to yourself and others that are involved in a research project. Simply it is an elaboration of a concept

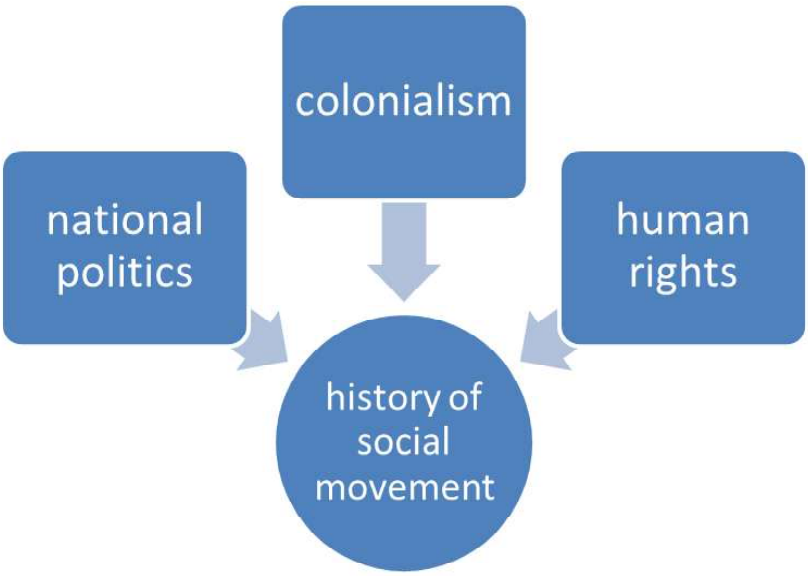

Figure 10.1: Concept Map

code or a theory that is linked with the concept. Later during the analysis we might forget the meaning of the code that we gave and therefore in order to remember it we may expand its meaning and write it. This process will be termed as memoing. After coding and memoing, another process **concept mapping** is done. In concept mapping diagrams are made that may reflect that how various concepts are related to each other. Simply stated, concept mapping is a pictorial map of the concepts that we coded in the beginning. So, colonialism, human rights and national politics are all linked to the history of a social movement. Concept maps help us in organising our thoughts while analysing. A concept map may look like the following:

This initial processing of the data now makes us ready to attempt the analysis. In anthropology as stated above, the following kinds of analysis are more common with qualitative data.

10.2.2 Interpretive and Performance Analysis

Interpretive analysis rests on understanding the meaning of cultural data like various myths, folklores, tales, interviews, etc. This interpretation has to be in light of the larger cultural patterns. Interpretive method in anthropology is an extension of the hermeneutic tradition in which the biblical text was considered as the word of god that needs to be interpreted by someone for god's pupils. Clifford Geertz and Paul Ricoeur have extended the idea of interpretation of text to culture and cultural performances. For Geertz culture is an assemblage of texts and therefore by interpreting the text, culture can be known. Similarly, for Ricoeur, human behaviour has meaning for its actors and therefore free-flowing behaviour can also be understood as a text that needs interpretation (Bernard, 2006). Culture is seen by Geertz as a form of text that needs to be read and deciphered in order to understand it. Human behaviour is symbolic and has meaning in its own particular context (Geertz, 1973). To illustrate the above points, we should take up the case of the Balinese cockfight that is considered as one of the most popular studies conducted through the interpretive and symbolic paradigms. While conducting his fieldwork in Bali, Indonesia, Geertz observed the occurrence of cockfights in every nook and corner of the village in which he was residing. Although, cockfight is not legal in Indonesia as has been described by Geertz in his explanation of the phenomenon, still it is quite frequent in Bali. Geertz has tried to understand the entire complex of cockfighting as a **social performance** rather than just a sport. The symbolic significance of cockfight was of immense importance for him and he interpreted and described the event in metaphorical and symbolic sense. He notes that cocks are not mere birds that are put to fighting occasionally, but are the extension and representation of the owner's self and personality. Balinese people take great care of their cock and consider it to be representing their masculinity and inner self. Not only this, cocks are also considered to be the symbols of demons and devils and cockfight are viewed as their symbolic offering of blood to appease these demons. Cockfighting is also used as a social idiom to explain and talk about similar situations of court trials, wars, political contests, inheritance disputes and street arguments. This entails a symbolic nature of cockfight where it becomes an expressional performance of in-group, out-group loyalties and conflicts. The cockfight is also representative of two dimensions of human existence namely-psychological and sociological dimensions. The psychological dimension is represented in the extension of human self or persona in the cock itself, and on

the other hand the sociological dimension is expressed in the public negotiation and display of the personality interaction through the game. Cockfight is the simulation of the larger social matrix where different kin groups, classes, and other social groupings and hierarchies are represented in antagonism and alliance and are seen negotiating power and status through the cockfight performance (Geertz, 1973).

10.2.3 Content Analysis and Grounded Theory

As a method of textual analysis, content analysis is a very elaborate and effective method. Content analysis is a deductive technique of data analysis wherein a hypothesis is formed in advance and then it is tested by analysing the text at hand. It is in sharp contrast to the other textual analysis method of grounded theory where the approach is inductive which means that a hypothesis might get generated after thoroughly analysing the text. Content analysis aims at extracting meanings out of an otherwise raw textual data. For applying content analysis text need not necessarily be composed of words. Content analysis can easily be applied to pictures, films, work of art and paintings.

Content analysis begins with identifying the content for analysis. The content can be words, pictures, performances etc. The next task is to identify the unit of analysis out of the content. Then this unit is broken down into variables and a variable matrix is formed which is later analysed quantitatively to test the hypothesis. To explain this with the help of an example- Vipul Mudgal (2011) used this technique to study the coverage given to rural India in terms of news items in leading newspapers. He selected six newspapers in all- three Hindi newspapers and three English newspapers (selected according to their readership) for this purpose. In all 968 rural news items were selected for analysis. A coding sheet was made in which 13 categories were formed namely- (1) name of the newspaper, (2) placement of the story, (3) display (positioning, size) of the story, (4) visuals (accompanying the story), (5) story type (author, etc.), (6) likely origin of the story (forum), (7) primary themes, (8) rights-based themes, (9) story setting/ reference point, (10) primary source of the story, (11) secondary source, (12) story slant, and (13) overall remarks. Each category mentioned above was then filled with 968 news items according to their compatibility in each category. Sometimes each category also had sub-categories or themes. For example primary theme was again broken into many themes like non-agrarian theme which were further sub-categorised as Naxalite related disaster, accident and other violence. Similarly development theme was further broken into farming, general development and rural environmental issues. After this matrix and coding was done, SPSS software was used to count the number of news items that fell into each category.

Table 10.3: Themes in Newspapers

Non-agrarian Themes (35.8%)		
1	Naxalite-related violence	13.7%
2	Other violence related themes	11.3%
3	Disasters/calamities	7.1%
4	Accident/crime	3.7%

Source- Mudgal, 2011

Apart from this the six newspapers were also analysed for the total space that they provided to rural stories as compared with the urban stories.

Content analysis as a tool has wide applicability. Recently it has been used to analyse data generated by anthropologists working in flood affected areas. In one such study the aim was to investigate into the visual and textual images of floods in Badaun district of Uttar Pradesh. The content for this analysis comprised of the textual data in the form of essays that were written by students of class XII and drawings made by student of class VIII on the subject of floods. The textual data in the form of essays were broadly categorised into three categories of texts depicting impacts of floods, problems encountered during floods and the resilience pattern of the community. These three categories were further sub-divided into different themes that emerged during careful reading of the essays. For example the category of impact was divided into themes like- economic loss, disease, soil erosion, human loss, price rise, communication failure and education. It was then analysed to see what percentage of people fall into each of the above themes. Content analysis is also a very powerful tool to analyse the visual data in the form of drawings and pictures. The drawings that were collected during the fieldwork were put to content analysis. The drawings were analysed for what was depicted in them. This in turn reflected the conscious and sub-conscious minds of the people affected by floods and their priorities during and after floods. The visual data in the form of drawings showed public buildings, human beings, people crying for help, trees, animals, birds, boats etc. The frequency of their occurrence is a measure of their dominance and priorities of the people (Khattri et al., 2012). Cowan and O'Brien, similarly used content analysis to study thriller films. They wanted to know how gender difference accounted for victimisation in these films by psychopath killers. They also tried to understand, what the characteristics were of the victims that made them victims at the hands of such killers. They chose 56 such films in which there were in all 474 victims. They were coded according to their gender and survival rate. Conventionally it is thought that in such movies the victims will be female whereas the killer and attacker would be male. However Cowan and O'Brien found that the killer was definitely male in most of the cases but the victims were both male and female. Also in terms of the characters that made victims susceptible to be killed were gendered- for example sexually pure women survived whereas egoistic and dictatorial males perished.

