WOLLO UNIVERSITY

SCHOOL OF PUBLIC HEALTH

RESEARCH METHODOLOGY

For BSc Pharmacy Students

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UNIT – 1

INTRODUCTION TO RESEARCH

Learning objectives:

At the end of this session, students will be able to:

1. Define Research, Health Research, Medical-lab Research.
2. List the major characteristics of research.
3. Describe the different types of research.

Definition

- **Research** in common parlance refers to a search for knowledge.
- One can also define research as a scientific and systematic search for pertinent information on a specific topic.
- In fact, **research** is an art of scientific investigation.

Definition….

- It is a scientific inquiry aimed at learning new facts, testing ideas, etc.

- Therefore, **research** is the systematic collection, analysis and interpretation of data to generate new knowledge and answer a certain research question or solve a problem.

- **Health Research** is a systematic collection, analysis and interpretation of data to solve a health related problem and its purpose is to generate knowledge essential to effectively promote the health of the population.

Purpose of Health Research

- To generate knowledge essential to effectively promote the health of the population.
- Without that knowledge, effective action is impossible because it has no logical or empirical basis.

The ultimate purpose of research is to:

- Fill in gaps in information/knowledge
- Find answers for questions so far unexplained

Research in Pharmacy Practices

- It is a research that provides evidences used to support clinical and other pharmacy practices.
- It is the detailed systematic study of a problem in the field of pharmacy.
- A scientific process that *validates and refines existing knowledge* and *generates new knowledge* that influence the delivery of evidence-based pharmacy practices.

Applications of Pharmacy Researches

- Community pharmacy
- Hospital pharmacy
- Clinical pharmacy
- Industrial pharmacy
- Compounding pharmacy
- Consulting pharmacy
- Ambulatory care pharmacy
- Regulatory pharmacy
- Home care pharmacy

Research must be:

- **Purposeful:** what do you want to be able to contribute?
- **Targeted:** Who are the audiences?
- **Credible:** consider sources of information, method of data collection, personnel involved…
- **Timely:** Is the information needed?

Characteristics of Research

1. It demands a clear statement of the problem.
2. It requires a plan.
3. It builds on existing data, using both positive & negative findings.
4. New data should be collected as required & be organized in such a way that they answer the original research questions.

Types of Research

- The classical broad divisions of research

1. **Basic research/pure research:**

- To generate new knowledge and technologies to deal with major unresolved health problems.
- Provides the foundation for further research.

2. **Applied research**

- A research that seeks to solve practical problems
- To identify priority problems and to design and evaluate policies and programs that will deliver the greatest health benefit, making optimal use of available resources.

Types of research….

- Research can also be divided as **quantitative** and **qualitative** researches.
- Early forms of research originated in the natural sciences were concerned with investigating things which we could observe and measure in some way.
- Such observations and measurements can be made objectively and repeated by other researchers.
- This process is referred to as "**quantitative**" research.

Types of research…

- Researchers working in the social sciences were interested in studying human behavior and the social world inhabited by human beings.

- Research which attempts to increase our understanding of why things are the way they are in our social world and why people act the ways they do is **“qualitative” research.**

Types of research…

- **Qualitative research** is concerned with finding the answers to questions which begin with: why? How? In what way?

- **Quantitative research** is more concerned with questions about: how much? How many? How often? To what extent? Etc.

Types of research….

- Health research is the application of principles of either or both qualitative and quantitative researches on health.

- The generated knowledge, both generalizable worldwide and locally specific, is essential to effective action for health.

Types of research….

- In most cases, health research has been divided into three overlapping groups.

1. **Essential health research:** Consists of activities to define the health problems of a given country or community, to measure their importance and to assure the quality of activities to deal with them.
2. **Clinical research :** ranges from studies of the prevention and diagnosis of diseases through new methods of treatment to problems of care and rehabilitation.
3. **Biomedical research:** It is the most basic part of health research which demands more resources, facilities and skilled investigators.

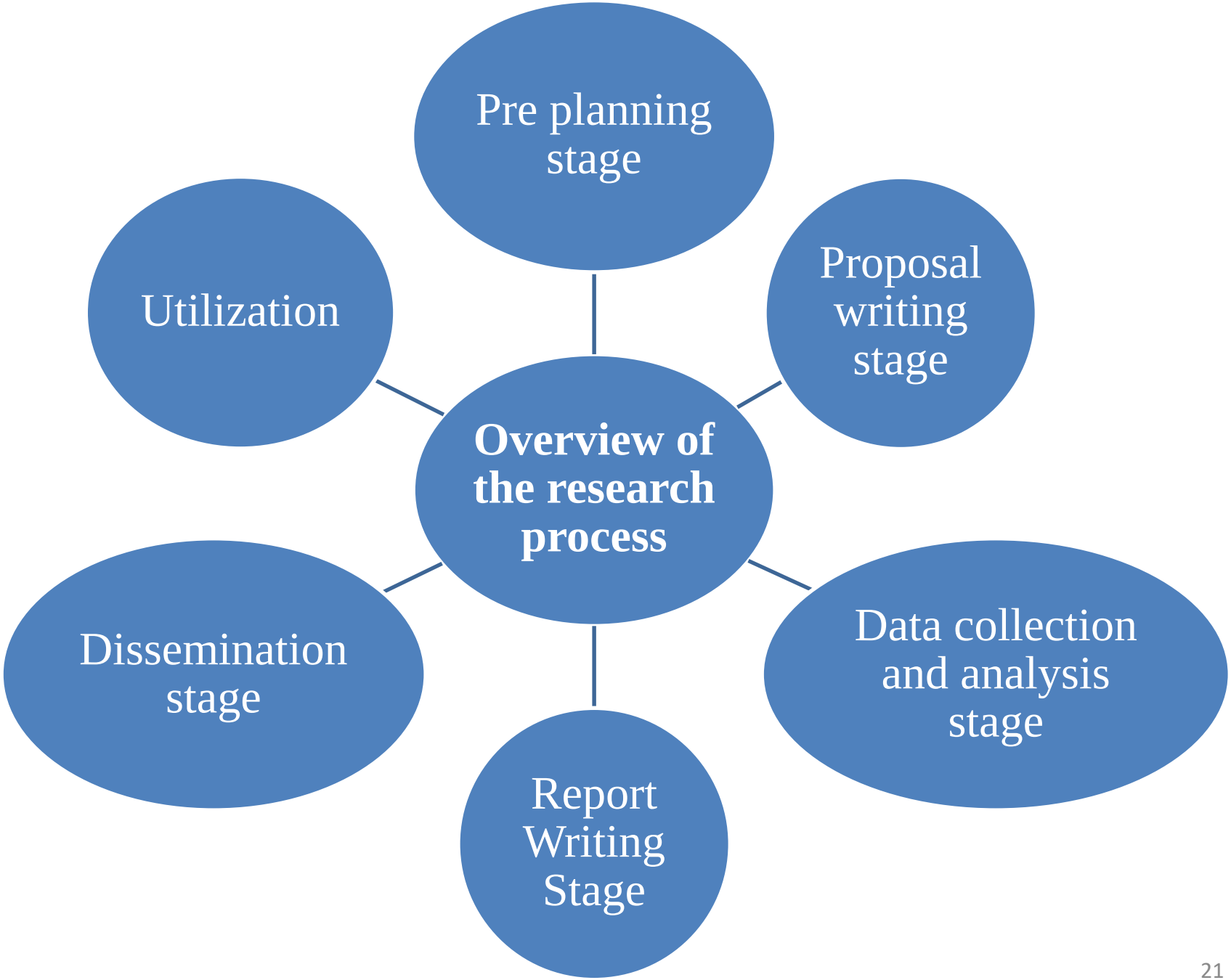
Health Systems Research

- It is a component of health research.
- Research that supports health development has come to be known as **Health Systems Research.**
- It is ultimately concerned with improving the health of a community, by enhancing the efficiency and effectiveness of the health system as an integral part of the overall process of socioeconomic development.

The Essential Features of HSR

1. Focus on **priority** problems.
2. Action oriented (i.e., aimed at developing solutions)
3. Requires an integrated **multidisciplinary** approach
4. **Participatory** in nature (from policy makers to community members)
5. Research must be **timely**.
6. Emphasis should be placed on comparatively **simple, short-term research designs that are likely to yield practical results.**

OVERVIEW OF THE RESEARCH PROCESS


Pre planning stage
Proposal writing stage
Data collection and analysis stage
Report Writing Stage
Dissemination stage
Utilization
Overview of the research process


Topic Selection
Background and Statement of the problem
Literature Review
Objectives
Methods and Materials
Work Plan
Budget
References
The Research Process
Proposal

Main components of any research work

1. Preparing a Research Proposal
2. Fieldwork (i.e., Data collection)
3. Analyzing data and preparing a Research Report

- There are also sub-components under each main component.

Development of a Research Proposal

Components:

- **Title of the research (*on cover page*)**
- **Summary**
- **Acknowledgement**
- **Acronyms and Abbreviations**
- **Table of Contents**

1. **Introduction**
   - **Background**
   - **Statement of the Problem**
   - **Literature Review**
   - **Conceptual Framework …..(Optional to your level)**
   - **Significance of the study**
2. **Research Objectives/Research Hypothesis**

Components:……cont'd

3. Methods:

- Study Design
- Study Area and Period
- Source and Study Population
- Inclusion and Exclusion Criteria
- Sample Size Determination
- Sampling Procedures
- Study variable
- Operational Definitions
- Data Collection Procedures
- Data Processing and Analysis procedures
- Data Quality Control
- Ethical Consideration
- Pre-test
- Dissemination of Results

Components:……cont’d

4. Work plan and Budget

5. References

6. Annexes

Essential Parts of Scientific Paper/Research Report

- **Title**: Describe concisely the core contents of the paper
- **Abstract**: Summarize the major elements of the paper
- **Introduction**: Provide context and rationale for the study
- **Objectives**: The goal to be achieved by a research
- **Materials**: Describe the experimental design so it is reproducible
- **Methods**: Describe the experimental procedures
- **Results**: Summarize the findings without interpretation
- **Discussion**: Interpret the findings of the study
- **Conclusion**: Summarize the findings
- **Recommendations**: Actions to be undertaken
- **Acknowledgement**: Give credit to those who helped you
- **References**: List all scientific papers, books and websites that you cited

UNIT - 2

TOPIC IDENTIFICATION AND DELIMITATION OF RESEARCH PROBLEMS

Introduction to Topic Identification

- The development of a health project goes through a number of stages.
- Formulation of the research proposal is the major task in the process of developing a research project.
- The proposal is a basis for approval and funding.
- After approval, the proposal is used as a **blueprint** during implementation of the project.

Introduction…

Issues to consider while selecting a topic:

- Is there evidence to indicate that the research proposal focuses on a problem of **priority importance**?
- Was the given health problem identified by **relevant** groups of the health system?
- Was the problem **adequately analyzed** to include all possible contributory factors from different sectors?
- Was it **clearly stated**?

Problem Identification

- A number of research questions could be presented that may be posed.
- A potential research situation arises when three conditions exist:-

1. Perceived discrepancy between what it is and what it should be;
2. The reason(s) for this difference should be unclear
3. There should be more than one possible and plausible answer to the question (or solution to the problem).

N.B. If there is only one possible and plausible answer to the question about the discrepancy, then a research situation does not exist.

Example 1:

- Ideally, we expect that all mothers should breastfeed their infants for full two years or even longer.
- But actually few mothers do so i.e. there is a discrepancy in the actual and the expected behavior of mothers.

➢ Therefore we can say that problem exists.

➢ This problem raises several questions.

Simple ones could be

Q.1. Why mothers do not breast-feed their infants for 2 years? OR

Q.2. What are the reasons for mothers discontinuing breast feeding earlier than 2 years?

There can be more than one possible answers to the questions

- Mothers do not have enough breast milk after the first months.
- Mothers have some infection or disease of breasts or nip which hampers breast feeding for a longer duration.
- The babies do not tolerate breast milk well.
- The mother may have a total dislike for breast feeding baby and so on.

Example 2:

- **Problem situation**: In district " Y " a report showed that in the first month there were 500 children under one year old who started immunization, but at the end of the year it was found out that there were only 25 children who completed their vaccination.
- **Discrepancy:** All the 500 children at district "Y" should have completed their vaccination but only 5% out of those who started vaccination have completed.
- **Problem (research) question**: why only 5% of the children completed their vaccination?
- **Definite answer**: Out of the 1 hospital, 2 health centers and 10 health stations found in district "Y", only 2 health stations were functioning, the rest were closed due to insecurity in the area.

