COURSE: NURSING RESEARCH

CHAPTER II: DIFFERENT TYPES OF RESEARCH

1. Basic Research

Is research done with a purpose to expand human knowledge and not to create or invent something but to satisfy certain curiosity e.g. Research to find the genome of a housefly.

2. Operational research

It is research designed to solve practical problems in order to improve the human life condition.
It is not done just to acquire knowledge.
E.g. Research to find HIV or malaria vaccine; research to reduce waiting time at outpatient clinic.

3. Quantitative research

i. It involves taking measurements and using statistical tests to explain what is observed.
ii. Can be easily replicated (i.e. has high reliability),
iii. The study is based on larger sample size representative of the population
iv. The analysis of the results is much more objective.

3.1 The Common quantitative research techniques include:

i. Observation technique
ii. Experimentation
iii. Survey technique by:
    a) Face-to-face interview
    b) Self-administered questionnaire
    c) Telephone interview

4. Qualitative research

i. It involves a complete detailed description of a situation,
ii. Can not be easily replicated (i.e. has low reliability),
iii. The study sample is not representative of the population
iv. The analysis of the results is much more subjective.
v. It requires highly trained and experienced researcher to undertake it.

4.1.The most common qualitative research techniques include**:**

a) In-depth interview
b) Focus group (8-12 people)
c) Case -study
d) Pilot study

5. Cross-sectional research (i.e. study)

i. This is a study that is done once in a given period of time to establish the state of affairs at that particular time.
ii. Data are collected only once and not repeatedly.
iii. It depends on choosing a representative sample for the results to be generalized to the whole population.
iv. It measures exposure (e.g. blood group, social-economic status) and outcome (e.g. disease intensity) at the same time.
v. It measures association between exposure and outcome in terms of relative risk (RR).

Advantages of Cross-sectional studies

i. Quick and less expensive way to show connection between exposure and disease
ii. Can be useful for hypothesis generation
ii. Can be useful for health planning

Disadvantages of Cross-sectional studies

i. Association between exposure and diseases can be influenced by a number of biases (e.g. referral bias, survivorship bias)

Example: Cross-sectional survey to assess the prevalence of HIV among prisoners in Kigali.

6. Longitudinal Research (i.e. study)

- This is a study which takes place over a period of time involving repeated observations or examination of a set of study individuals (i.e. sample) at different points in time.
- A longitudinal study involves less than 20 *rounds* of observation (i.e. data collection)
- When the rounds of observations are 20 or more the research is called a Time Series study.

Example of a longitudinal study:

Study to assess sex behavioural change after health educational intervention among college students. Such a study may involve making observation (i.e. collecting data) more than once at different occasions over a period of time (months or years)

Advantages of longitudinal studies

i. Collects the information that represents the real situation.

Disadvantages of longitudinal studies

i. Demand a lot of resources of time, money, and personnel because they can take a long time
ii. Can be associated with fatigue (i.e. people being studied and researchers can lose interest after some time).

7. Prospective Study

A prospective study is a longitudinal study that collects information about the study subjects (i.e. sample) into the future.

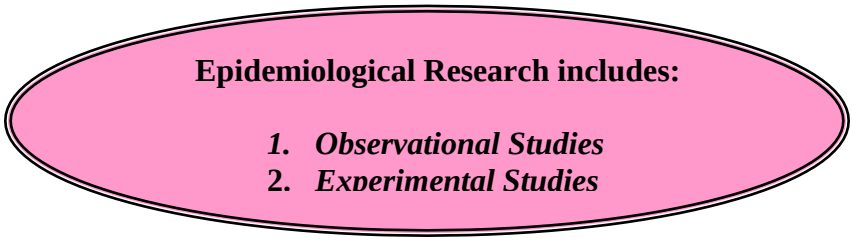
8. Retrospective Study

A retrospective study is a longitudinal study that collects information about the study subjects (i.e. sample) back into the past. It uses previous records about the subjects.

Both retrospective and prospective study methods can be applied in one study called Retrospective-Prospective study.

9. EPIDEMIOLOGICAL RESEARCH

Epidemiological research is research on the distribution and determinants of disease and different health related conditions and events in specific populations to obtain information to be used in the control of health problems. It comprises of two major categories of studies as shown in the figure below:



The table below shows the different types of epidemiological studies that can be Observational or Experimental.