Textual analysis in general deals with extracting themes from the available text in order to understand the social-cultural grammar of the society. Content analysis is an effective tool in this direction and is also an important example of how qualitative data can be put to quantitative analysis which in turn reveals analytical categories. The nature of anthropological data is such that words, pictures, performances and symbols form a large part of the data bank which can be put to content analysis for getting a holistic picture of the research question that needs to be investigated.

This brings us to the second kind of analysis that is the quantitative analysis.

Check Your Progress

8) What do you understand by salvage ethnography?

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9) Discuss coding, memoing and concept mapping.

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10) How did Geertz explain Balinese cockfight through the interpretive and the symbolic approach? Discuss.

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11) Explain content analysis.

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10.3 QUANTITATIVE ANALYSIS

This kind of analysis has been defined by Earl Babbie (2007) as- "the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect." Quantitative analysis is also defined as those techniques that are used by researchers to put numerical data to statistical analysis. This kind of analysis has been dealt with in the previous unit in detail (see Unit 9). It is sufficient to state that quantitative analysis in most of the research methods books has been categorised into three viz- univariate analysis, bivariate analysis and multivariate analysis. A univariate analysis is defined as the analysis of a single variable. Through this kind of an analysis we describe various properties of the variable. For example calculating the 'mean age' of a sample is a univariate analysis of the variable 'age.' Similarly calculating the percentage of people agreeing or disagreeing on an issue is an example of univariate analysis termed as 'frequency distribution.' The purpose of univariate analysis is descriptive rather than explanatory because it does not involve relationship between two or more variables. Bivariate analysis is one in

which two variables are involved. In this analysis two variables are analysed simultaneously with an aim of determining or finding a relationship between the two. Correlation coefficient is an example of bivariate analysis. A multivariate analysis is one where we tend to find relationship between several variables for example we may be interested in knowing the effect of age, gender and social class on religiosity of people.

Check Your Progress

12) How has Earl Babbie defined quantitative data?

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10.4 SUMMARY

This unit on analysis of data that is collected during research will help the learner to move ahead systematically with her/his investigation. In the field as the lesson mentions, we encounter a variety of data and sometimes more than what we anticipate. It is finally the way we analyse our findings using appropriate know how, aids us in the creation of valid knowledge. Hence to assist the learner, the lesson takes us through various kinds of methods which can help in analysis of data depending on what kind is collected.

10.5 REFERENCES

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Khattri, P., Joshi, P.C., Minakshi and Guha-Sapir, D. (2012). "Projections of Disaster: Investigations into Visual and Textual Images of Flood in Badaun, Uttar Pradesh". *Anukriti*. 2(5).

Mudgal, V. (2011). "Rural Coverage in The Hindi And English Dailies". *Economic and Political Weekly*. XLVI(35).

Trautmann, T.R. (2007). *The Aryan Debate*. New Delhi: Oxford University Press

10.6 ANSWERS TO CHECK YOUR PROGRESS

1. Refer to the 1st paragraph in section 10.0
2. Charles Darwin

3. See section 10.0
4. Refer to the 6th paragraph in section 10.0
5. Refer to the 1st paragraph in section 10.1
6. Refer to the 2nd paragraph in section 10.1
7. Refer to the 4th paragraph in section 10.1
8. Refer to the 1st paragraph in section 10.2
9. Refer to the 1st paragraph in section 10.2.1
10. See section 10.2.2
11. See section 10.2.3
12. See section 10.3

UNIT 11 WRITING OF THE RESEARCH REPORT

Contents

Learning Outcomes

After reading this unit, the student will learn to:

- Describe the structure of a research report;
- Identify each part of a research report sequentially;
- Illustrate the results in the report with associated aids; and
- Create new knowledge significantly with the presentation of the research report

11.0 INTRODUCTION

In the last unit, you were elaborately explained about how analysis of data is done once all information is collected from the field. This unit which in a way is a continuation of the former unit, discusses how the data collected and analysed is then to be presented in the form of a research report. A research report is the culmination of all the stages of research which began with the choosing of a focused research problem. This unit explains in detail the various sequential steps that a researcher has to put forward to create the product of the research conducted through valid use of methods, tools and techniques. It is this report

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which finally displays the entire research process meaningfully. Let us hence, take each stage of writing a research report in the following parts and describe them with clarity.

11.1 WRITING RESEARCH REPORTS

Although theoretically speaking, writing a research report will follow data analysis because after we have analysed the data we will be interested in presenting it in a form of a research report, but more practically, both writing and analysis goes on simultaneously. Writing a research report is an act of communication. No matter how well a research is conducted and data analysed but if they are not properly communicated then they will not have the desired impact or result. The first thing that a research report communicates is a body of specific data and ideas. Second, the report also contributes to the general body of knowledge on that topic of research. Finally, the report should also open up scope for further research in that area or allied areas. While writing, one needs to keep in mind that who is going to read the report? Whether the report is for a general public or for a scientific audience? Accordingly, the language of the report and the style of reporting need to be modulated. With this is mind we should start with the process of writing the research report (Henn, et.al., 2006).

Check Your Progress

1) For whom is a research report written?

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11.2 THE STRUCTURE OF THE RESEARCH REPORT

The first thing that we should know in writing the report is about the structure of the report. Whether our research is quantitative or qualitative, or both, there are certain sections that should form part of the report. Although the individual researcher is free to give her own structure to the report but still what follows can form a reference.

11.2.1 Cover Page/Title Page

A report generally begins with a cover page. This page contains the title of the report, the name of the person or institution that is submitting the report, the name of the institution to which the report is submitted and the date of its release. In case of an institutional affiliation, the report also bears the logo of the concerned institute or other affiliating and sponsoring agencies. The title of the research should be concise. In anthropology, the research titles generally contain the name of the area in which the study is conducted. Some funding agencies also prescribe that the title should include the research design for example- a case-control study, an observational study, an experimental study, a descriptive study etc.

Check Your Progress

2) What is a Cover Page also known as?

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3) What does a Cover Page contain?

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11.2.2 Content Page

The title page is followed by a content page. This page contains all that is present inside the report alongwith the page numbers. The researcher should be very careful while preparing the content page and great care should be taken while indicating page numbers. The report does not only contains various chapters and written materials but a great deal of a report's space is also occupied by tables, charts, figures, maps, photographs, abbreviations, preface, acknowledgements, references, subject index and appendices. All these should find mention in the content page. The content page is followed by the lists of tables, maps, charts, figures, photographs, abbreviations etc. Effort should be done to give independent numbers to each table, chart etc used in the report and then separate tables should be made indicating the name and number of these tables and charts and the page number on which they appear.

11.2.3 Preface

The preface gives a complete idea of what should be expected inside the report. It is like a general introduction to the research project that outlines its subject, scope and aims. It also discusses the problem that is dealt with in the report in more general and global terms. The preface also contains a brief note on each of the chapters that are present in the report. It contextualises the report within the global and local political economic context by underlining the relevance of the research.

Check Your Progress

4) What does the Preface entails?

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11.2.4 Acknowledgements

The report should acknowledge the work of every person or group that may have helped in finalising the report or conducting the research. This may include the funding agency, the affiliating institutes, the office staff, the field staff, respondents etc. Giving names of people who helped also involves some ethical issues. In research we are bound by the ethics of anonymity to our respondents. Acknowledgement should therefore not be at the cost of losing the anonymity of people.