Criteria for Selection of Research Topic

a) **Personal interest**

b) **Objective criteria:**

1. Relevance: priority, magnitude of problem
2. Avoidance of duplication
3. Feasibility: complexity, manpower, time, equipment, money…
4. Political commitment: interest & support to utilize the results
5. Applicability (cost-effectiveness): availability of resources
6. Timeliness: urgency of data needed for making decision
7. Ethical acceptability

Selection of Research Topic…

1. **Relevance**
   - The topic should be a priority problem
   - How large or widespread is the problem?
   - Who is affected?
   - How severe is the problem?
2. **Avoidance of duplication**
   - Find out whether the suggested topic has been investigated before
   - If topic has been researched, the results should be reviewed to explore whether major questions that deserve further investigation remain unanswered
   - If not, another topic should be chosen

Selection of Research Topic...

3. Feasibility: Consider complexity, manpower, time, equipment, money…

4. Political commitment

- Interest and support of the local/ national authorities
- This will increase the chance that the results of the study will be implemented
- However, in some circumstances, you may feel that a study is required to show that the government's policy needs adjustment
- In such circumstances, make extra effort to involve the policy makers at an early stage in order to limit the chance for confrontation later

Selection of Research Topic...

5. Applicability of possible results/ recommendations

- Is it likely that the recommendations from the study will be applied?
- This will depend on:
  - Management capacity within the team
  - The blessing of the authorities
  - Availability of resources for implementing the recommendations

6. Timeliness (urgency)

- urgency of data needed for making decision

7. Ethical acceptability

- Consider the different ethical principles

Scales for rating research topics

- **Relevance**

  1= Not relevant

  2= Relevant

  3= Very relevant

- **Avoidance of duplication**

  1= Sufficient information already available

  2= Some information available but major issues not covered

  3= No sound information available

Scales…

- **Timeliness (urgency)**

  1= Information not urgently needed

  2= Information could be used right away but a delay of some months could be acceptable

  3= Data very urgently needed for decision making

- **Political acceptability**

  1= Topic not acceptable to high level policy makers

  2= Topic more or less acceptable

  3= Topic fully acceptable

Scales…

- **Feasibility**

  1= Study not feasible, considering available resources

  2= Study feasible, considering available resources

  3= Study very feasible, considering available resources

- **Applicability**

  1= No chance of recommendations being implemented

  2= Some chance of recommendations being implemented

  3= Good chance of recommendations being implemented

Scales…

- **Ethical acceptability**

  1= Major ethical problems

  2= Minor ethical problems

  3= No ethical problems

Rating Sheet
Rating scale: 1 = low, 2 = medium, 3 = high

Criteria for selecting a research topic	Proposed Topic		
	Health problem I	Health problem II	Health problem III
Relevance	3	2	3
Avoidance of duplication	3	2	3
Feasibility	2	3	3
Political acceptability	1	2	2
Applicability	2	1	2
Urgency of data needed	3	2	2
Ethical acceptability	1	1	3
Total	15	13	18

Group Assignment

- Identify 3 topics for your thesis
- Use the criteria mentioned earlier when selecting your topic
- Finally you will defend your topics

UNIT – 3

INTRODUCTION SECTION OF RESEARCH PROPOSAL

Introduction (Background information and Statement of the research problem)

- This section should convince the reader of the relevance of the study (Magnitude, Severity of the problem).
- It should provide enough background data for an outsider to understand the different aspects of the problem, or the different factors influencing the problem and the context in which it occurs.
- Your review of available literature and reports should further illustrate why the problem is important, not only in your own working area but probably also beyond.

Statement of the problem…

- Questions to be answered in the introduction section.

1. Was the problem adequately analyzed to include all possible contributory factors from different sectors?

2. Was it clearly stated?

➢ These questions should be clearly answered before trying to develop the research proposal.

Statement of the problem…

Clear statement of the problem:

- It is the ***foundation*** *for the further development of the research proposal (research* objectives, methods, work plan, etc)

- Makes it easier **to find information & reports** of similar studies from which your own study design can benefit.

- Enables the researcher to systematically **point out why the proposed research** on the problem should be undertaken and **what you hope to achieve** with the study results.

Statement of the problem…

- **The main purpose of the introduction** is to provide the necessary background/context for the research problem.
- How to frame the research problem is perhaps the biggest problem in proposal writing.
- However, try to place the research question in the context of either a current "hot" area, or an older area that remains viable.
- In short, try to paint the research question in broad brushes and at the same time bring out its significance.

Elements of the Statement of the problem

Information to be included in this section:

1. A brief description of socioeconomic and cultural characteristics and an overview of health status.
2. Basic description of the research problem
3. Its size, distribution, and severity (who is affected, where, since when, etc.)
4. The discrepancy between what it is and what should be.

Elements of the Statement of the problem…

5. An analysis of the major factors that may influence the problem & a convincing argument that available knowledge is insufficient to answer a certain question & to update the previous knowledge.
6. A brief description of any solutions that have been tried in the past, how well they have worked, and why further research is needed.
7. A brief description of the consequences of the problem if left unsolved.
8. Present the rationale of your proposed study and clearly indicate why it is worth doing.

Group Assignment

- Write two pages of **the statement of the problem** for the selected title.

- Find some reference materials that are useful for the topic you selected earlier and make sure where and how these references will be used in your own study (you need to show that!)

UNIT – 4

LITERATURE REVIEW

LITERATURE REVIEW

- It is defined as a broad, comprehensive, in-depth, systematic, and critical review of scholarly publications, unpublished scholarly print materials, audiovisual materials, and personal communications.

- It is an account of what has been published on a topic by accredited scholars and researchers.

Purpose of a Literature Review

- It prevents from duplicating work that is already done before.
- It increases knowledge on the problem you want to study and this may assist you in refining your "statement of the problem".
- It gives confidence why the research project is needed.
- To be familiar with different research methods

Purpose of a Literature Review

- To make the research problem clear and bring focus into it.
- It serves as a benchmark for comparing the results with other findings
- Develop a *theoretical framework (conceptual framework)* related to the study.

Sources of Information

1. **Individuals, groups, and organization**: Opinion, observation, experience, routine reports, etc
2. **Unpublished information:** Raw data, annual reports, documentation, Local surveys, etc
3. **Published information:** Books, Journals, abstracts, indexes
4. **Computer-based searches:** Internet (Google, MEDLINE, PUBMED)

- *N.B: National databases and computerized literature search have improved retrieval of past work.*

Some examples of resources where information could be obtained are:

- Clinic and hospital based data (routine activity statistics)
- Local surveys, annual reports
- Scientific conferences
- Statistics issued at region and district levels
- Articles from national and international **journals**, e.g.
  - The Ethiopian Journal of Health Development,
  - The Ethiopian Medical Journal,
  - The East African Medical journal,
  - The Lancet, etc.
- Internet
- Documentation, reports, and raw data from the MOH, Central Statistical Offices, NGOs, etc.

Steps in conducting literature review

1) Identifying key words

2) Go to the library and begin searching the catalog for holdings (i.e journals and books).

- Most major libraries have computerized databases
- Focus initially on journals and books related to the topic
- Also begin to search the computerized data bases such as Google Scholars

3) Initially, try to locate about 50 reports of research in articles or books related to research on your topic

- Set priority on the search for journal articles and books because they are easy to locate and obtain

- Determine whether these articles and books exist in your academic library

4) Skim this initial group of articles or chapters, and duplicate those that are central to your topic

5) As you identify useful literature, begin designing a literature map

- ***Literature map*** *is a visual picture (or figure) of groupings of the literature on the topic, that illustrates how your particular study will contribute to the literature, positioning your own study within the larger body of research*

References that are identified:

- Should first be skimmed or read
- Then summaries of the important information in each of the references may be recorded on separate index cards
- These should then be classified so that the information can easily be retrieved

6) As you put together the literature map, also begin to draft summaries of the most relevant articles

- These summaries are combined into the final literature review that you write for your proposal

- Include precise references to the literature using an appropriate style so that you have a complete reference to use at the end of the proposal or study

7) After summarizing the literature, assemble the literature review and organizing it by important concepts

- End the literature review with a summary of the major themes and suggest how your particular study further adds to the literature

❖**Information obtained from key persons could also be summarized on the index card.**

Organization of information on index cards

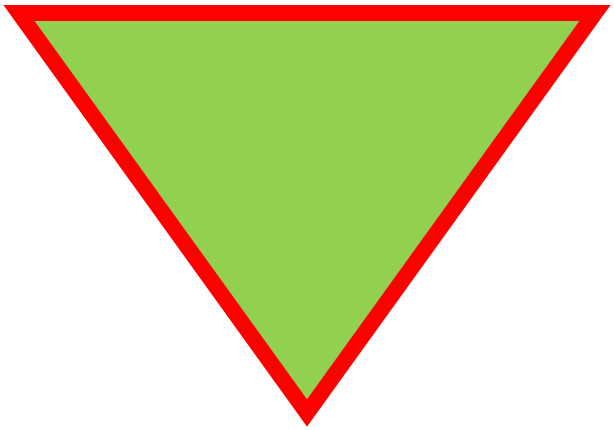
- The index cards should contain:
  - **Key words**
  - A **summary** of the contents of books or articles which is relevant to one's own study
  - **A brief analysis of the content**, with comments such as: - how information from that particular study could be used in one's own study

- **After collecting the required information on index cards,** the investigator should decide in which order he/she wants to discuss previous research findings.
- A general organization looks like a funnel:

✓ **From Global to Local**

✓ **From Broader to Focused**

✓ **From Past to Current**



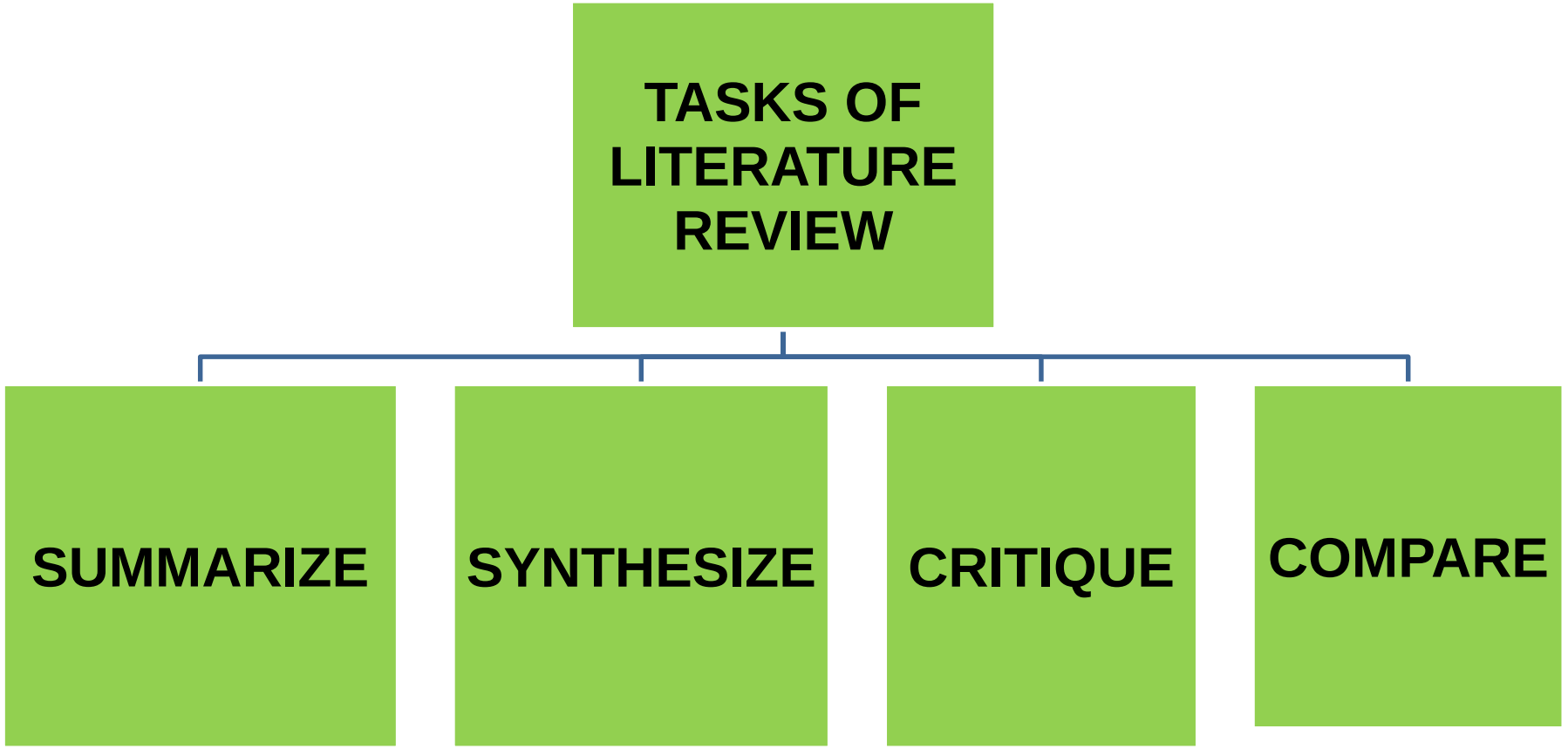
Characteristics of Effective Literature Reviews

- Outlining important research trends
- Assessing the strengths & limitations of existing research
- Identifying potential gaps in knowledge
- Establishing a need for current and/or future research projects

Steps for Writing LR

1. **Planning**
   - **What Type of Literature Review Am I Writing?** Theory, Methodology, Sources , Policy, Quantitative, Qualitative
2. **Reading & Research:**
   - What Materials Am I Going to Use? Collect and read material, Summarize sources.
3. **Analyzing**
   - How Do I Assess Existing Research? Summarize, Synthesize, Critique and Compare
4. **Drafting**
   - What Am I Going to Write? Thesis Statement, Organization, Introduction and conclusion , Citations
5. **Revising**
   - How Can I Fine-tune My Draft? Title, Introduction, Body, Topic sentences, Transitions, Conclusion, Spelling and Grammar

Four Analysis Tasks of the LR



Different Ways to find References

1. **Online resources**
   - Currently, they are effective searching
   - Catalogues (library catalogues or online public-access catalogues [OPACs])
   - Bibliographic databases (some of which may be labelled as indexes, citation indexes, abstract databases, or publishers' databases)
2. **Snowball Referencing**
   - Is the traditional way to collect references.
   - Begin by finding a book or journal article relevant to your work.
   - You check the reference list at the end, select those items that seem most important, and find them.