TYPE OF STUDY	ALTERNATIVE NAME	UNIT OF STUDY
1. OBSERVATIONAL STUDIES		
1.1Descriptive studies		
i. Case Report		i. Individuals
ii. Case Series		ii. Individuals
iii. Community Health Status reports		iii. Individuals
1.2 Analytical Studies (Exploratory studies)		
i. Ecological Studies	i. Correlational studies	i.Populations
ii. Cross-sectional studies	ii. Prevalence studies	ii. Individuals
iii. Case-control studies	iii. Case-reference studies	iii. Individuals
iv. Cohort studies	iv. Follow-up studies	iv. Individuals
2. EXPERIMENTAL STUDIES		
i. Randomized clinical trial	i. Clinical trial	i. Patients
ii. Field Trials	Ii. Community Intervention studies	ii. Healthy people
Iii. Community Trials		iii. Healthy people

9.1 OBSERVATIONAL STUDIES

They examine associations between risk factors (i.e. exposure) and health outcomes.

i. They measure the state of health or disease as it is.
ii. Report the observation
iii. They are descriptive and/or exploratory
iv. They are not explanatory (i.e. not experimental to determine cause and effect).

9.1.1 Descriptive Studies

i. Descriptive studies portray the profile of events or people as it is.
ii. May be qualitative and/or quantitative
iii. Generate hypothesis

9.1.1.1 Case Report

This is a descriptive report of new or interesting observations based on a single case (i.e. one patient). *Example: The first case of HIV/AIDS was reported in 1981 as a case report.*

9.1.1.2 Case Series

This is a descriptive report of new or interesting observations based on more than one case (i.e. patient). *Example: Case series reports confirmed the presence of HIV/AIDS.*

Advantages of Case report or Case series

i. Quick dissemination of new observation
ii. To generate hypothesis

Disadvantages of Case report or Case series

i. No control or comparison group
ii. No cause-effect conclusion can be made.
iii. No measure of association with certain risk factors can be made.

9.1.1.3 Community Health Status Reports

i. They are based on routinely available data (e.g. from health facility), or
ii. They can obtain data by special survey.
iii. They do not analyze links (e.g. associations or correlations) between exposure (e.g. age, sex,occupation), and effect (i.e. outcome like disease or death) during a specified period.
iv. They may examine statistics on a certain disease for those ill or dead by age, sex, occupation.
v. They can be followed by analytical studies into the factors associated with observed situation.

9.1.2 Analytical Studies

i. They analyze data for links between exposure and outcome.
ii. Test hypothesis

9.1.2.1 Ecological Studies

They measure association in the form of correlation between exposure to a condition and development of an outcome (e.g. disease) in populations or groups of people.

This figure shows the following facts:
i. Occurrence of illness is related (correlated) to Age (i.e. Illness increases with age).
ii. In the Northern province there are more ill persons than in the Eastern province.

Advantages of Ecological studies

i. Use data collected for other purposes
ii. The study can be completed quickly and less expensively
iii. Useful for hypothesis testing

Disadvantages of Ecological studies

i. No individual data on exposure and outcome
ii. The data may be biased by chance e.g. getting data from one area only and not randomly.
iii. No cause-effect conclusion can be made.

9.1.2.2 Cross-Sectional Studies

Already described in Section 3.5 above.

9.1.2.3 Case-Control Studies

- They are longitudinal retrospective studies starting with cases (i.e. people confirmed to be having a disease or other outcome condition)
- They also start with another group of people confirmed not to have the disease to be studied. This group is called a CONTROL or comparison group.
- The cases and controls are usually matched for age, sex, and other demographic features.
- Large numbers are enrolled in both groups to compensate for possible later drop-outs.
- **Then** the study involves finding data on the previous (i.e. past) exposure (i.e. risk factors) for each individual.
- The data of the two groups are then compared to measure the association between exposure and outcome (e.g. disease confirmed at the beginning of the study).
- The measure of association is called Odds Ratio (i.e. OR).

e.g. **{**Sick Exposed/Sick Unexposed**}/{**Healthy exposed/Healthy unexposed**}**

Advantages of Case-Control Studies

i. If well designed can test a hypothesis of a rare disease most feasibly and economically.
ii. It gives a quicker answer about the association between exposure and disease
iii. If properly designed and done it will be used for the cause-effect (i.e. causal) conclusion.

Disadvantages of Case-control studies

ii. If not carefully designed various biases can disrupt the study results e.g. selection bias, participation bias, recall bias, survivorship.
iii. Not used to estimate the rate of disease in the community or group of people.

Example: After a case-control study about the relationship between smoking and development of lung cancer, it is possible to say that those who have lung

cancer **now** had smoked in the **past.** However, the results of this study do not necessarily imply that smoking was the cause of lung cancer.

Advantages of the Case-Control Studies

i. Can test hypothesis if well designed
ii. It is the most feasible and economic study for testing hypothesis about a rare disease.
iii. It gives a quick answer about the association between exposure and disease.
iv. If properly designed and done, it can be used for cause-effect inference (i.e. conclusion).