11.2.5 Introduction

This is the first chapter of any research report. The introduction, introduces the problem to the readers. It constructs the canvas on which the rest of the report is painted and delivered. Gilbert (2001) is of the view that introduction should be such that it keeps the interest of the reader alive. It is the face of the entire research report. The introduction should incorporate the common thread that runs throughout the report. The theoretical light with which the data is analysed and what the researcher wants that the readers should keep in mind while reading the report should be spelled out clearly in the introduction. The introduction should also include the major highlights of the report that you want your readers to pay more attention.

Check Your Progress

5) What is the role of the Introduction in any research text?

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11.2.6 Literature Review

This is in continuation of the introduction. This chapter presents a review of the literature on the topic of the research. A lot may be written on a topic, therefore it is impossible to review all the writings. Selected writings of well-known academics and publishers should be taken into account and then snow-balling should be done, that means those literatures should be picked up for review that are given space in those selected writings. This however does not mean that we should ignore other alternative scholarships on the topic. Researcher should decide on this. The literature review should also highlight the historical context of research on the topic. Highlighting the major shifts in theoretical understanding of the topic should also be the aim of the review. Literature review is also done to highlight the gaps in research on the given topic and establish your own research as one that is aimed at fulfilling some of the gaps.

Check Your Progress

6) What does Literature Review provide in a research report?

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11.2.7 Research Methodology

The chapter on research methodology may begin by outlining the research problem and the rationale behind choosing the research topic. This is followed by defining and conceptualising various variables in the research. This leads to a discussion on the operationalisation of the variables. This means that how we are going to measure and record the responses on various variables needs to be spelled out. This chapter should also discuss our epistemological orientations and theoretical conceptualisation of the problem under research. This chapter also includes discussion on the research design, rationale behind choosing the field area, methods and techniques of data collection and methods of data analysis. There has been a practice in anthropological research in particular to give separate space for the discussion of field area and the people. This dimension is generally dealt with in a separate chapter on 'area and people.' Anthropologically, this chapter is important as it gives us necessary categories and dimensions to analyse cultural data within the beliefs, practices and aspirations of the people living their everyday lives in an area. Anthropologists also write a reflexive account of their own selves in the context of the 'other' where they conducted the fieldwork. This means that they reflect upon their everyday interactions with the people and how these interactions affect their data collection and access to various dimensions of their lives.

Check Your Progress

7) What does the section on Research Methodology discusses?

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11.2.8 Thematic Chapters

This chapter is followed by specific chapters related to the topic of research and for which the researcher has collected the data. These may be called as the 'thematic chapters.' These chapters should subscribe to the broader objectives of the research and the kind of data gathered from the field. The various research questions with which the research began should now be answered through these thematic chapters. A widely followed way of writing the thematic chapters and also the other chapters mentioned above is to use headings and sub-headings within a chapter. By doing this the chapters are divided into several sections and each section is then numbered. These several sub-headings can also be included in the content page. You can take the example of this particular unit or other

units in your course and you will find that they are not one continuous unit but are broken-down into various headings and sub-headings that are also numbered. An advantage of such a style of writing is that it gives necessary breaks to the readers while reading the content. This is also an attempt towards further organising one's thoughts on the topic. Thematic chapters should also include sub-sections on the discussion of the results of data analysis.

Check Your Progress

8) What are Thematic Chapters?

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11.2.9 Conclusion

The thematic chapters are followed by a concluding chapter. This contains the main findings of the research that are presented at one place and discussed in a holistic perspective of the larger objectives and research questions. This may also include the implications of the research findings on the larger populations and its relation to larger policy formulations. More importantly, the conclusion should also lead to further questions on the research topic.

Check Your Progress

9) Where are the main findings of a research discussed in a research report?

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11.2.10 References and Bibliography

This is a very important part of the research report. Great care should be taken while writing references. Not only should the references be in proper acceptable style of writing but the researcher should be careful about including all the references that appear in the report. A researcher might have gone through more resources than what are being actually cited. All such resources are included as bibliography. This is the basic difference between writing reference and bibliography. Throughout this unit you must have seen that the author writes (Bernard, 2006) and the full reference is cited in the reference section. In contrast citations in the bibliography might not appear in the main running text. The purpose of bibliography is to provide the readers with useful list of relevant material. Whereas, citing references, directs the reader to the original source. While preparing the reference list, the most widely used referencing style is

called as the APA (American Psychological Association) style. According to the APA style, the following is the format for referencing.

a) ***For referring books***:

Author, A. A. (year). *Title*: *Subtitle*. Location: Publisher.

Example:

Anderson, B. (2006). *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. London: Verso.

b) ***Chapters in books:***

Author, A. A., & Author, B. B. (year). Title of chapter: Subtitle. In A. Editor & B. Editor (Eds.), *Title of book: Subtitle* (pages of chapter). Location: Publisher.

Example:

Das, M. (2004). Disease and Illness and their Ethnomedical Treatment among the Rathwas of Suskal, Gujarat. In A.K. Kalla and P.C. Joshi (Eds.), *Tribal Health and Medicines* (283-300). New Delhi: Concept.

c) ***Journal Article:***

Author, A. A., & Author, B. B. (Year). Title of article: Subtitle. *Title of Journal*, *volume number* (issue number), pp-pp.

Example:

Srivastava, S.S. (2017). Aspiring Modernity, Lingering Traditionalism: Explorations of Clientele and Patronage Politics in India. *The Eastern Anthropologist,* 70(1-2), 21-38.

d) ***Web documents, for example pdf:***

Author, A.A. (Date of publication). Title of webpage. Retrieved from URL

Example:

School of Social Sciences UNSW, Australia. (2015). School of Social Sciences Referencing Guide. https://socialsciences.arts.unsw.edu.au/media/SOSSFile/SoSS_Referencing_Guide_v2_2015.pdf

Check Your Progress

10) What is the most widely used referencing style?

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11.2.11 Annexure

Annexure generally forms that part of the report and contain those documents and materials that do not seem to fit anywhere else in the main report. However, it should not be seen as an irrelevant part of the report and should contain only

those documents that are relevant to the general theme of the research topic or research questions. Items like copy of a questionnaire, interview schedule or observation plan should be annexed. Besides this, relevant tables and data from the fieldwork in the form of frequency tables and charts can also be put as annexure. Media reports, scanned copy of paper cuttings, important public documents like government circulars, government orders etc. can also be included in the annexure.

The structure given above is just a suggestion and what is generally done by most researchers while preparing reports. This should not be treated as the only structure and new ways of presenting and writing the report should always be looked for and encouraged. Research and report writing are both creative activities that require a lot of imagination and thinking. The above structure can only act as a reference and a starting point (Henn et.al., 2006).

Check Your Progress

11) Can an Interview Schedule be put as a part of Annexure in a research report?

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11.3 PRESENTING RESULTS THROUGH VISUAL DISPLAYS

After this general structuring, now we should discuss on the issue of presentation of the results of data analysis. Presentation is more like visual display. These visual images of the results act as ready reckoners while going through the report and the readers and evaluators of the report can easily go through them to know instantly about the major findings of the research. These visual images in the form of matrices, tables, pie-charts, bar diagrams, pathway models etc. may be used in every chapter to present the results.