Five things to try whenever you search

1) **Alternative search strings (the words typed into the search field)**
2) **Various fields**
   - When entering the search screen of an OPAC or database, you often see several blank areas where you can type the search.
   - These may be labelled ‘title’, ‘keyword’ ‘subject’, etc.
3) **Different spellings and punctuation**
   - Some databases have built-in information about British and American spellings
   - E.g Paediatrics Vs Pediatrics

4) Truncation

- Truncation involves using an * or a ? to indicate unspecified parts of words
- e.g., child* for child, childhood, children.

5) Boolean logic

- Most databases accept search strings with AND, OR, or NOT.
- Some examples of search strings involving Boolean operators:
  - ✓ obstetrics AND anaemia (cover both topics)
  - ✓ obstetrics OR childbirth (one or the other)
  - ✓ obstetrics NOT eclampsia (the hits will be about obstetrics but not eclampsia)

- In conclusion, while reviewing a literature, all what is known about the study topic should be summarized with the relevant references.
- This review should answer:
  - **How much is known?**
  - **What is not known?**
  - **What should be done based on what is lacking?**

- Overall, the LR should be **adequate**, **relevant** and critical.

- While reviewing a literature, give emphasis to **both positive** and **negative findings** and avoid any distortion of information to suit your own study objectives.

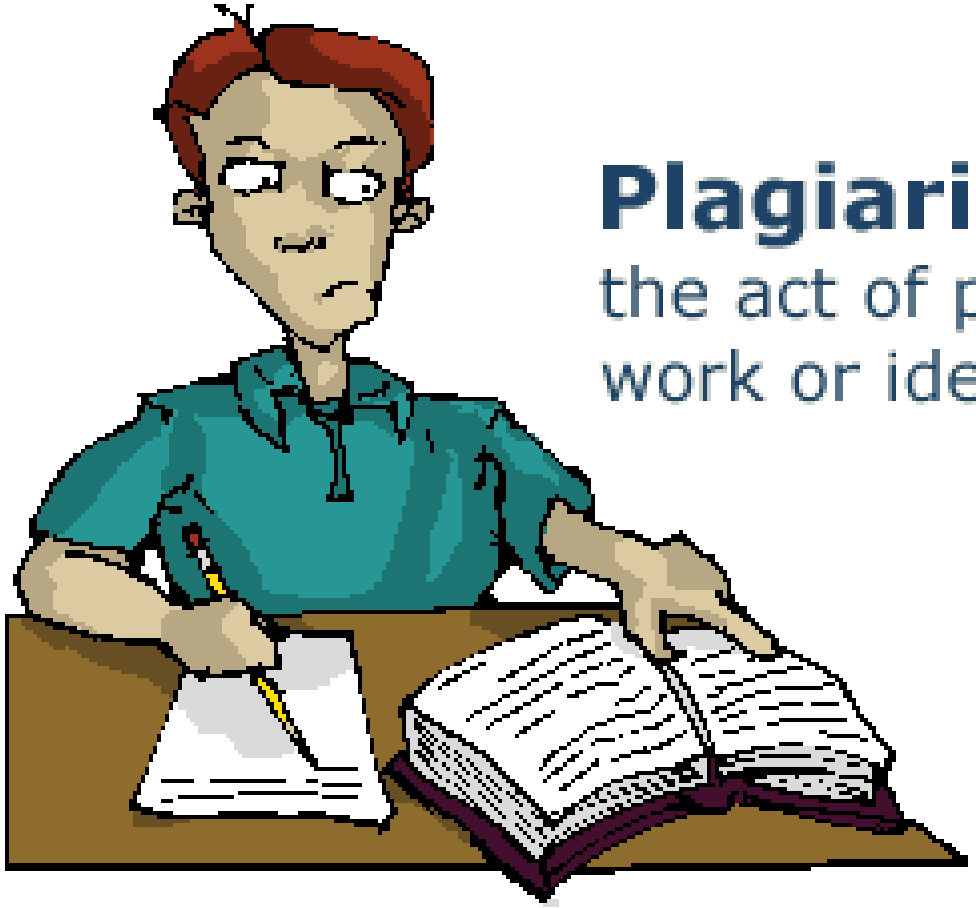
- Finally, after an exhaustive LR, summarize the findings and write a coherent discussion by ***indicating the research gap*** which supports the undertaking of your study.

Common Mistakes in Reviewing Literature

- Main purpose is not clear
- Inadequate LR
- Too long, rambling, unstructured
- Too short, too general
- The approach is not clear
- Special terms are not defined

You should also have:

1. A note-taking handout. As we go through the assignment, take notes, or write down any questions you have
2. A sample outline
3. Examples of plagiarizing v. paraphrasing



Plagiarism:
the act of presenting another's work or ideas as your own.

Paraphrase!!!

Plagiarism v. Paraphrasing Samples

Direct quote from research:

- "Japan's beautiful Mount Fuji last erupted in 1707 and is now classified as dormant. Dormant volcanoes show no signs of activity, but they may erupt in the future."

Non-plagiarized paraphrase:

- Mount Fuji, the highest mountain in Japan, is actually a dormant volcano. Dormant means that it is not active. The last time Mount Fuji erupted was in 1707, and there is always the possibility of a future eruption.

Plagiarism v. Paraphrasing Samples

Direct quote from research:

- "Three weeks after Katrina, warnings of the arrival of Hurricane Rita sent residents of cities such as Houston, Texas, rushing to evacuate, fearing for their lives. Fortunately, Hurricane Rita turned out to be much less severe than Katrina. However, mass evacuations like this bring hazards of their own, as panicking drivers may cause accidents on the jammed roads."

Non-plagiarized paraphrase:

- Shortly after Hurricane Katrina devastated the city of Houston, Texas, a warning for a new hurricane named Rita was broadcast, which caused many people to panic and flee the city. However, the mass departure of people leaving Houston at the same time could have caused many car accidents, even though the hurricane turned out to be not as dangerous as Katrina.

Justification/Significance of the study

- The **justification** of the study illustrates **why** the research is conducted and the **significance** refers to **whom** it shall benefit.
- **Points that need to be considered for justifying the selected research problem:**
  - A current and existing problem which needs solution
  - A widely spread problem affecting a target population
  - Effects on the health service programmes
    - ✓ *Being a problem which concerns the **planners, policy makers** and the **communities** at large*
    - ✓ *Effects (research findings) to **support decision-making at different levels of the health delivery system.***

Conceptual Framework

- It gives an overall view of the inter-relationship (inter-dependence) of the variables.

- Depicting the relationship between the outcome variable and independent variables

Group Assignment

- Try to review literatures in relation to your topic (indicate the information gap clearly).
- Write 2 to 4 pages of LR for the selected title.
- Write not more than a half page of justification or significant of your research project.

UNIT – 5

RESEARCH OBJECTIVES

Research Objectives

- The objectives are a statement that clearly depicts the goal to be achieved by a research.
- The objectives should be closely related to the statement of the problem
- **Importance of developing objectives**

1. Focus the study (narrowing it down to essentials)
2. Avoid the collection of data which are not strictly necessary
3. Organize the study in clearly defined parts or phases
   - Properly formulated, specific objectives will facilitate the development of research methods &will help to orient the collection, analysis, interpretation &utilization of data.
4. Helps for evaluating the project.

Research Objectives

- Two forms:

1. **General objective**:
   - The aim of the study in general terms
   - Clearly related to the statement of the problem.
2. **Specific objectives**:
   - Measurable statements on the specific questions to be answered.
   - More specific and related to the research *problem situation.*
   - Logically connected parts of the general objective
   - Indicate the variable to be examined and measured.

How should we state our objectives?

We have to make sure that our objectives:

- Cover the different aspects of the problem & its contributing factors in a coherent way & in a logical sequence
- Are clearly expressed in measurable terms
- Are realistic considering local conditions
- Must be **SMART** (**S**pecific, **M**easurable, **A**chievable, **R**ealistic and **T**ime bounded)
- Meet the purpose of the study

Objectives….

- Use action verbs that are specific enough to be measured
  - To determine, To describe,
  - To identify, To find out,
  - To assess, To verify,
  - To calculate, To compare,
  - To establish, To explore etc.

- **Avoid the use of vague non-action verbs:**
  - To appreciate,
  - To understand,
  - To study,
  - To believe, etc.

What formats can be used for stating Research Objectives?

Research Objectives can be stated as:

1. **Questions**: “The objectives of this study are to answer the following questions …”
2. **Positive sentence**: “The objective of this study is to determine …”
3. **Hypothesis**: “The objective of this study is to verify the following hypothesis...”

- A **hypothesis** is a prediction or explanation of the relationship between one or more independent variables (risk factors) and one dependent variable (outcome).
- It specifies the relationship among variables.
- These variables are to be statistically tested at a later stage.
- In order to measure the relationship among variables to be studied the dependent and independent variables need to be identified.

The tendency of stating too many study objectives.

- It should be noted that it is on the bases of these specific objectives that the methods, results and discussion sections will be presented.

- It is therefore advisable to limit the number of specific objectives.

- In most practical situations, the number of specific objectives should not exceed three.

Examples of formulation of Research Objectives

- **Title:** Magnitude and factors associated with self-medication practices among Wollo University students, Northeast Ethiopia, 2020
- **General Objective:** To assess the magnitude and factors associated with self-medication practices among Wollo University students
- **Specific Objectives:**

1. To determine the magnitude of self-medication practices among Wollo University students
2. To identify factors associated with self-medication practices among Wollo University students

UNIT – 6

METHODS

Methods

- Methodology and Method are often (incorrectly) used interchangeably.
- **Methodology** – the study of the general approach to inquiry in a given field.
- **Methods**– the specific techniques, tools or procedures applied to achieve a given objective
- In this section of the research process
  - Define population → Who, When, where, how to select
  - Select design & measurement → How
  - Gather evidence → How
  - Data analysis plan → how, what method