Disadvantage of case-control studies

i. If not properly designed, various biases can disrupt the study results, e.g. selection bias, survivorship bias, participation bias, and recall (i.e. remembering) bias.
ii. Cannot be used to estimate the rate of disease in the community or group of people.

9.1.2.4 Cohort Studies

- Also called follow-up studies into the future (i.e. prospective studies)
- They begin with a group of people (i.e. Cohort) that have **no disease** (or condition) to be studied.
- Then the people are divided into two subgroups of those **EXPOSED** and those **UNEXPOSED** to a possible cause of disease (e.g. smoking), or some protective factor (e.g. use of insecticide treated nets).
- The aspects (i.e. variables) to be studied are specified and measured at the beginning e.g. malaria illness and anaemia.
- Then the whole cohort is followed-up (i.e. observed) for a period of time (e.g. months or years), to see how subsequent development of disease (or other condition) i.e. (outcome) differs between the subgroups with exposure (e.g. treated nets) and without exposure.
- In Cohort studies the exposure (e.g. treated net, smoking) **is not** introduced by the investigator but by the study subjects (i.e. studied persons) themselves, e.g.
    i. Use or non use of treated net
    ii. smoking or not smoking;
    iii. use or non-use of contraceptive (or condom)
    iv. genetics/biology of study subject (i.e. male or female, presence or absence of sickle cell anaemia)
    v. Circumstances (living in a poor rural area or in a large city).
- Each person (i.e. study subject) is followed-up until any of the following happens:
    i. The person develops a health problem (or condition) being studied.
    ii. The person dies.
    iii. The study ends
    iv. The study subjects are lost to follow-up.
- The measure of Association is **Relative Risk (RR).**

Example: After a Cohort study about the relationship between smoking and development of lung cancer, it is possible to say that those who have lung cancer **now**

smoked during the study period**.** However, the results of this study do not necessarily imply that smoking was the cause of lung cancer.

Advantages of Cohort Studies

i. Exposure is measured before disease outcome and so no problem of forgetting the type of exposure someone experienced.
ii. Incidence rate can be estimated, because the study takes a long time to complete
iii. It is the only observational study that allows the calculation of disease rate.

Disadvantages of Cohort Studies

i. They are expensive as it takes as a long time to get outcome.
ii. It cannot quickly test new hypothesis about a new exposure e.g. new drug.

9.2 EXPERIMENTAL STUDIES (or Intervention Studies)

Features of an Experimental Studies include the following:

i. The investigator determines (manipulates) the exposure status of each participant. *Examples of exposure*: Use of insecticide treated bednets, use of contraceptives, or testing a new drug.

ii. There are separate intervention group and comparison (i.e. control) group.

iii. There is random allocation of study subjects into intervention group and comparison (i.e. control) group.

ii. The effect of the exposure (i.e. intervention) is measured by comparing the outcome (e.g. treatment) in the intervention group (i.e. treatment group) and that in the comparison group (i.e. control group). Random allocation of subjects eliminates the effect of confounding variables (i.e. factors that are not part of the main focus of the study) known or unkown since they are distributed equally in the intervention and comparison groups.

iii. In health research, experiments are often used to evaluate a new clinical therapy (e.g. drugs) or preventive tool (e.g. vaccine, insecticide treated bednets, or contraceptive).

iv. The ethical issues must be observed carefully e.g.
   a. No person should be denied appropriate treatment (if available) as a result of participation in the experiment.
   b. The intervention/treatment (e.g. drug or vaccine) must be acceptable according to the knowledge currently available.
   c. Experimental studies to find out Risk Factors are ethically ***UNACCEPTABLE***. E.g. A study to find out the effect of passive smoking (i.e. inhaling smoke from the smoker) on birth weight would not randomly assign expectant mothers to environments where they would or would not be exposed to cigarette smoke! Cohort study (observational) design may be used.

Types of Experimental (i.e. Intervention Studies)

1. Randomized Controlled Trial (or Randomized Controlled Clinical Trial)
2. Field Trial
3. Community Trial (or Community Intervention).

9.2.1 Randomized Controlled Trial (or Randomized Controlled Clinical Trial)

This is a trial to study new treatment or preventive measure in which study subjects (i.e. people) are ***randomly allocated*** to the experimental (i.e. intervention) group and a comparison (i.e. control) group.