To give you an example, a study was conducted by a team including the author of this unit, in the flood affected Bahraich district of Uttar Pradesh. The aim was to understand how social vulnerabilities like caste, religion and gender influence the mental health of flood affected people. After analysing the texts generated out of interviews and focussed group discussions, it was concluded that social vulnerabilities act as perpetual stressors that are internalised by the people and therefore affect their mental health. This result was depicted with the help of a flow diagram as follows:

PDP-Stressor Model

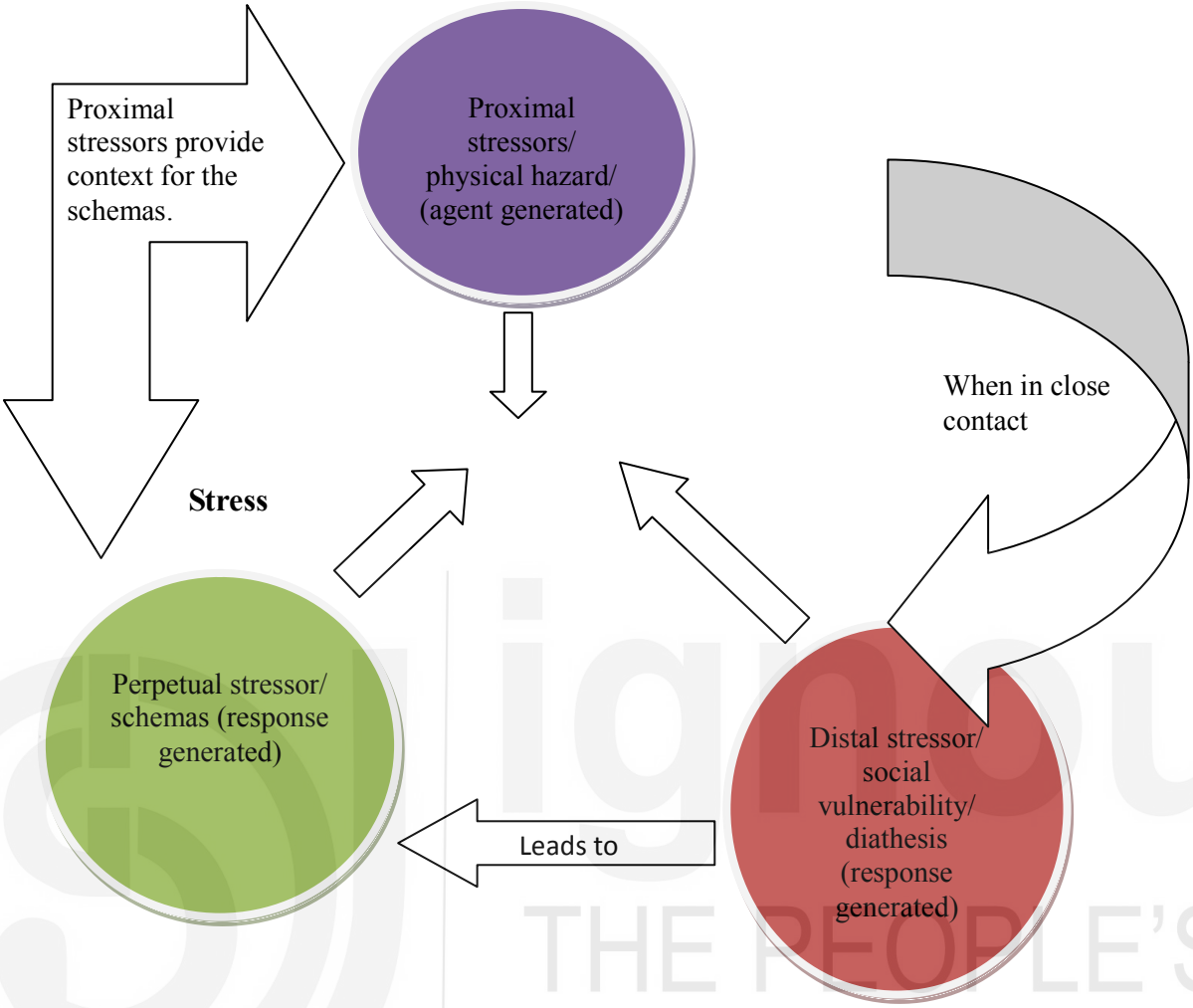


Figure 10.2: Flow diagram depicting analysis results

Source- Khattri et.al., 2012

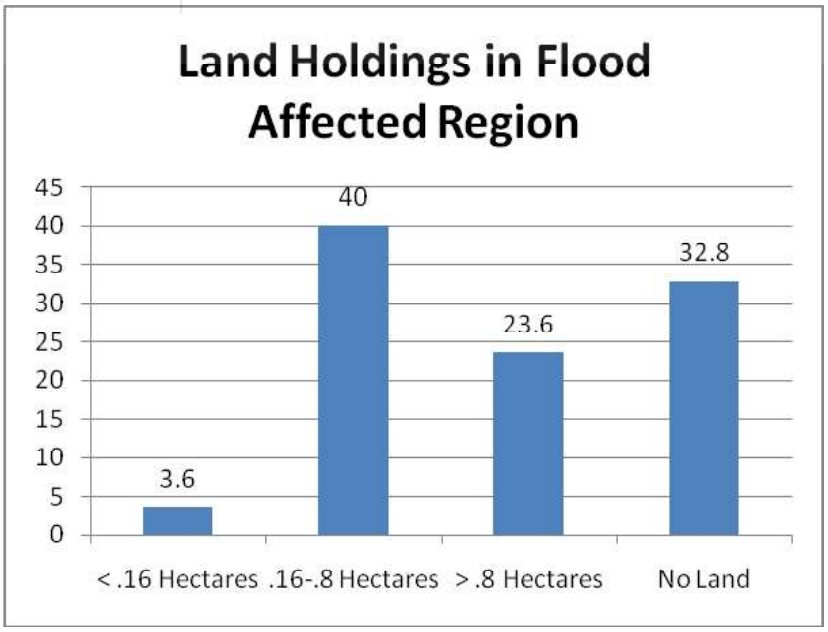
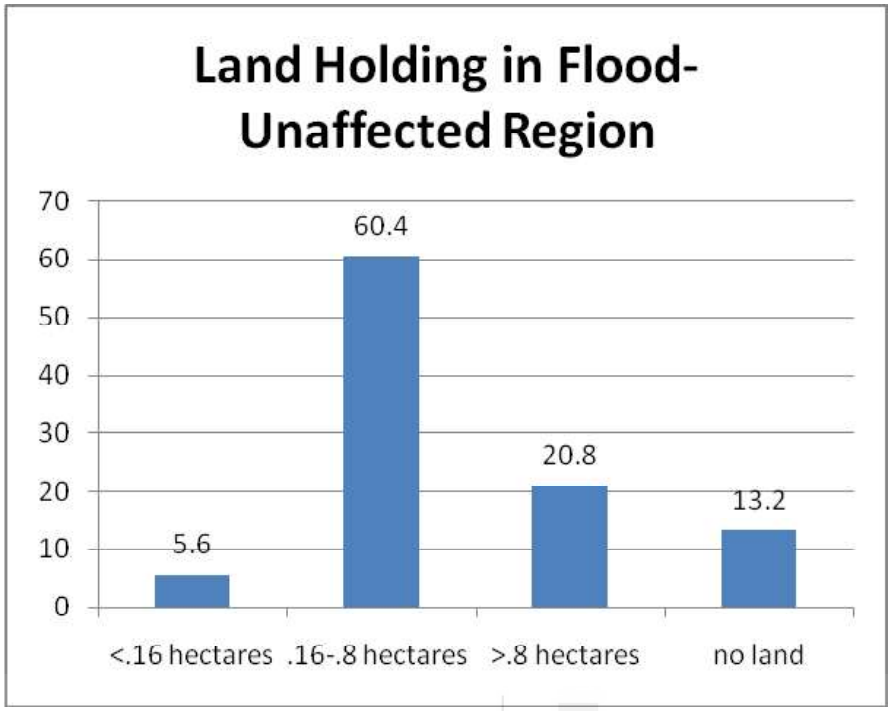


Figure 10.3 and 10.4- Bar diagram depicting land holdings



Source of 10.3 and 10.4- ICSSR research project, 2016

The above flow diagram suggests that stress is a function of proximal factors, social vulnerabilities and schemas. Schemas mean mental images that are internalised in the form of the way others evaluate people of certain caste, gender and religion.

Similarly bar diagrams may be used to show a comparative picture of land holdings in flood affected and unaffected regions. The bar diagrams below are from a project report submitted to the ICSSR (Indian Council for Social Science Research), New Delhi.