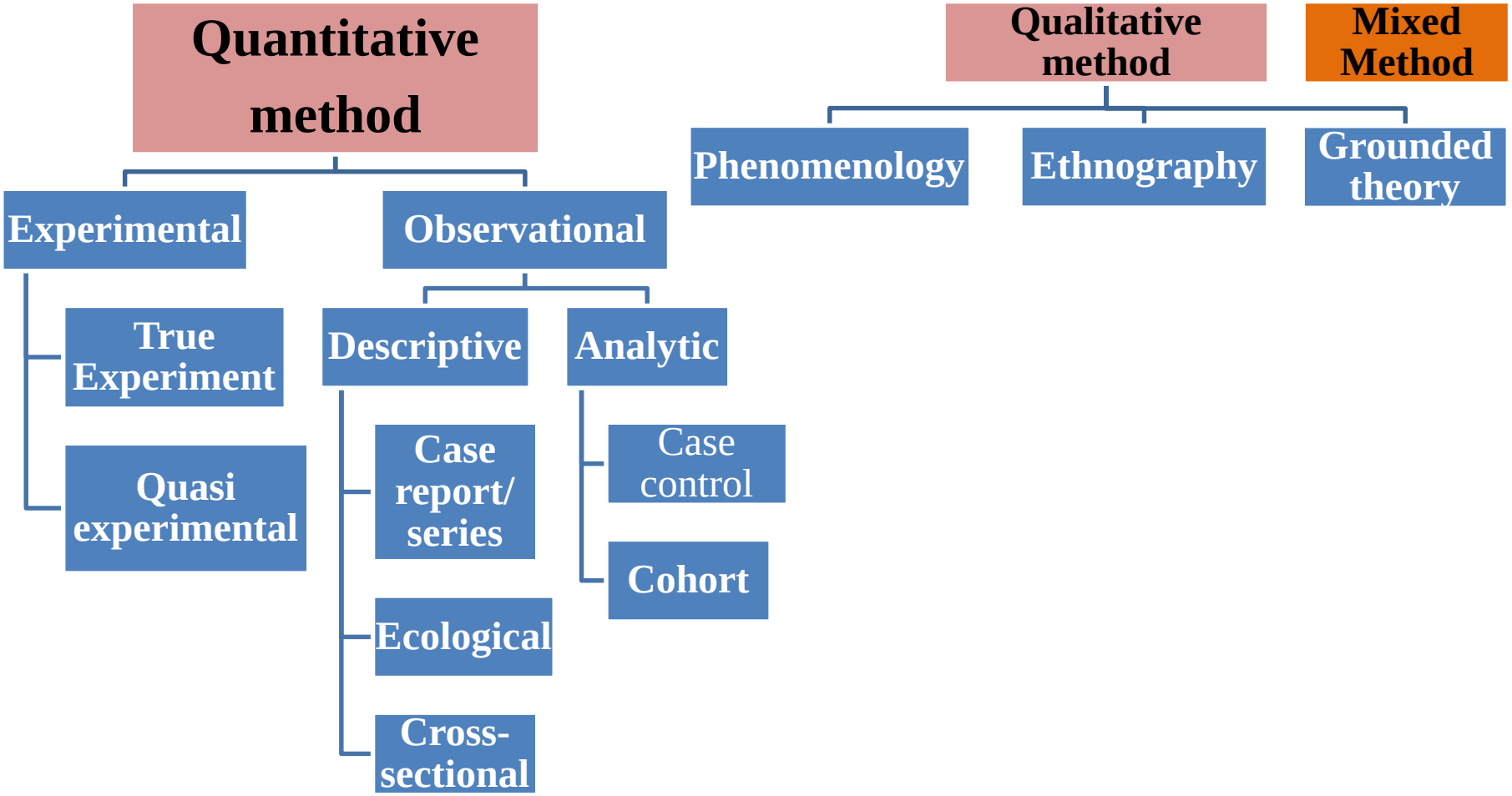
Methods

1. Study Design
2. Study Setting & Period
3. Study Population: Source, Study, Sample
4. Inclusion & Exclusion criteria
5. Sampling techniques
6. Sample Size Determination
7. Variables: Type, measurement
8. Operational Definitions
9. Data collection techniques
10. Data quality assurance
11. Data processing and analysis
12. Ethical considerations
13. Pre-test
14. Dissemination of findings

1- Study Designs

- There are three types of research paradigms
    1. Quantitative
    2. Qualitative
    3. Mixed

Taxonomy of Research Designs



Reading Assignment

- **Please refer** your epidemiology lectures for more details:

- The principles, advantages and limitations of each of the designs

Reading Assignment

RESEARCH DESIGN CONSIDERATIONS

- The concept of research control
- Internal and external validity
- Characteristics of good design
- The time dimensions

Study Design…

- A research may involve different study designs.
- **Study design characteristics include:**
  - Type of data (qualitative vs quantitative),
  - The type of comparisons (with or without control group),
  - The type of setting or unit of analysis chosen, etc.

Study Design…

- **The type of study design chosen depends on:**

1. The type of problem
2. The knowledge already available about the problem
3. Resources available for the study

2. Study setting and Study Period

- It is necessary to check the location where the study is to be/was conducted (where the data is going to be/ were collected).
- Location can affect the external validity of the study, since subjects vary considerably between residential areas, due to climate, physical environment, economics, and sociocultural milieu.
- **Study period** refers to the actual data collection time that extends from a few days to several months.
- ***Write the setting/study area & period of the study which focuses on your outcome of interest.***

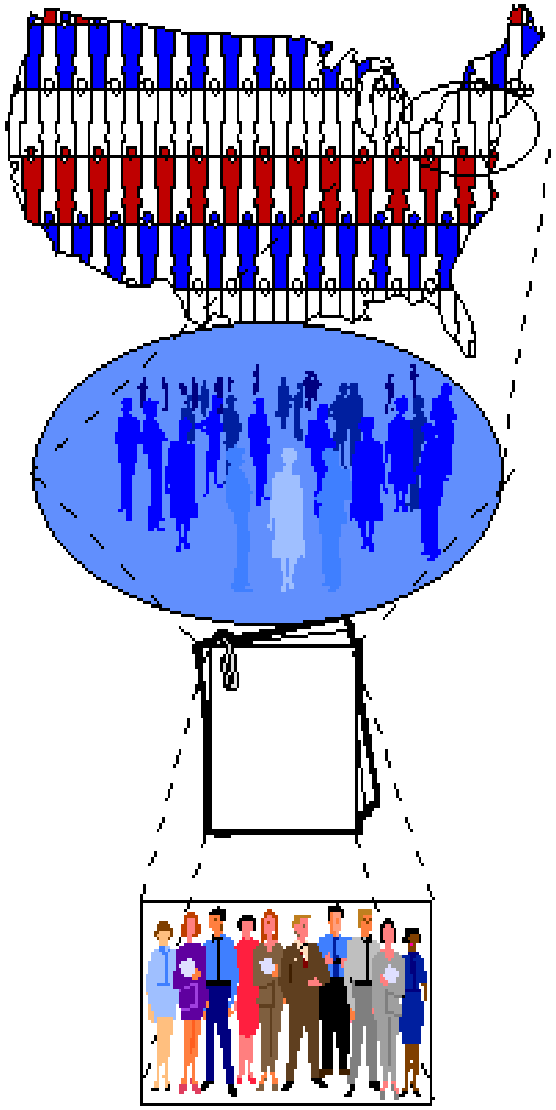
3. The population

- What is your population of interest?
  - To whom do you want to generalize your results?
  - To whom you have access?
  - Can you sample the entire population?
  - What will be your frame?

The population

Who do you want to generalize to?

The Theoretical Population



What population can you get access to?

The Study Population

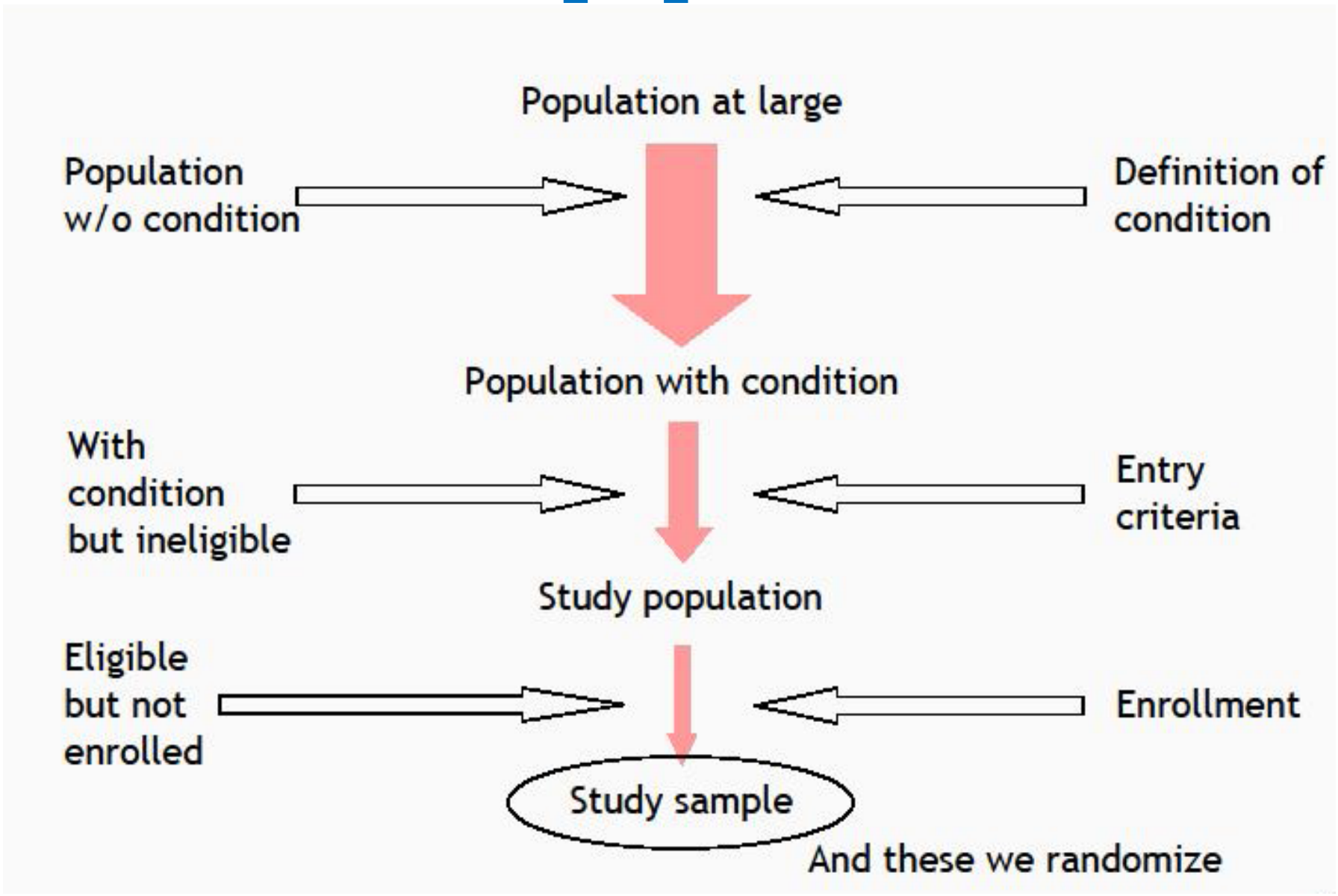
How can you get access to them?

The Sampling Frame

Who is in your study?

The Sample

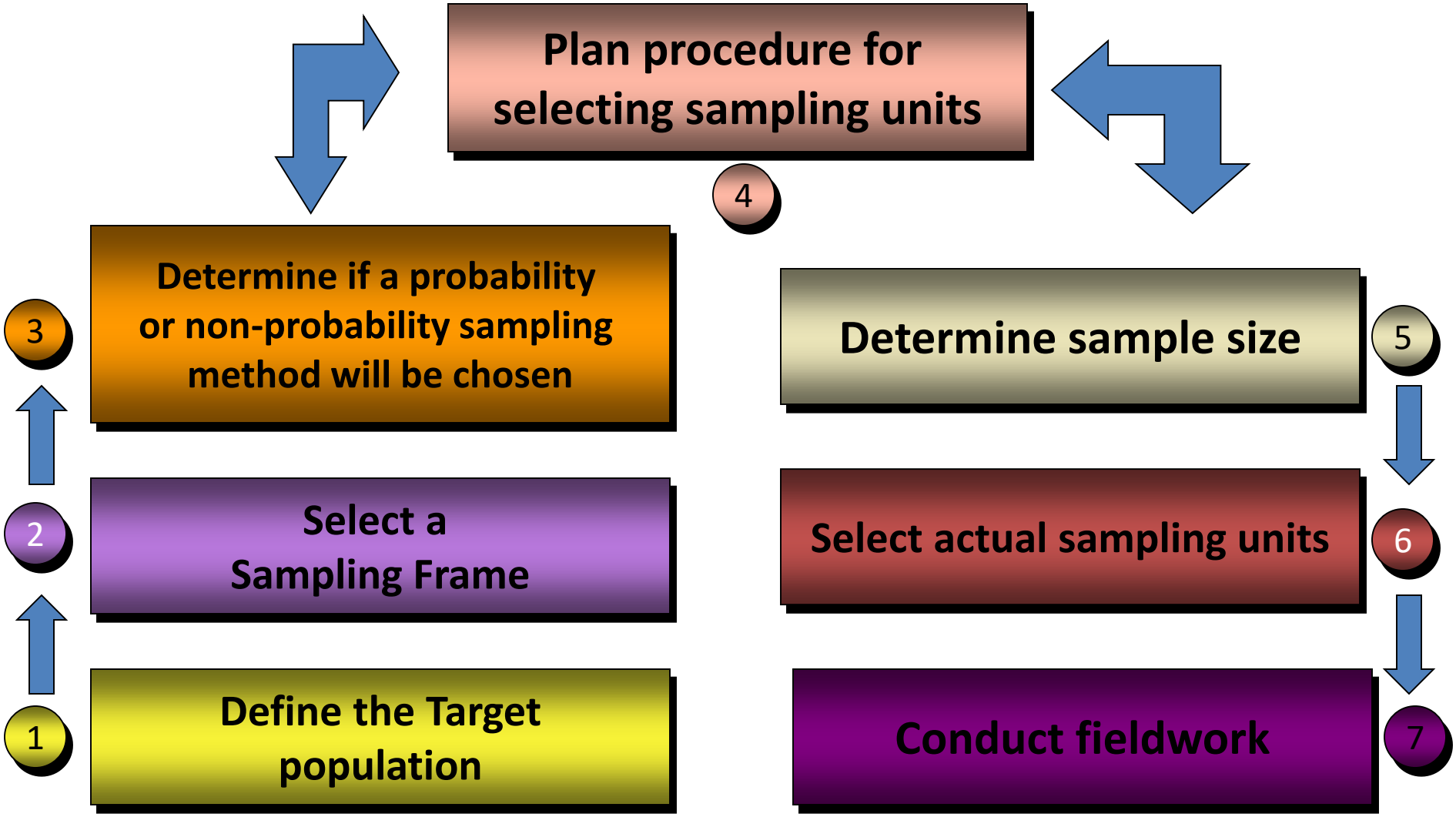
The population



4. Sampling Procedure

- A **sample** is “a smaller (but hopefully representative) collection of units from a population used to determine truths about that population” (Field, 2005)
- Why sample?
  - Resources (time, money) and workload
  - Gives results with known accuracy that can be calculated mathematically
- **The sampling frame** is the list from which the potential respondents are drawn
  - Registrar’s office
  - Class rosters
  - Must assess sampling frame errors
  - Patient registers, etc