Features of a Randomized Controlled Trial:

i. They involve people who are ill.
ii. Random allocation of study subjects to intervention and comparison group to reduce bias.
iii. The random allocation of persons to experimental and comparison (i.e. control) groups can be:
   a) Single blind: The study subjects (i.e. persons) do not know which group is treated or which is not, but the researcher knows.
   b) Double blind: Neither the study subjects nor the researcher knows which group is treated and which is not. It is an independent clinical committee that knows the allocation to treatment.

iii. If a placebo (i.e. something resembling medicine but having no medicine) is given to the comparison group, the study is called "*Randomized single blind placebo controlled trial*" or "*Randomized double blind placebo controlled trial*".
iv. The safety and data monitoring committee is set up to monitor the adverse effects.
v. Both the study groups are followed up over a period of time for disease outcomes, which are then compared in the two groups.

Advantages of Randomized controlled trial:

i. The exposure (e.g. drug) is tightly controlled.
ii. Random allocation reduces confounding factors due to bias.

Disadvantages of Randomized controlled trial:

i. Study subjects that agreed to participate may not be representative of the population of interest.
ii. Design and implementation may be complex
iii. It can be expensive.

9.2.2 FIELD TRIALS

- Generally, these are studies that involve people who are not ill (unlike randomized controlled trials) to assess the effect of certain interventions on improving the health of the population. However, control of certain diseases e.g. tuberculosis and leprosy can also be studied in field trials whereby the cases have to be found, treated, and followed up for further treatment at home.
- The study subjects are not admitted to a health facility, but are out "in the field" i.e. at home.

  Examples of field trials include studies on:

  i. Preventive treatment i.e. prophylaxis e.g. iodized salt; use of fluoride in water to prevent dental carries.
  ii. Vaccines for disease prevention
  iii. Vector control

iv. Testing of diagnostic tests
v. Education intervention for behavioral change
vi. Environmental alteration e.g. building of latrines.

- *Problem with field trials is that they tend to be expensive*.

9.2.3 COMMUNITY TRIALS

- These are studies based on the whole community rather than individuals.
- They are most appropriate for diseases that are influenced by socioeconomic conditions. E.g. Hygiene and sanitation intervention studies have to involve the whole community.

9.2.4 STUDY DESIGNS IN EXPERIMENTAL STUDIES

A study design is the plan of the study (i.e. research) showing the number of groups to be studied and the timing of data collection (i.e. when observation, and/or intervention will be done).

10. ACTION RESEARCH

Action research or participatory action research is a research initiated to solve an immediate problem or a reflective process of progressive problem solving led by individuals working with others in teams or as part of a "community of practice" to improve the way they address issues and solve problems. Action research involves the process of actively participating in an organization change situation whilst conducting research.

11. EVALUATIVE RESEARCH

Evaluative research is a research undertaken to see whether a program or activity is meeting or has met the objectives set for it.

➢ SELECTION OF A STUDY DESIGN

The selection of an appropriate research design depends on:
i. the state of knowledge about the problem
ii. the nature of the problem and its environment
iii. the resources available for the research
iv. the ingenuity and creativity of the researcher

➢ VALIDITY AND RELIABILITY OF THE RESULTS OF THE STUDY

- **Validity** of the results of the study is their accurateness (i.e. authenticity) due to measuring or observing of what was supposed to be measured or observed according to the objectives of the study.
- **Reliability (i.e. repeatability)** of the results of the study is the ability to get similar results when the study is done again using similar methodology.
- All conclusions made must be valid (i.e. authentic) and reliable (i.e. repeatable)

- **<u>Ways to increase validity and reliability of the results:</u>**
  i. **Triangulation of methods:** Using different research techniques in the same study.
  ii. **Using a Control Group:** Observing a control group that is not exposed to the factor being studied or to an intervention reduces threats due to unexpected and confounding (i.e. confusing) factors.
  iii. **Using appropriate sampling procedures and assignment of subjects to research groups.** This reduces threats due to selectivity bias which tends include more of certain types of study units (e.g. smokers) than the others (e.g. non-smokers).
  iv. **Using Before and after measurements**: It allows us to rule out variation due to different time periods.
  v. **Using Unobtrusive methods** of data collection and allowing adaptation time for subjects to get used to being observed or interviewed.
  vi. **Careful design and pre-testing** of instruments reduce bias due to instrumentation. Training of interviewers and standardization of interview techniques and tools such as questionnaires are also important in reducing this bias.
  vii. **Knowledge of the environment of the events** enables the researcher to be sensitive to external events that could affect validity (i.e. history). Local key informants can contribute a lot to the increase in the validity of the study if they work with someone new and not familiar to the local situation.
  viii. **Using Stratification and matching** to control for confounding variables (i.e. factors) during the analysis of the results. Stratification is separating the study units (e.g. people) into different categories like males and females and analyze data separately. Matching is the use of very similar study units (e.g. age, residential area, etc) for comparison.