In the same way frequency tables, bar diagrams etc. may be used in the report for a better communication of results and analysis. Microsoft excel and other software like the SPSS (Statistical Package for Social Science) comes in handy for preparing such tables, graphs, bar-diagrams and pie-charts.

Check Your Progress

12) What are some examples of Visual Display in a research report?

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11.4 USING PHOTOGRAPHS IN REPORTS

Photographs are generally used in order to illustrate certain scenes, facts or events. They are also used as evidence for things that are mentioned in the report. It gives a kind of legitimisation to the facts that are discussed. For example, the

extent of damage caused by floods can be easily illustrated with the help of photographs of flood affected regions. In anthropology however photographs take a very different dimension. They do not only serve the purpose of illustration but are also an important part of documenting culture. Bateson and Mead (2007) have argued that language sometimes does not serve the purpose of recording the intangible dimensions of culture. Words used in native languages may not be completely translated to convey the same meaning in English or in any other language. Realising this, both called for the development of an alternative method of recording the intangible and that is by taking photographs and using it in ethnographies. Anthropologists preparing research reports may also therefore take photos to document the intangible dimensions of culture. For example, childhood learning can be written about but will have more impact when accompanied with a photo of the ways children learn to carry loads on their heads or dance. Photographs document the emphasis given during practice sessions for dance. How pupils acquire separate awareness in different parts of the body can only be documented through photographs. Similarly it is one thing to write about the agony of people who suffered loss due to earthquakes and an entirely different thing to capture the suffering on camera. The amount of agony documented through this cannot be only conveyed through words. Thus photographs in reports are not only for illustrations but are also for documentations.

Further it is contended that photographs as documents comes in handy to explain and describe events that are based more on non-verbal cues. For example if we say that in certain culture, learning of cultural values (enculturation) is more dependent upon non-verbal cues than verbal instructions of parents and elders then one might be interested in knowing that what are those non-verbal cues that are used by the elders for their kids. Instead of just explaining this phenomenon in words, pictures and images might be used to put across the explanatory frame (Bateson and Mead, 2007).

Check Your Progress

13) What do photographs portray in any anthropological research report?

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11.5 SUMMARY

To sum up, it can be said that both the processes of analysis and writing are transformative processes. They have the capacity to transform the ordinary into an event. This means that collecting, organising, analysing and writing about something that may not be visible before this process was done. They bring to light issues and themes in society, history and biology that lay hidden. This helps not only in understanding the issues but also in making provisions and policy for the welfare of people. Writing is a very individual process. This is truer in the context of writing poetry, novels, memoirs etc. However, research report writing

has been universalised by following certain conventions of writing style and presentation. Various research institutes across India and elsewhere in the world give guidelines for writing and presenting research findings. It is in this context that this chapter should be seen. However, this should not constrain you from imagining and exploring other ways in which you can present the data and analyse it.

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11.7 ANSWERS TO CHECK YOUR PROGRESS

1. See section 11.1
2. A Cover Page is also known as a Title Page
3. See section 11.2.1
4. See section 11.2.3
5. See section 11.2.5
6. See section 11.2.6

7. See section 11.2.7
8. Specific chapters which are related to the topic of research are called Thematic Chapters
9. The main findings of research are discussed in the Concluding Chapter
10. The most widely used referencing style is the APA (American Psychological Association) style
11. Yes
12. Flow diagram; Bar diagram
13. See section 11.4

PRACTICAL MANUAL

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PRACTICAL MANUAL

Contents

DISCLAIMER: All methods and techniques presented here are discussed keeping in mind the assignment to be done after going through this practical manual

Learning Outcomes

After going through this manual, the learner will be able to:

- Describe research design clearly;
- Identify methods and techniques to conduct research;
- Familiarise oneself with the exact way of doing research; and
- Analyse research results firmly to create knowledge

1.0 INTRODCUTION

In this course on Research Methods (BANC 110) you have extensively read and learnt about the significance of research in a discipline like anthropology, you have been taken through various units which not just provides you with a description of the historical development of research in anthropology but also gives you a critical outlook of whether anthropology is a scientific discipline or not. In the many units in this course, you have learnt about: how fieldwork has a distinct tradition in anthropology (so much so that it is called a field science); the importance of research design, methods, techniques and tools; the significance of ethics in research; the use of statistical analysis and how to finally analyse data and create a report.

These varied aspects of research must have by now given you a clear idea as to how you will behave in the field and gather information. These units gave you a strong theoretical background about tackling your research problem.

However you may still have some uncertainty about how you will carry out research when the time will demand. Hence it becomes imperative that as part of your anthropological training, you are cleared of your doubts and made to feel comfortable when you finally proceed to the field to decipher your research problem at hand. The purpose of this manual is to provide exactly this.

As part of your practical component we try to provide exactly a guide of sorts which assists you to be ready when you finally visit your field, be it a small distant village or the virtual space in your laptop. In this unit you will thus be acquainted with the basic steps briefly (as it has been already covered in Unit 5), the methods to collect data with (this too has been extensively discussed in Units 6 and 7) and finally you will be categorically explained about a few methods to do research which can be helpful in your firsthand research work.

1.1 RESEARCH DESIGN

This has already been covered in Unit 5. However as part of this practical guide, a concise description is being provided so as to hone your understanding of it better. As this is where after reading this component you can become equipped to conduct research convincingly, hence a discussion on research design will prove to be beneficial to you. This portion will act as a recapitulation for you and at the same time make your grasp on it stronger.

Research design can be viewed as an elaborate plan which is made in preparation for collection of data in any research. It is therefore sometimes also called a blueprint of a research. Its main aim is to answer the research questions posed or to test a hypothesis put forward by the researcher. In fact it is this design that helps researchers/ students to better their skills by using the best suitable methodology for their research. To define research design, Caliwan states that it is "any organsied inquiry designed and carried out to provide information for solving a problem" (2014).

The research design has two purposes. i. it helps you to frame a research outline based on the kind of research you propose to do and ii. It makes you design a step by step framework on how you will proceed with your research.

First let us take the former one.

1.1.1 Kinds of Research Design

A research design can be of various kinds namely, descriptive, explanatory, experimental, survey, cross sectional, semi-experimental, review etc.

But first depending on the kind of research to be done, a research design will be formulated. Research can be qualitative or quantitative in nature. Qualitative research is one which is descriptive in style meaning that it is majorly a narrative and does not necessarily allow to be defined by quantitative research. Its main agenda is to comprehend why something occurs in a particular way. Whereas quantitative research is conducted through surveys, censuses, polls etc. It is basically interested in collecting an accurate form of data in the context of numbers, like for example, how many people voted for a particular political party. While qualitative research is conducted among a small sample, quantitative research is conducted among a large sample group which may be random. It uses the help of statistical method to reach its results.