The Sampling Process



Sampling

- It is the process of selecting a few from a bigger group.
- Bigger group is the population and the selected few is the sample.
- The larger the sample size the more accurate will be the findings.
- **Types of sampling:** Sampling strategies are numerous.
- They can be categorized into three groups:

1. Random/probability sampling
2. Non-random/probability sampling
3. Mixed sampling

Types of Sampling

1. Probability (Random) Sampling

- Simple random sampling
- Systematic random sampling
- Stratified random sampling
  - Proportionate
  - Disproportionate
- Cluster sampling
- Multi-stage sampling

2. Non-Probability sampling

- Convenience sampling
- Purposive sampling
- Quota sampling

Types of sampling

I. Probability sampling

- It is any method of sampling that utilizes some form of *random selection.*

- *Every individual of the target population has equal chance to be included in the sample.*

1. Simple Random Sampling (SRS)

- **Objective**: To select *n* units out of *N*

List of Clients

Random Subsample

- **Procedure**: Use a table of random numbers
  - ✓ a computer random number generator

Lottery method: You could print off the list of N clients, tear then into separate strips, put the strips in a hat, mix them up real good, close your eyes & pull out the first n.

2. Systematic Random Sampling

- Here are the steps you need to follow in order to achieve a **systematic random sample**:

  - ✓ Number the units in the population from 1 to N
  - ✓ Decide on the n (sample size) that you want
  - ✓ K = N/n = the interval size
  - ✓ Randomly select an integer between 1 to k
  - ✓ Then take every k^{th} unit

Systematic random sampling

- Example

N = 100

want n = 20

N/n = 5

select a random number from 1-5: chose 4

start with #4 and take every 5th unit

1	26	51	76
2	27	52	77
3	28	53	78
4	29	54	79
5	30	55	80
6	31	56	81
7	32	57	82
8	33	58	83
9	34	59	84
10	35	60	85
11	36	61	86
12	37	62	87
13	38	63	88
14	39	64	89
15	40	65	90
16	41	66	91
17	42	67	92
18	43	68	93
19	44	69	94
20	45	70	95
21	46	71	96
22	47	72	97
23	48	73	98
24	49	74	99
25	50	75	100

E.g. Systematic sampling

- N = 1200, and n = 60

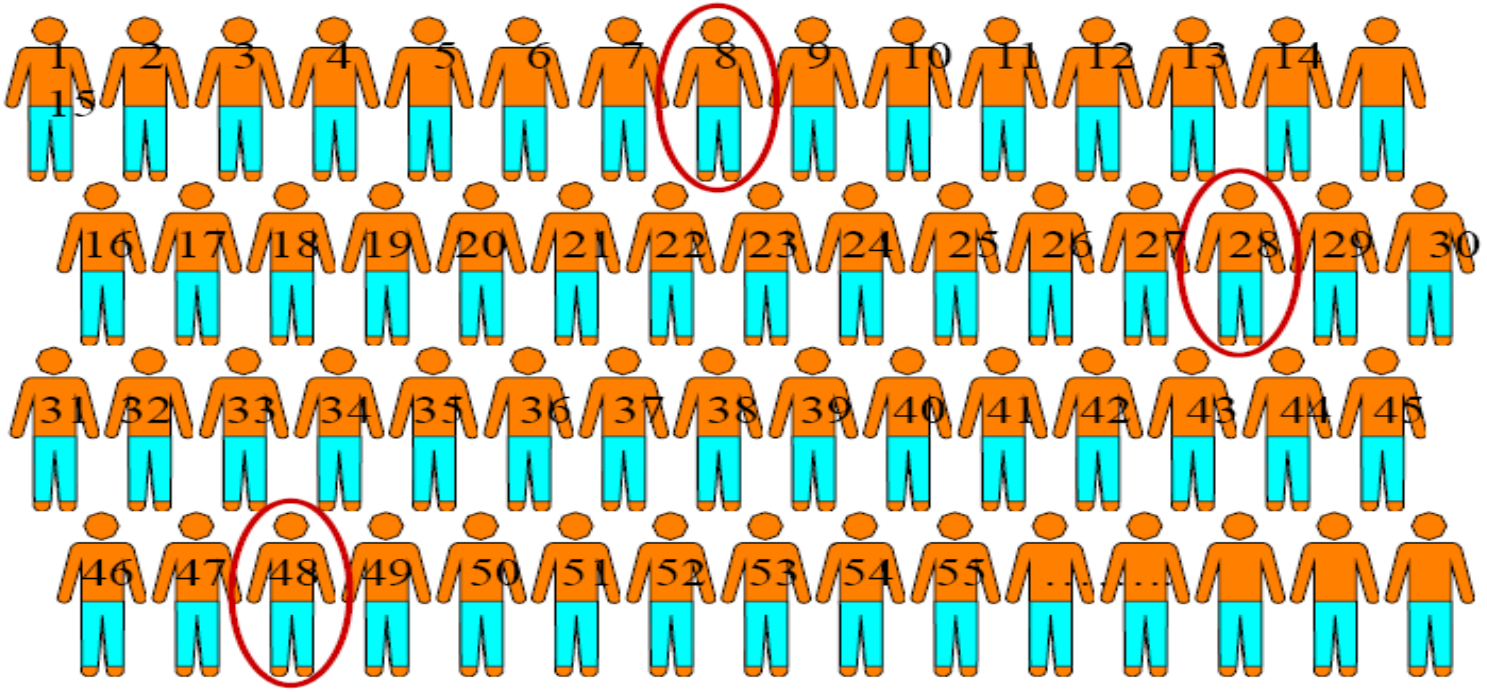
  $\Rightarrow$ sampling fraction = 1200/60 = 20
- List persons from 1 to 1200
- Randomly select a number between 1 and 20 (ex : 8)

  $\Rightarrow$ 1st person selected = the 8th on the list

  $\Rightarrow$ 2nd person = 8 + 20 = the 28th

  etc .....

05:28



Systematic sampling should not be used when a cyclic repetition is inherent in the sampling frame

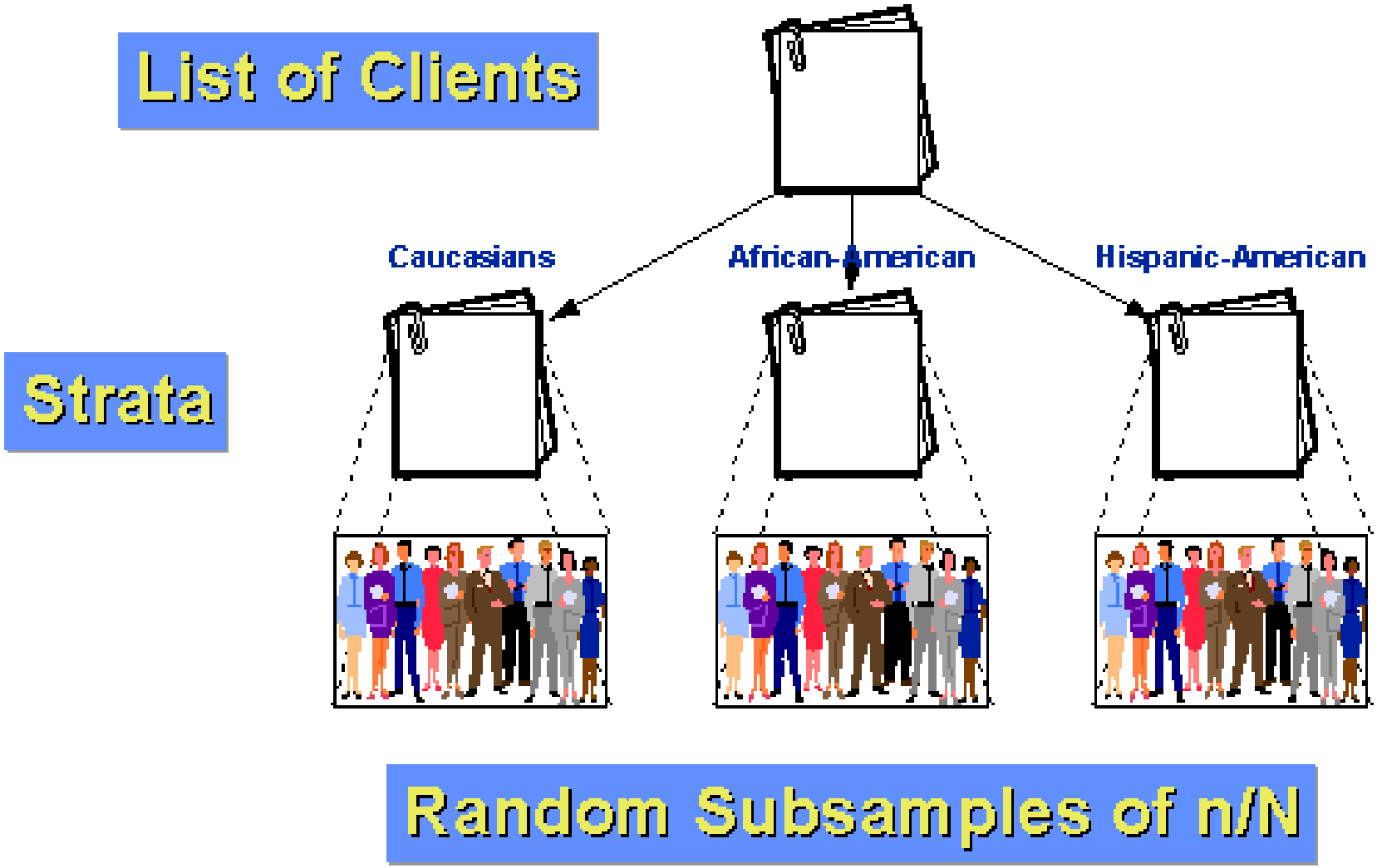
3. Stratified Random Sampling

- It involves dividing the population into homogeneous subgroups and then taking a simple random sample in each subgroup.
- **Objective**: Divide the population into non-overlapping groups (i.e., *strata*) N_1, N_2, N_3, ... N_i, such that $N_1 + N_2 + N_3 + ... + N_i = N$. Then do a simple random sample depending on the type of allocation

➢ Proportional allocation: $$n_i = \frac{n}{N} * N_i$$

Example: An agency has clients from 3 ethnic groups and the agency wants to asses client's view of quality of service for the last year.

Stratified random sampling



4. Cluster (area) Random Sampling

- The problem with random sampling methods when we have to sample a population that's dispersed across a wide geographic region is that you will have to cover a lot of ground geographically in order to get to each of the units you sampled.