Keeping this as our base, let us now try to briefly look at some of the popular kinds of research design.

a) Descriptive research

It is where a phenomenon is specifically and concretely described. If one would like to proceed with an explanatory form of research design then one has to provide a good description of the research problem. For example to know why there is gap between poor and rich people, it can only be known if such a gap actually exists. Descriptive study can help in viewing this gap if it is there.

b) Explanatory research

It answers the why which arises from any descriptive study. For example, the reason for presence of more women domestic help as compared to men domestic help can be studied through the explanatory research.

c) Experimental design

Experimental design is a tad bit difficult to apply for researchers studying human beings. However if the opportunity arises, such researchers do make use of the experimental design. It is fundamentally the testing of an independent and a dependent variable and include two groups, that is the control group, where things are as it is, and experimental group, where things have been adjusted to get a result. This design in social sciences can be tested in a laboratory, a field and in natural social world. Statistical analysis is done in such design and it is used to mainly find the differences between the control group and the experimental group.

d) Longitudinal design

A longitudinal design which is also known as a panel design involves the study of the same selected variables over a long period of time. It mostly uses observation as its main method of study. Longitudinal studies can range from studying variables as they are and without manipulating them, from over a week to as long as decades. An example can be observation of a person and her weight loss journey. Covid 19 and its impacts can well become a good longitudinal study.

e) Cross sectional design

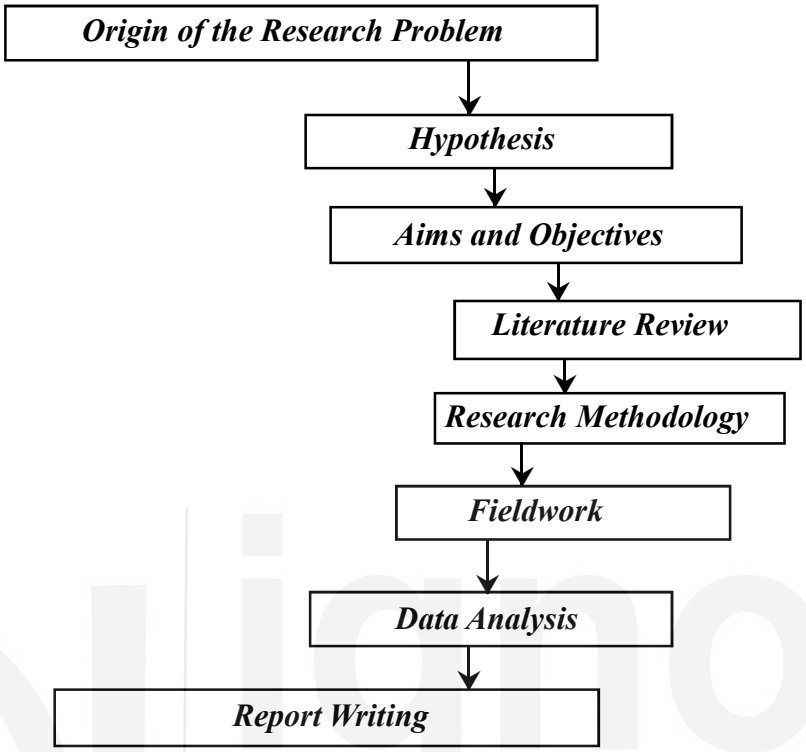
This is the opposite of longitudinal design. In a cross-sectional design different samples or a "cross-section" of a population are studied at a single point of time. As such kind of a study is shorter it is hence also cheaper to carry out. Cross-sectional design falls under the gamut of descriptive studies. It helps in knowing about various characteristics which can be found in a population and informs about present happenings in it. For example it can show the intensity of domestic violence in a community happening at the time the study is undertaken.

1.1.2 Steps in Research Design

Now that you have been reviewed broadly about the kinds of research design available, let us briefly run through the various steps you have to follow from the beginning till the end while doing research. It includes step by step stages of

means by which data is to be collected, what tools will be used, how they will be used and finally the proposed ways by which the data will be analysed.

In anthropology, the steps of a research design may look something like this:



The steps of a research design are nothing but the methods and procedures that will be or are taken into consideration to collect and analyse measures of variables stated in a research problem. The first step in a research design is the research problem and its creation itself. It starts with the designing of a research proposal once the problem or topic is formulated.

a) Formulation of a problem/topic:

The identifying of a topic is the research problem. It has to be focused, doable and achievable. You must be aware of the purpose of your research.

b) Statement of research problem

To be clear about the purpose of your research, it helps to formulate the research problem. Defining the problem acts as a tracking device for your research. It checks whether the research addresses the problem as has been stated in the beginning.

c) Theory building

Theory building approach is one, which is created from the observations that you make in the field and the logical conclusions that come out from them. These theories bring out the meaning of your observations. Merton states that as these theories are produced only after you make your examination of the field, they are frequently termed as post factum theory (1968)

d) Theory testing

In comparison a theory testing process approaches the study with an already existing theory or theories which assists in the observations you may make in the field. Hence it may be said that it progresses from the unspecific to the exact. The field must be in a position to exhibit a test which is creditable to a theory. When a probability is proved to be true then the connected theory is verified. If not then the theory is turned down or altered.

e) Hypothesis

It is appropriate to use a hypothesis when you are testing a theory. A hypothesis is nothing but a speculation about anything that the researcher wants to prove. It is a supposition or explanation (theory) that is provisionally accepted in order to interpret certain events or phenomena, and to provide guidance for further investigation.

For example: **If** cigarette smoking is high in a community **then** it is likely that majority of the people will suffer from lung cancer. So the independent variable (if/smoking) may affect the dependent (then/lung cancer) variable. Testing will let us know if we are correct or not.

f) Aims and objectives

Aims are broad statements of desired outcomes, or the general intentions of the research, which 'paint a picture' of your research project or thesis. It addresses the long-term research outcomes, i.e. it should reflect the aspirations and expectations of the research topic.

When your aims are clear for your research agenda, then the next job is to formulate the associated objectives of the aim. The objectives should be focused, connected and not too many so as to not get distanced from the main agenda at hand.

Hence Objectives are subsidiary to aims and are the steps you are going to take to answer your research questions to accomplish the goals of the project. They should be sensible and precisely described and deal with the more immediate research outcomes.

g) Literature Review

A literature review is vital to assemble before proceeding to the field. It is also employed during breaks from the field to know more on the topic of research. Literature review is the critical evaluation of similar earlier research. Literature review does not imply the using of quotations and summarising from these sources. It is in fact an assessment of already available material and attempting to amalgamate the previous research to the proposed one and providing an explanation for the same emphasising on the points of agreement and disagreement. Hence you are expected to place one's original work in the context of existing literature; interpret the major issues surrounding your topic; identify new ways to interpret, and shed light on any gaps in previous research; ensure which literature makes a significant contribution to the understanding of your topic and points the way to further research on your topic.

h) Unit and Universe of study

The unit of analysis is the major entity that is being analysed in a study. It is the 'what' or 'who' that is being studied. In your research, typical units of analysis will include individuals (most common), groups, social organisations and social artifacts.

The universe is the population which represents the entire group of units that is the focus of your study. Thus, the population could consist of all the persons in the country, or those in a particular geographical location, or a special ethnic or economic group, depending on the purpose and coverage of your study.

i) Research Methodology

The methods section describe actions to be taken to investigate a research problem and the rationale for the application of particular processes or modes of operation used to categorise, choose, deal with and evaluate data employed to understanding the problem, thereby, allowing the audience to judiciously examine a research's complete legitimacy and dependability.

The methodology section of your research answers two main questions: How was the data collected or generated? And, how was it analysed? The writing should be direct and precise and always written in the past tense. For a better understanding, let us explain methodology, methods and tools and techniques separately.

***Methodology*:** It is the outline strategised to understand how research is to be commenced. It identifies the methods to be used.

***Methods*:** Methods are the means of data collection.

***Tools and Techniques*:** The ways by which methods are actually put to action are the techniques and tools. For example: If interviewing is a method, then the technique will be an interview guide and the tool can be an interview schedule.

Depending on the kind of research or investigation you are doing, the tools for data collection will be chosen.

j) Fieldwork

Methods and techniques are used in the field. Fieldwork which is our identity in anthropology is investigation where the researcher (you) stays in or visits the place of investigation for long periods of time, not less than a year, receives firsthand experience and collects data. Powdermaker defines fieldwork as "the study of people and of their culture in their natural habitat. Anthropological fieldwork has been characterised by the prolonged residence of the investigator, his participation in and observation of the society, and his attempt to understand the inside view of the native people and to achieve the holistic view of a social scientist" (cited in Robben and Sluka 2007: 7). Others like Luhrmann points out that, "Anthropology is the naturalist's trade: you sit and watch and learn from the species in its natural environment" (1991:1)

This is followed by analysis of data and writing of the report. We will discuss these portions at the end of this manual after a comprehensive description of some major methods used in anthropological fieldwork. This will give you a fairly good idea about how to use the methods while conducting research.