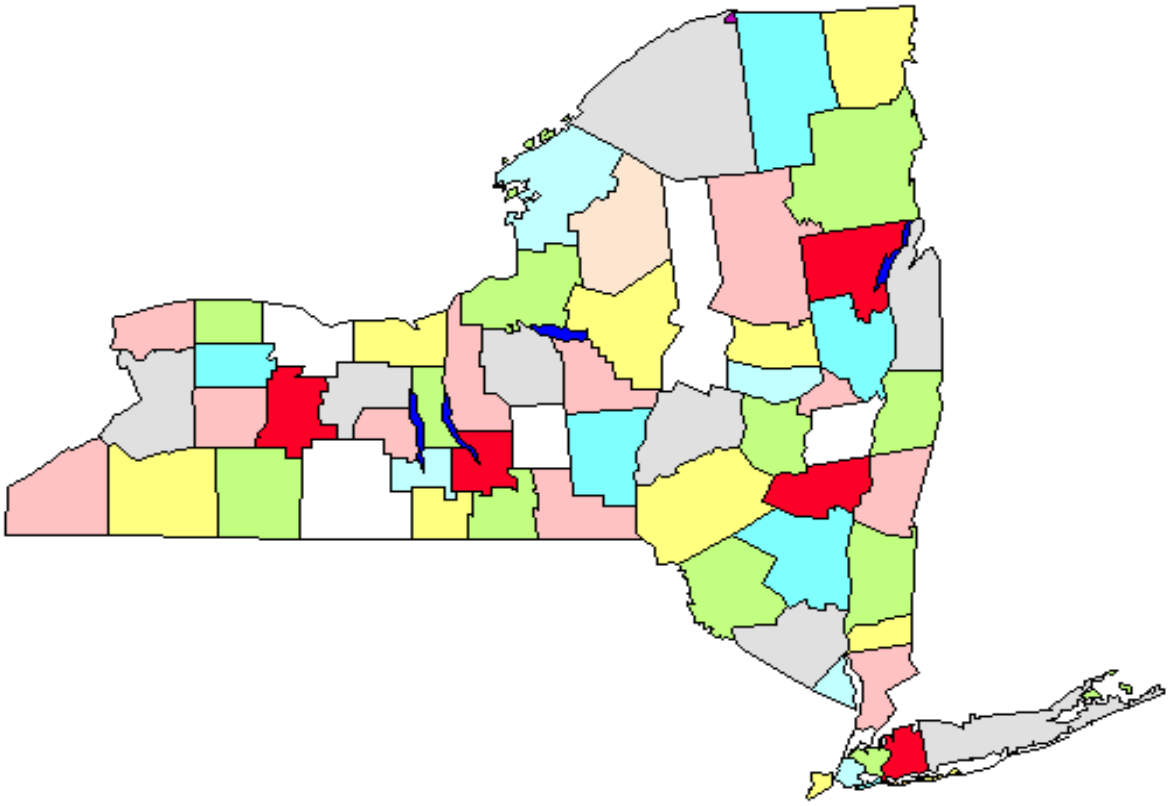
- In cluster sampling, we follow these steps:

✓ Divide population into clusters (usually along geographic boundaries)

✓ Randomly sample clusters

✓ Measure all units within sampled clusters

- **Example**: In the figure we see a map of the countries in New York State. Let's say that we have to do a survey of town governments that will require us going to the towns personally. If we do a simple random sample state-wide we'll have to cover the entire state geographically.



5. Multi-stage sampling

- The four methods -- simple, stratified, systematic and cluster -- are the simplest random sampling strategies
- When we combine the random sampling methods, we call this **multi-stage sampling**
- **Example**: Consider the problem of sampling students in grade schools. We might begin with a national sample of school districts stratified by educational level. Within selected districts, we might do a simple random sample of schools. Within schools, we might do a simple random sample of classes or grades.
- And, within classes, we might even do a simple random sample of students. In this case, we have three or four stages in the sampling process and we use both stratified & SRS.

II. Non probability sampling

- Does not involve *random* selection.
- Does it mean that non probability samples aren't representative of the population?
- It does mean that non probability samples cannot depend upon the rationale of probability theory.
- Most sampling methods are **purposive** in nature because we usually approach the sampling problem with a specific plan in mind.

1- Convenience sampling

Example

- Man in the street (attitude of foreigners about Ethiopia)

- College students for psychological study

2- Purposive sampling

- In this sampling, we sample with a *purpose* in mind

1. Modal Instance Sampling

- ✓ In statistics, the *mode* is the most frequently occurring value in a distribution.
- ✓ We are sampling the most frequent case, or the "typical" case
- ✓ We could say that the modal voter is a person who is of average age, educational level, and income in the population

Purposive sampling…

2. **Expert Sampling**
   - ✓ It involves the assembling of a sample of persons with known or demonstrable experience and expertise in some area.
3. **Quota Sampling**
   - ✓ In quota sampling, you select people non randomly according to some fixed quota.
   - ✓ two types: *proportional* and *non proportional*
4. **Heterogeneity Sampling (sampling for *diversity)***
   - ✓ We sample for heterogeneity when we want to include all opinions or views, and we aren't concerned about representing these views proportionately.

Purposive sampling…

5. Snowball sampling

- ✓ In snowball sampling, begin by identifying someone who meets the criteria for inclusion in the study
- ✓ You then ask them to recommend others who they may know who also meet the criteria
- ✓ Snowball sampling is especially useful when you are trying to reach populations that are inaccessible or hard to find.
- ✓ For instance, if you are studying the homeless, you are not likely to be able to find good lists of homeless people within a specific geographical area.
- ✓ However, if you go to that area and identify one or two, you may find that they know very well who the other homeless people in their vicinity are & how you can find them.

Selecting a sampling method depends on:

1. Population to be studied
   - Size and geographic distributions
   - Heterogeneity with respect to the variable studied
2. Resource availability
3. Level of precision required
4. Importance of having a precise estimate of sampling error

Errors of Measurements

- When we take a sample, our results will not exactly equal the correct results for the whole population.
- That is, our results will be subject to errors.
- This error has two components:

1. **Sampling error**:

- Consists of random deviations from the true value, which can occur in any direction,
- It can be minimized by increasing the size of the sample.

2. Bias

- Any systematic deviations from the true value, always in the same direction.
- It is possible to **eliminate or reduce** the non-sampling error (bias) by **careful design of the sampling procedure.**

5. Sample Size Determination

- In planning any investigation, we must decide how many people need to be studied in order to answer the study objectives.
- If the study is too small, we may fail to detect important effects, or may estimate effects too imprecisely.
- If the study is too large, then we will waste resources.

- In order to calculate the required sample size (n), you need to know the following facts:

✓ The reasonable estimate of the key proportion (P) to be studied

✓ The degree of accuracy required (d). That is, the allowed deviation from the true proportion in the population as a whole.

✓ The confidence level required, usually 95%. ($Z_{\alpha/2}$)

✓ The size of the population that the sample is to represent (N).

Determination of Sample Size for Estimating Means

- To estimate population mean, μ

$$n = \frac{Z_{\alpha/2}^2 \sigma^2}{d^2}$$

Example:

- Find the minimum sample size needed to estimate the drop in heart rate (μ) for a new study using a higher dose of propranolol than the standard one.
- We require that the two-sided 95% CI for μ be no wider than 5 beats per minute and the sample standard deviation for change in heart rate equals 10 beats per minute.

$$\mathbf{n = (1.96)^2 10^2 / (2.5)^2 = 62 \text{ patients}}$$

- We round up to the next largest whole number if the calculation yield a number that is not itself an integer.

Sample size determination for single population proportion (cross-sectional)

- Let P denotes proportion of interest to be estimated, then

$$d = Z_{\frac{\alpha}{2}} SE$$

$$= Z_{\frac{\alpha}{2}} \sqrt{\frac{P(1-P)}{n}}$$

$$\Rightarrow \sqrt{n} = Z_{\frac{\alpha}{2}} \frac{\sqrt{P(1-P)}}{d}$$

$$\Rightarrow \boxed{n = Z_{\frac{\alpha}{2}}^{2} \frac{P(1-P)}{d^{2}}}$$

- If the proportion of interest to be estimated is unknown, use P=50% for maximum sample size.

Note

- σ^2 and P are not known, so we

➢ Do Pilot or preliminary sample:

  – Select a pilot sample and estimate σ^2 with the sample variance, S^2

➢ Or take from previous or similar studies

➢ You can take conservative P=50%

- The minimum sample size (n) required for a very large population (N>10,000) is:

$$n = \frac{Z^2\, p(1-p)}{d^2}$$

Example

- A survey is being planned to determine what proportion of family in a certain area are medically indigent. It is believed that the proportion can not be greater than 0.35. A 95% confidence interval is desired with d = 0.05. What size sample of families should be selected?

$$n = \frac{(1.96)^2(0.35)(0.65)}{(0.05)^2} = \frac{3.8416 \times 0.2275}{0.0025} = 350 \text{ families}$$

6. Variables of the study

- **Variable**…
  - any observation that can take on different values
- **Attribute**…
  - a specific value on a variable

- Example:

Variable	**Attribute**
Age	18, 19, 20, etc...
Sex	Male, Female
Satisfaction	1 = very satisfied
	2 = satisfied
	3= somewhat satisfied
	4 = not satisfied
	5 = not satisfied at all

Types of Variables

1. Independent variable

- Also known as the Experimental or Treatment Variable
- what you (or nature) manipulate in some way

2. Dependent variable

- Also known as outcome variables
- what you presume to be influenced by the independent variable

7. Operational definition

- To “operationalize” a variable is to decide how you will measure it
- For example, if the variable you’re interested in is **depression**:
  - Will you ask people to rate themselves, and if so, on what sort of a scale?
  - Alternatively, will you measure depression by facial expression? By some behavior that you observe? In some other way?

8. Data collection

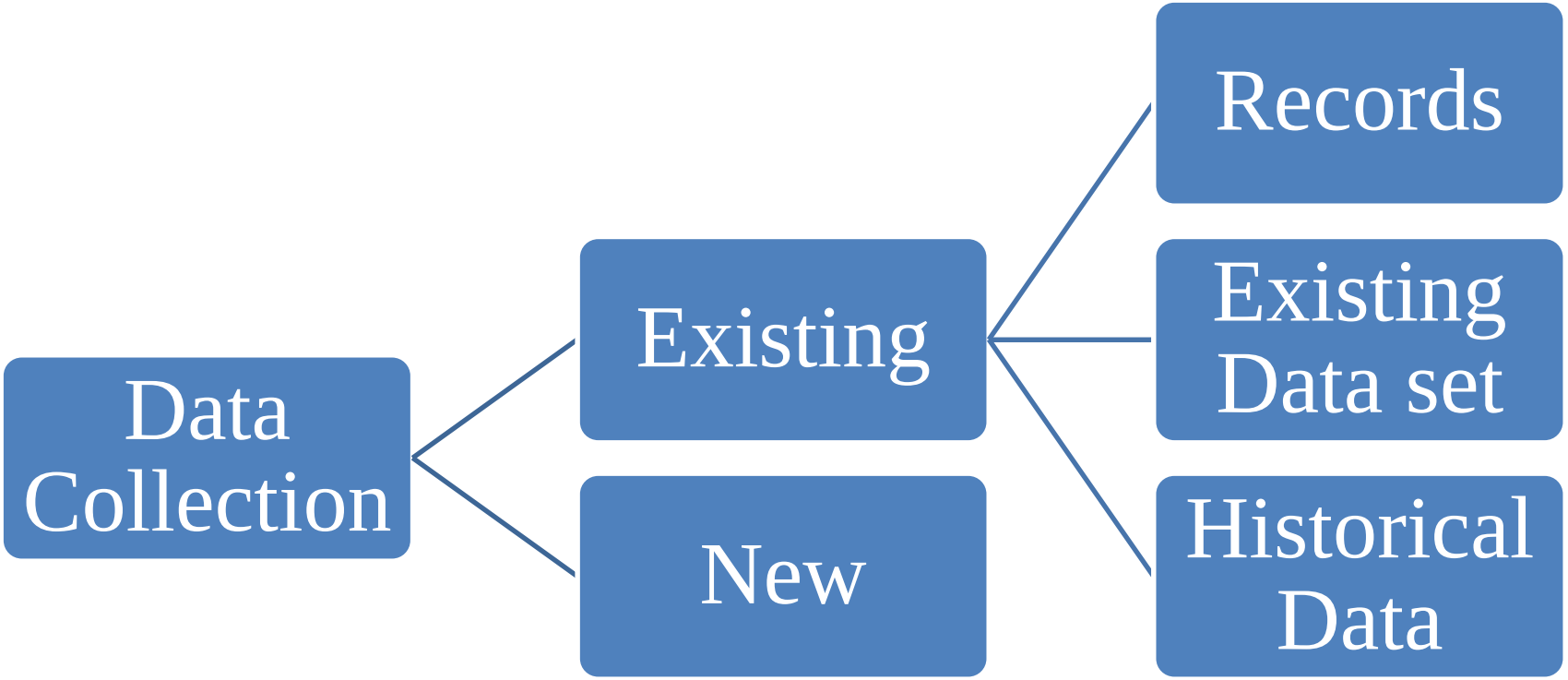
- The successful completion of a sampling procedure connects the research with the respondents and specifies the kind and number of respondents who will be involved.

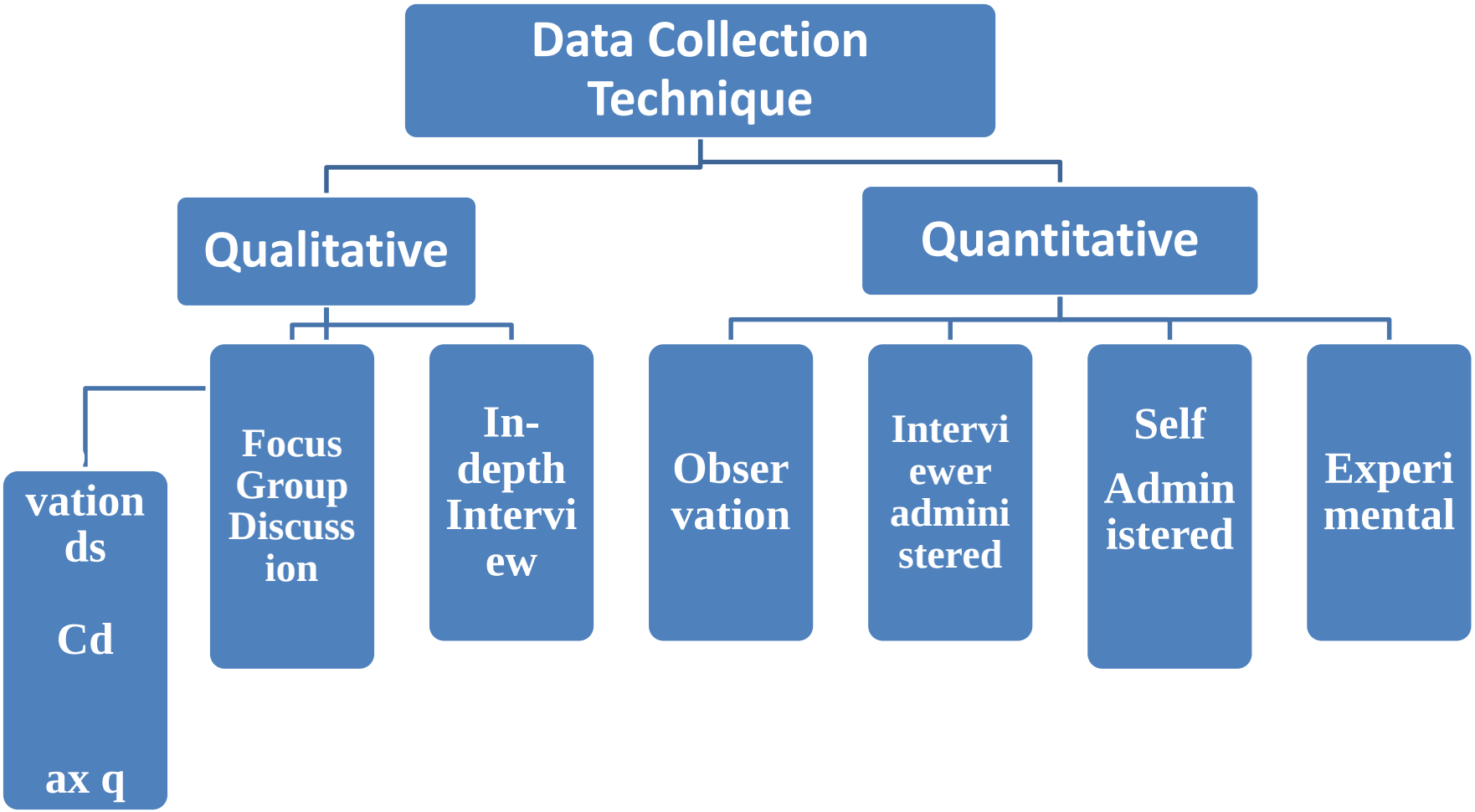
- The investigator knows at this stage not only what will be studied, but also who to approach for the required information.

- The information will be available, provided that the right connection between the researcher and the respondents is made.

Data Collection Methods

- Quantitative techniques
- Qualitative techniques


Data Collection
Existing
New
Records
Existing Data set
Historical Data


Data Collection Technique
Qualitative
Quantitative
vation ds
Cd
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Focus Group Discuss ion
In-depth Intervi ew
Obser vation
Intervi ewer admini stered
Self Admin istered
Experi mental

Major Types of Data Collection Methods

- **Self-reports**
  - **Interviewer administered questionnaire**
  - **Self administered questionnaire**
- **Observation**
  - **Participant**
  - **Non-participant**
- **Biophysiologic measures**
  - **In vivo**
  - **In vitro**

Questionnaire

- A **questionnaire** is a
  - research instrument
  - consisting of a series of questions to gather information from respondents

Principles of Questionnaire Writing

- Be clear and precise.
- Response choices should not overlap.
- Use natural and familiar language.
- Do not use words or phrases that show bias.
- Avoid double-barreled questions.
- State explicit alternatives.
- Questions should be reliable and valid.

Questionnaire…

- **Question Types:**
  - An **open-ended question** asks the respondent to formulate his /her own answer.
    - **E.g., Why did you decide to stop taking your prescribed drugs?**
  - A **closed-ended question** has the respondent pick an answer from a given number of options.
    - **E.g., Have you ever taken the drugs? (yes/no)**
    - The response options for a closed-ended question should be exhaustive and mutually exclusive.

Questionnaire…

Question sequence

- Questions should flow:
  - logically from one to the next.
  - from the least sensitive to the most sensitive,
  - from factual to attitudinal,
  - from more general to more specific.

Question Construction

- **Develop an outline of the instrument's content**
  - ***Questions can be borrowed/adopted from other instruments
- **Carefully monitor the wording of each question**
  - for clarity, sensitivity to the respondents psychological and cultural state, freedom from bias and reading level
- **Sequence questions in a psychologically meaningful order that encourages cooperation and openness**
- **Review of draft instruments by peers and then pretest with a small sample of respondents**

Self administered questionnaire

- **Advantages:**
  - Questions are presented in a consistent manner
  - Easier to administer to large groups
  - Less costly to use than interviews
  - Structured questionnaires are easier to code and analyze
  - Possibility of anonymity
  - Lack of interviewer bias

Interviewer administered questionnaire

Structured interviews:

- The questions that the interviewer is to ask are designed and written before the interview
- Every subject is asked the same questions in the same way

Interviewer administered questionnaire

Advantages

- Higher response rates
- Appropriate for more diverse audiences
- Opportunities to clarify questions or to determine comprehension
- Opportunity to collect supplementary data through observation

Questionnaire…

Ways to reduce biases

- Counterbalancing positively and negatively worded statements
- Developing sensitively worded questions
- Creating a permissive, non judgmental atmosphere
- Guaranteeing confidentiality of responses

Observation

- Observation is a technique for collecting data through visual observation of events.
- It requires the nature of the data to be observable.
- Structured observation of pre-specified behaviors
- The method of data collection chosen for a study should be appropriate for the type of information required

Biophysiologic Measures

- **In vivo measurements:** Performed directly within or on living organisms (e.g., blood pressure measures)
- **In vitro measurements:** Performed outside the organism's body (e.g., urinalysis)

Reading Assignments

- Please, refer your Health education course:
- Qualitative Data Collection Techniques:
  - Observation (Participant Vs. Non-participant)
  - In-depth Interview
  - FGD

Data Quality Assurance

- Refers to the Validity and Reliability of a measuring Instrument
- **Validity**: Determination of the extent that an instrument actually reflects what it is supposed to measure.
- Internal and External validity???
- **Reliability**: is the consistency of measurement results across persons, occasions, locations and instruments

9. Data processing and analysis

- Things to be considered in this section
  - What to do for the data after collection
  - Processing data:
    - Editing data
    - Coding data
    - Verifying coded data
    - Analyzing data by SPSS or other statistical software applications
    - Displaying data (charts, diagrams, tables)

Analysis of data

- What type of analysis you will calculate
  - Descriptive
  - Analysis
  - Both
- What type of test statistics/model you will be used
  - Z- test, T-test, X^2- test etc
- How to analyze your data
- How to present your data

10. Ethics in Research

- Ethical issues relating to research participants (their consent, incentives, sensitive information, harm to participants etc).

- Ethical issues relating to the researcher (avoiding bias, using appropriate research methodology, correct reporting etc).

Why is research ethics important?

- **Promote the aims of research**,
  - such as knowledge, truth, and avoidance of error.
- Promote the **values that are essential to collaborative work**, such as
  - trust, accountability, mutual respect, and fairness.

Why is research ethics important…

- help to ensure that researchers can be held **accountable to the public**.
- Promote a variety of other important **moral and social values**, such as
  - social responsibility,
  - human rights,
  - animal welfare,
  - compliance with the law, and
  - health and safety.

Basic Principles of Research ethics when dealing with human participants

Four basic ethical principles

- Respect for persons,
- Beneficence and
- Justice.
- Respect for communities

Pre test

- ***Components to be assessed during the pre-test?***
  - The reactions of respondents to:
    - The research procedures and
    - Questions related to sensitive issues.
  - The appropriateness of format and wording of questionnaires and the accuracy of the translations.
  - The time needed to carry out interviews, observations or measurements.

UNIT – 7

WORK PLAN AND BUDGET

7) Work Plan and Budget

A) Work Plan

A WORK PLAN is a schedule that summarizes the different components of a research project and how they will be implemented in a coherent way within a specific time-span. It may include:

- ► The tasks to be performed;
- ► When and where the tasks will be performed; and
- ► Who will perform the tasks and the time each person will spend on them.

♣ Work plan could be presented in different forms, such as GANTT chart.

♣ A GANTT chart is a planning tool that depicts the **order** in which various **tasks must be completed** and the **duration of each activity.**

♣ The length of each task is shown by a bar that extends over the number of days, weeks or months the task is expected to take.

1

Work Plan and Budget

How can a work plan be used?

A work plan can serve as:

- A tool for planning the details of the project activities and drafting a budget.
- A visual outline or illustration of the sequence of project operations. It can facilitate presentations and negotiations concerning the project with government authorities and other funding agencies.
- A management tool for the Team Leader and members of the research team, showing what tasks and activities are planned, their timing, and when various staff members will be involved in various tasks.
- A tool for monitoring and evaluation, when the current status of the project is compared to what had been foreseen in the work plan.

Example of a GANTT Chart

		Responsibility	Month 1	Month 2	Month 3	Month 4	Month 5
1.	Prepare proposal and submit to donors	PI					
2.	Obtain fund and discuss arrangement with local government	PI					
3.	Preparation of study tool	PI					
4.	Prepare for field Work	PI``					
5.	Travel to data collection site	PI					
6.	Select data collectors and research assistants	PI					
7.	Conducting training for data collectors and supervisors	PI					
8.	Pre-testing of the survey instrument	PI+RA+DC					
9.	Data collocation	PI+RA+DC					
10.	Data entry and cleaning	PI+RA+DEC					
11.	Data analysis and write up	PI					
12.	Prepare workshop on findings	PI+RA					
13.	Hold workshop	PI+RA					

P.I. = Principal Investigator
R.A. = Research Assistant
D.C. = Data Collectors
DEC = Data entry clerk

Work plan

Activity	Time frame in weeks											
	May Wk1	May Wk2	May Wk3	May Wk4	June Wk 1	June Wk2	June Wk3	June Wk4	July Wk1	July Wk2	July Wk3	July Wk4
Proposal writing												
Permission												
Pretest												
Data collection												
Data entry												
Data analysis												
Write up												

Work Plan and Budget

B) Budget

Why do we need to design a budget?

- A detailed budget will help you to identify which **resources are already locally available and which additional resources may be required**.
- The process of budget design will encourage you to consider aspects of the work plan you have not thought about before and will serve as a useful reminder of activities planned, as your research gets underway.

How should a budget be prepared?

- It is necessary to use the **work plan as a starting point**. Specify, for each activity in the work plan, what resources are required. Determine for each resource needed the **unit cost** and the **total cost**.
- The budget for the fieldwork component of the work plan will include funds for **personnel, transport and supplies**.
- Note that UNIT COST (e.g., perdiem or cost of petrol per km), the MULTIPLYING FACTOR (number of days), and TOTAL COST are required for all budget categories.

Work Plan and Budget

Budget justification

- It is not sufficient to present a budget without explanation.
- The budget justification follows the budget as an explanatory note justifying briefly, in the context of the proposal, why the various items in the budget are required.
- Make sure you give **clear explanations** concerning why **items that may seem questionable** or that are particularly costly are needed and discuss how **complicated expenses have been calculated.**
- If a strong budget justification has been prepared, it is less likely that essential items will be cut during proposal review.

Example of a budget proposal

	Budget Category	Unit Cost	Multiplying factor	Total Cost (Birr)
1.	Personnel	Daily Wage (including per diem)	Number of staff days (Number of staff x Number of working days)	
	Principal investigator	300	1x15	4,500.00
	Supervisors	300	2 x 15	9,000.00
	Data collectors	150	10 x 15	22,500.00
	Data entry clerk	100	1x 20	2000.00
	Secretarial work	100	1x20	2000.00
	Sub total		**Personnel TOTAL**	**40,000.00**
2.	Transport	Cost per km	Number of km	
			(no. vehicles x no. days x no. km)	
	Car	5 Birr	2 x 10 x 100 =2000	10,000.00
	Sub total		**Transport TOTAL**	**10,000.00**
3.	Supplies	Cost per Item	Number	
	Questionnaire duplication	10 Birr/Quest.	600	6,000.00
	Clip board	20	13	260.00
	Flip chart paper	5	50	250.00
	Pen	2.50	30	75.00
	Pencil	1.00	30	30.00
	Eraser	1.00	30	30.00
	Sharper	1.00	30	30.00
	Marker	20	12	240.00
	Transparency (pack)	300	1	300.00
	Printing paper (pack)	100	4	400.00
	Photocopying cost	1.00	500	500.00
	Printing and Binding	30	10	300.00
			Supplies TOTAL	**8,415.00**
4.	Training	Cost per item	Number of days	
	Hall rents	250	4	1,000.00
	Tea/coffee	10 Birr/participant/day (10x15)=150	4	600.00
			Training TOTAL	**1,600.00**
			Grand Total	**60,015.00**

Budget

SUMMARY OF FUNDS REQUESTED (RO)				
	Year 1	Year 2	Year 3	TOTAL
Capital Equipment		7500		7500
Recurrent Items	8000	6000	16000	30000
Use of University Facilities	1000	1000	1000	3000
Local Travel Costs	1000	1000	1000	3000
Publication Costs	500	500	2500	2600
Miscellaneous	2000	2000	2000	6000
TOTAL	12500	18000	22500	53000

UNIT - 8

Summary of the Major Components of a Research Proposal

Components of a Proposal

Title and cover page

Acknowledgment

Acronyms and Abbreviations

Table of contents

List of tables

List of figures

Summary

Components of a Proposal….