1.2 METHODS TO CONDUCT RESEARCH

A method is a way of conducting and implementing research, while methodology is the science and philosophy behind all research (Adams John et al 2007). In section 1.1.2 under heading **i.** you have already been told about what methodology, methods and tools and techniques entail and how each has a different meaning though each work together. In this section you will be explained about some major methods which are used in anthropological research and the tools and techniques which assist these methods to conduct research. These methods and techniques are discussed keeping in mind the exercises which will be given to you in your assignment.

1.2.2 Observation

Observation in anthropological parlance means watching with intent. This method is the least intrusive while the anthropologist triflingly participates or mixes herself/himself into the culture s/he is studying. Data is collected through what is observed and through verbal communication while remaining the least interfering as possible. Observation can be conducted alongside interviewing or conversing with the community studied. Much can be learnt by observing the day to day happenings which Malinowski called the "paraphernalia of everyday life" (1922).

Observation for the benefit of the researcher can be divided into two kinds broadly, with a third kind thrown in to employ in certain situations. The two kinds of observation are Participant observation and Non-participant observation and to these one can add the Quasi-participant observation method.

Participant observation is a method where it is expected that the researcher would try as much as possible to be a part of the culture or society s/he is studying. It is mostly used to study rituals being conducted or a ceremony having intrinsic meaning, or for that matter any social event. Here the researcher becomes a participant by following the existing norms of such events without questioning or doubting them, for example, partaking of certain kinds of food which the researcher has not seen or tasted before. The aim is to behave like a member of the society studied. This may help to get an entry into it in a comfortable manner and allow further focused investigation to be conducted with trust and conviction.

Non-participant observation on the other hand is the opposite of participant observation as clearly the name suggests. Here though the researcher enters the community s/he studies it without much interference. There is limited interaction with the culture studied. This is best used when an etic (the view of the researcher) is required to study communities, like body behaviour, language pattern, food habit etc. For example, to know if a family consumes rice or chapattis as their staple food item. Many a times, however this method is viewed to be limited in scope and biased as it only places the opinion of the researcher which might be in contrast to the people's views inhabiting the community studied.

It is to do away with such biases that a middle way is mostly chosen by the researcher, which is called the quasi-participant observation method.

Quasi-participant observation falls between participant and non-participant observation method. Though here too, the researcher gets involved in the daily life of the community studied but rather than imposing her/his perspective about any particular aspect studied the researcher looks for the perspective of the community and tries to bring forth the native's point of view. The involvement of the researcher is not such that s/he gets captivated by the occurrences unfolding in front of her/him nor does s/he completely distances from the culture studied and only offers her/his own assumed perspective. In quasi-participant observation method, the researcher carefully and patiently brings out the happenings of a community in a neutral manner.

ACTIVITY 1

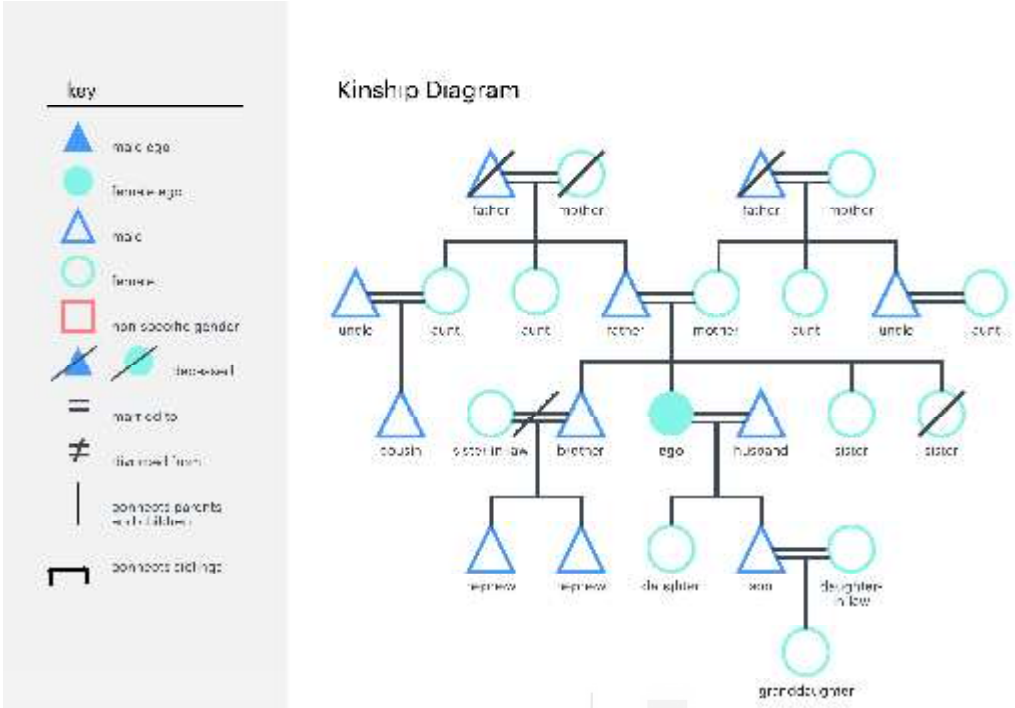
Make a project report on any method of your choice on any social event and give your interpretation/observation of the same.

1.2.4 Genealogy

Let us now move on to another method of study which helps in anthropological research. This is called the genealogical method. This study or method is used in anthropological ethnographic studies to find out the history of a family. It was basically introduced by early anthropologists to study kinship from the perspective of descent and marriage. Once information is collected through the interview technique about one's family including ancestors and descendants, it is then graphically represented displaying the connection between each family member. It tries to trace a historical representation taking the connection to the known ancestors and linking it to the present and newest generation. It is a popular anthropological method and has been used in their ethnographies by W.H.R Rivers in his study of the Todas, by Raymond Firth while studying Tikopia and many others. In fact it was W.H.R. Rivers who developed this method in anthropology during his expedition to the Torres Straits in 1898-99.

The graphic symbols are varied. For example females are shown with a circle and males are represented with a triangle. Below a diagram is placed to see the various graphic symbols used in making a genealogical chart which helps in building a family tree clearly exhibiting the kind of relationship everyone holds in the family. You can use this as a simple example and take it further to expand on more genealogical connections.

This method is important in anthropological research as it helps you to collect data about family history, events in a family, inheritance, ownership etc. It is used during fieldwork mostly to collect and categorise data for various research usages. It can help you understand relationships between people and social organisation of a culture better. It involves intense interviewing and is used with an ego at the centre to have a systematic creation the genealogical chart. The ego is the reference individual and the chart is a diagrammatic representation displaying the bonds of kinship (see genealogy chart on next page). Besides kinship relations this chart can also show structural demography of the population under investigation. It can thus show how a society functions and also the actual size of a population.



A basic genealogical chart, Source: https://www.lucidchart.com/blog/make-a-kinship-diagram-online

ACTIVITY 2

Make a three generational genealogical chart/ family tree of your choice as per your anthropological interest.

1.2.4 Case Study

Case study which is a known and valid method of conducting research was introduced by Herbert Spencer. It is used to carry out thorough and extensive study of an individual, or a group, an institution, an event etc. For example in a case study the researcher can study a case of a person with a deviant behaviour. Employing qualitative analysis, you can with the use of this method obtain a full and comprehensive account of a phenomenon, a person, a family etc. Thus a case study can be called an intensive method of study. It helps to know more specific and particular aspects of the entity studied. Case Study can be obtained through a combination of interview, observation etc. There are different types of sources which assist in the collection of a case study. Some of the important ones are Life Histories, Personal Documents, Records, Biographies along with data collected from interviews and observation.

ACTIVITY 3

Collect case-studies of 10 individuals of any gender working in any organisation to understand how their jobs are adversely or positively affecting their lifestyles. Give your interpretation of the same.

Life History is a popular method of collecting a case study. It is a qualitative method of collecting data where individuals are asked to talk about their life events starting from their childhood to the present informing about certain particular and important incidents or occurrences from their lives. It has been

found to be very effective in studying one's health status and medical choices through the person's medical history.

ACTIVITY 4

Collect life-history to see the different kinds of medical system a person has followed for an ailment through his/her lifetime.