1. Introduction
2. Objective
3. Methods
4. Work plan
5. Budget
6. References
7. Annexes

Title of the Research

- A good title should be short, accurate, & concise.
- It should make the central objectives of the study clear to the reader.
- It is important to specify what population will be investigated, and where it will be conducted.
- It should be an informative summary of the paper.

Title…

- Select the words in a title carefully for clarity & accuracy.
- Long titles are unappealing to readers.
- However, shorter titles may not be sufficiently specific, and therefore not as informative.
- All important aspects of paper should figure in the title.

Title…

- A title should be a label, not a sentence.
- Pay attention to the association of words. Faulty word order may allow different interpretations – possibly changing the meaning.
- Free from jargon, overstatement.
- Abbreviation or acronym should be avoided.
- Title should consist of 12 to 15 words

Example

1. An Investigation of [delete-no added meaning] Hormone Secretion and Weight in Rats [A little vague- Which hormone? What effect on weight increased or decreased?]

2. Fat Rats: [catchy journalistic style] Are Their Hormones Different? [2 part title–commonly used in journals; relationship between obese rats & specific hormone not identified]

3. The Relationship of Luteinizing Hormone to Obesity in the Zucker Rat [Clear relationship & precise description]

Summary

Sub-components of the Summary section

- Background (Problem Statement)
- Objective
- Methods
- Work plan and total Budget

  - *Summary: Consists of about 250-300 words*
  - *Not more than one page*

Introduction

- Can be divided into 4 sections:
  - **Background**
  - **Statement of the problem**
  - **Literature review**
  - **Significance/Justification of the study**

Objectives

- A research objective summarizes what is to be achieved by the study.
  - **General**
  - **Specific objectives**

Methods

- **Study Design**
- **Study Area and Period**
- **Source and Study population**
- **Sample Size Determination and the Sampling Procedure**
- **Variables of the Study**
- **Operational Definition of Variables**
- **Data Collection Procedures**: data collection method, tool, collectors, where & when the data will be collected
- **Data Quality Control**
- **Data Processing and Analysis**: coding, entering, cleaning, storing, recoding (software to be used), statistical methods
- **Ethical Considerations**
- **Pre-test**
- **Dissemination of Result**

Work Plan

- Work plan summarizes (in a table, chart, graph) the various components of a research project and how they fit together. It includes:

1. Tasks to be performed
2. When the task will be performed
3. Who will perform the task including number of staff needed to perform the task

Work plan…

A work plan can serve as:

- A tool in planning the details of the project activities and later the project funds.
- The visual outline or illustration of the sequence of the project operations.

Work plan…

Ways of Presenting a work plan

- Work schedule
- GANNT chart
- PERT chart (**P**rogram **E**valuation **R**eview **T**echnique)

Budget

How should a budget be prepared?

- It is necessary to use the work plan as a starting point.
- Specify, for each activity in the work plan, what resources are required.
- Determine for each resource needed the **unit cost** and the **total cost**.
- The budget for the fieldwork component of the work plan will include funds for personnel, transport and supplies.

References

Methods of citations in preparing literature review:

A) Vancouver system

- This system have been adopted as standard by over 300 biomedical journals
- **For an article the following information should be noted:**

  Author(s)' Surname followed by initials. Title of article. *Name of Journal* Year; Volume(number): page numbers of article.

- **Example:** Louria D. Emerging- and re-emerging infections: The societal variables. *International Journal of Infectious Disease 1996; 1(2):59-62.*

References…

- **<u>For a book</u> the following information should be noted:**

- Author(s)' Surname followed by initials. *Title of book. Place: Publisher,* Year, Edition

- **Example:** Abramson J. *Survey methods in community medicine. Edinburgh:* Churchill Livingstone, 1990, 4th ed.

References...

- **<u>For a chapter in a book</u>, the reference can include:**
- Author(s) of chapter (Surname(s) followed by initials). Chapter title. In: Editor(s) of book, (Surname(s) followed by initials) (eds). *Title of book.* Place: Publisher, Year: Page numbers of chapter.

- **Example:** Todd J, Barongo L. Epidemiological methods. In: Ng'weshemi J**,** Boerma T, Bennett J, Schapink D (eds). *HIV prevention and AIDS care in Africa; A district level approach. Amsterdam: KIT Press, 1997: 51-68***.**

References...

- **For internet (Website), the reference can include:**

  Author(s) of surname(s) followed by initials (Name of organization). Title. Year. URL (Available at): hyperlink. Date of access.

❖ **The use of et al**

- et al is used when there are more than 6 authors.
- For example: Getaw W, Shambel W, Mohammed A, Asressie M, Abebe A, Kebede M, et al.

References...

B) the Harvard System

- *In other* journals and books it is common to put the year, between brackets, straight after the name of the author(s).
- Name of the author(s) (year). Title. Place of Publication: Publisher

Example:

– Abramson J (1990), 4th ed. *Survey methods in community medicine. Edinburgh:* Churchill Livingstone.

References…

- *There* are more systems in use for referencing to literature.
- Always carefully look what system is used in the journal you are submitting an article to and follow it systematically.

- When you use the **Vancouver system**, you will use consecutive numbers in the text to indicate your references. At the end you will then list your references in that order, using the format described above
- In Harvard System, put the surname of the author, year of publication and number(s) of page(s) referred to between brackets, (E.g. Shiva 1998:15-17). If this system of citation is used, the references at the end of the proposal, should be listed in **Alphabetical order.**

Annexes or Appendices

- Include in the appendices of your proposal any additional information you think might be helpful to a proposal reviewer.
- For example, include:
  - Biographical data on the principal investigator
  - Information sheet and The consent form
  - The data collection Instrument
  - Dummy tables
  - A copy of the approval from the Institutional Review Board.
  - Assurance of the investigator

UNIT – 9

WRITING RESEARCH REPORT/THESIS

Components of a Research Report

Preliminary sections:

- Title and Cover page
- Acknowledgment
- Acronyms and Abbreviations
- Table of contents
- List of Tables
- List of Figures
- Abstract

Main section:

1. Introduction
2. Objective
3. Methods
4. Results
5. Discussion
6. Conclusion
7. Recommendations
8. References
9. Annexes

8.3) Writing a research report

Conventionally, a report usually contains the following major components.

Title and cover page

- The cover page should contain the title, the names of the authors with their academic ranks and positions, the institution that is publishing the report, (e.g., Gondar College of Medicine and Health Sciences) and the month and year of publication.

- The title could consist of a challenging statement or question, followed by an informative subtitle covering the content of the study and indicating the area where the study was implemented.

Writing a research report

Acknowledgements

- It is good practice to thank those who supported you technically or **financially** in the design and implementation of your study. Also, your **employer who has allowed you to invest time in the study** and the respondents may be acknowledged.

- **Acknowledgements are usually placed right after the title page or at the end of the report, before the references.**

Writing a research report

Abstract (Summary)

The summary should be brief and informative. A reader who has been attracted by the title will usually look at the summary to decide whether the report is **worth reading**. The summary should be written only *after* the first or even the second draft of the report has been completed. It should contain:

— a very brief description of the problem
— the main objectives
— the place of study
— the methods used
— major findings
— conclusions followed by the major recommendations.

The summary will be the **first** (and for busy health decision makers most likely the **only**) part of your study that will be read. Therefore, its writing demands thorough reflection and is time consuming. **Several drafts may have to be made, each discussed by the research team as a whole.**

Writing a research report

Table of contents

A table of contents is essential. It provides the reader a quick overview of the major sections of your report, with page references, so that (s)he can go through the report in a different order or skip certain sections.

Writing a research report

List of tables, figures

If you have many tables or figures it is helpful to list these also, in a **'table of contents' type of format with page numbers.**

List of abbreviations (optional)

If abbreviations or acronyms are used in the report, these should be stated in full in the text the first time they are mentioned. If there are many, they should be listed in alphabetical order as well. **The list can be placed before the first chapter of the report**.

The table of contents and lists of tables, figures, abbreviations should be prepared last, as only then can you include the page numbers of all chapters and sub-sections in the table of contents. Then you can also finalise the numbering of figures and tables and include all abbreviations.

Writing a research report

I) Introduction

The introduction is a relatively easy part of the report. It should certainly contain some relevant (environmental/ administrative/ economic/ social) **background data about the country**, the **health status of the population**, and **health service data** which are related to the problem that has been studied (this could be taken from the proposal developed earlier).

Then the statement of the problem should follow, again revised from your research proposal with additional comments and relevant literature collected during the implementation of the study. It should contain a paragraph on what you hope(d) to achieve with the results of the study.

Global literature can be reviewed in the introduction to the statement of the problem if you have selected a problem of **global interest**. Otherwise, relevant literature from individual countries may follow as a separate literature review after the statement of the problem. **You can also introduce theoretical concepts or models that you have used in the analysis of your data** in a separate section after the statement of the problem.

Writing a research report

In short,

- ♣ Statement of the problem
- ♣ Literature review
- ♣ Significance of the study

- **Conceptual framework – gives an overall view of the interrelationship (interdependence) of variables**

Writing a research report

II) Objectives

- The general and specific objectives should be included as stated in the proposal.

- The objectives form the HEART of your study.

Writing a research report

III) Methods

The methods you followed for the collection of your data should be described in detail. The methods section should include a description of:

- The study type
- The study area and population (The Setting)
- Source population/ study population
- Inclusion & exclusion criteria
- Variables (dependent and independent variables)
- Operational definitions of variables
- The size of the sample(s), Sampling method(s)
- Data-collection techniques used for the different study populations; how the data were collected and by whom, etc.
- Validity / Reliability (Data quality assurance)
- Procedures used for data processing and analysis, including statistical tests (if applicable)
- Ethical considerations
- Pre-test

Writing a research report

- If you have deviated from the original study design presented in your research proposal, you should explain to what extent you did so and why.

- The consequences of this deviation for meeting certain objectives of your study should be indicated. If the quality of some of the data is weak, resulting in possible biases, this should be described as well under the heading '**limitations of the study'.**

Writing a research report

IV) Results

- Findings should be presented
- Tables and graphs could be used (should be well titled and captioned)
- The tables should be well constructed, and without anomalies such as percentages which do not add up to 100 percent
- Avoid too many decimal places
- Graphs should clarify and not complicate, and care should be taken that they do not mislead
- If appropriate statistical tests are used, the results should be included. P-values alone are not very helpful. Confidence intervals and the type of tests used should be indicated.

Writing a research report

V) Discussion

- The findings can now be discussed by objective or by cluster of related variables or themes, which should lead to conclusions and possible recommendations.
- The author interprets the findings. Care should be taken not to introduce new findings, i.e., findings not mentioned in the result section.
- The discussion may include findings from other related studies that support or contradict your own.
- Limitation of the study and generalizability of the finding should also be mentioned.

Writing a research report

VI) Conclusions and recommendations

- The conclusions and recommendations should follow logically from the discussion of the findings.

- The recommendations may be summarized according to the groups towards which they are directed, for example:

  - policy-makers,
  - health and health-related managers at district or lower level,
  - health and health-related staff who could implement the activities,
  - potential clients, and
  - the community at large.

The recommendations should take into consideration the local characteristics of the health system, constraints, feasibility and usefulness of the proposed solutions.

Writing a research report

VII) References

- The references in your text can be numbered in the sequence in which they appear in the report and then listed in this order in the list of references (Vancouver system).

- Another possibility is the Harvard system of listing in brackets the author's name(s) in the text followed by the date of the publication and page number, for example: (Shan 2000: 84).

  - In the list of references, the publications are then arranged in alphabetical order by the principal author's last name. You can choose either system as long as you use it consistently throughout the report.

Writing a research report

VII) References

- The Ethiopian Journal of Health development follows (accepts) the Vancouver style.

- Examples are given in the previous chapter.

Writing a research report

VIII) Annexes or appendices

- The annexes should contain any additional information needed to enable professionals to follow your research procedures and data analysis.

- Information that would be useful to special categories of readers but is not of interest to the average reader can be included in annexes as well.

Examples of information that can be presented in annexes are:

- tables referred to in the text but not included in order to keep the report short;
- lists of hospitals, districts, villages etc. that participated in the study;
- questionnaires or checklists used for data collection.

Many Thanks!!