1.2.6 Secondary Data (Published and Unpublished Sources)

Other than collecting data from primary sources, there are many a time data from secondary sources which can also help you in your research. Secondary data is information which is not first-hand suggests that they have already been collected primarily before and now are available in various places for you to access. These places may be a library, an archive, a database, the internet etc. Secondary sources helps you to authenticate either your own planned research problem or test your research findings.

There are mainly two kinds of secondary sources: 1. Published sources and 2. Unpublished sources-

Let us first discuss Published sources. Published sources are printed material. Examples of printed or published material may be:

a. Published articles, research papers
b. Statistical records, Census records, reports of the government
c. Official statements and publications of the foreign governments
d. Magazines, journals, and periodicals
e. Reports presented by research scholars, anthropologists etc.

Unpublished sources may include:

a. Research thesis, dissertations etc., of academics, scholars etc.
b. Records of private companies
c. Field diaries
d. Letters
e. Unpublished biographies or autobiographies etc.

ACTIVITY 5

Make a project report incorporating all processes based on any published or unpublished material depicting any biological or socio-cultural concern.

1.3 TOOLS AND TECHNIQUES

In order to actually carry out the methods discussed above, you will have to employ tools and techniques to get your results. The most commonly used techniques in anthropological research are questionnaire and interview. There are a variety of tools which are used under these techniques. Let us discuss them in detail to know what tools to use and when.

1.3.1 Questionnaire

A questionnaire as a tool is mainly used when the researcher cannot completely be with the respondent or is not required to conduct intense in-depth investigation. The questionnaire helps in collecting basic information about an individual's personal life. It is mainly seen in the form of a survey. A questionnaire thus includes a set of questions which is connected to the theme or purpose of study at hand and the respondents have to fill it themselves. Questionnaires can either be open ended or close ended. In the former the respondents can write the answers that they want. In the latter, however the answers are placed as options already in it, and the respondents have to tick or choose an appropriate one. The options are generally like: Strongly Agree, Agree, Disagree, and Strongly Disagree or Yes and No etc. A questionnaire can also be a combination of these two types.

There are also different types of questionnaire, like structured, semi-structured, pictorial etc.

Structured ones have fixed questions whereas the semi-structured ones have questions which can be modified according to any situation experienced so that good amount of valid information can be collected. Pictorial questionnaires have questions in the form of images.

A questionnaire should be self-explanatory. The questions should be such that they are clearly understood by the respondents as the researcher would not be there to explain the questions to them. Hence each question should be crisp and precise. To collect good data from questionnaires, the respondents also have to be carefully selected. Questionnaire though is one of the oldest tools of data collection has mostly been seen as a rigid method as it does not allow much scope for answering the why of the problem investigated. This tool cannot be employed on illiterate people. Questions may be misunderstood as the researcher is not present to explain them to the respondents. Hence one should choose the questionnaire as a tool of investigation only when the situation demands. Questionnaire can on the positive side lead to the use of statistical analysis thus accommodating quantitative research while conducting surveys or collecting census.

1.3.2 Interview

Just like observation is watching something with an objective, similarly, interview is having a conversation with a purpose. Interview is one of the most rational techniques to collect data. It allows face to face interaction with the researcher and the respondent. Unlike questionnaire, here the researcher has the opportunity to mould questions, add new ones to take the conversation ahead in context of the investigation conducted. Interview is considered as a direct method of data collection. It is used as a technique when questionnaires do not give the expected data or when a sample is specifically selected from the answers received from filling up a questionnaire. This is to collect more in-depth data. What we cannot observe, we will have to ask. Hence interview works as a beneficial alternative to collect data. However to actually conduct successful interviews, the researcher has to build a strong rapport with all respondents, for them to trust enough and answer personal and sensitive queries. Interviews can be individual interviews or group interviews. Group interviews are popularly known as Focus Group Interviews. Individual interviews have open ended questions and ask questions

to find out social and cultural experiences of the respondent. Here the respondents recount their life occurrences in a logical and intelligible manner. These kinds of interviews are semi-structured to allow more questions to be added or reframed as the interview is conducted. In a group interview there is a group of people interviewed together who have similar characteristics or experiences which allows them to clubbed together to get certain answers. Characteristics may include belonging to the same caste, or gender or economic status etc. Experiences may include rape victims, or alcoholism, or some illness etc. Depending on the category or selected group, it will bring better or not so responsive results. For example youngsters may like to share their experiences about a certain situation better in the presence of their peers, for example their aspirations. However the same group may respond cautiously if asked about habits like drug abuse.

On the basis of individual or group interviews, interviews can be structured or unstructured. In the former the questions are pre-determined and the kind of questions prepared, their sequence, language etc. are all standardised. The questions are close ended. The latter one allows flexibility in the way the questions are framed and asked. Here the aim is to collect as much information as possible. The researcher can adjust the questions if necessary during the time of interviewing.

On the basis of the above explanation interviews can be created through an interview guide or an interview schedule.

Interview Guide contains a set of questions related to the research problem which are prepared randomly without a sequence to assist during the main interview. It does not have a set framework. It helps the researcher to maintain a flow with the respondent while conversing and helps the respondent stay focused in case s/he gets carried away while sharing incidents from her/his life. The interview guide is immensely helpful while collecting case studies and life histories.

Interview Schedule is a format made by the researcher before conducting an interview. The schedule too can be structured or unstructured. Though similar to a guide, it is created to collect quantitative data. Hence it contains a fixed format of questions that the researcher makes use of while conducting interviews, mostly while conducting surveys. Census data too is collected with the help of an interview schedule, and is mostly structured.

1.4 ANALYSIS OF DATA

The findings of the field finally have to be given meaning. This is done by analysing all material gathered. In terms of quantitative data it is simpler compared to qualitative data.

When talking about quantitative data there are generally accepted guidelines for how to display data and summarise the results of statistical analyses of data about populations or groups of people. However, this display needs to be presented in an informative way. They are:

a. Describe the sample;

b. Remind the reader of the research question being addressed, or the hypothesis being tested;

c. Tell the reader what you want him/her to get from the data;

d. State which differences are significant;

e. Highlight the important trends and differences/comparisons; and

f. Indicate whether the hypothesis is confirmed, not confirmed, or partially confirmed.

In the case of qualitative data, the analysis cannot be neatly presented in tables and figures, as quantitative results can be. It must all be expressed in words, and this results in a large quantity of written material, which we call a narrative, through which you must guide your reader. Structure is therefore very important. Try to make your sections and subsections reflect your thematic analysis of the data, and to make sure your reader knows how these themes evolved. Headings and subheadings, as well as directions to the reader, are ways which you can use to make your chapters in a report easy to navigate.

1.5 WRITING THE REPORT

The report is the final presentation of the research work done by the researcher. It involves several steps and is what you finally call your project report, thesis or dissertation. It is a logical analysis of the data collected. The report contains preface; table of contents; introduction; main content; conclusion; tables and figures; use of quotations in the main text; glossary; appendix; references; bibliography; review and index; photographs etc. The final presentation should be meaningful, have clarity and should be useful to at least disseminate knowledge to the world.

You can read about analysis of data and report writing in detail from Unit 10 and 11. Also see Practical Manual from the Course BANC 102 to go through the section on References (1.1 **k**)

1.6 SUMMARY

Now let us summarise what you have read in this practical manual. In this manual you have been carefully reprised on conducting research with the use of valid existing methods. To do so, you have been explained about what a research design is, what kinds of research design there are and what are the various steps in a research design that one has to follow. Keeping the method of testing your understanding and as part of your training you have been guided on a few important methods which you can test and work on from your own locations. The tools and techniques which are actually used in the methods described have also been explained to you. Finally analysis of data and writing of the report have been crisply covered for your clarity. To understand this manual better and to clear doubts you can read Unit 5, 6, 7, 10 and 11 carefully again. Some activities have been placed in this manual. After going through the manual, do attempt the activities. This will help you in your learning process to become a good researcher.

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