Methodology in Research

Dr. Shamima Choudhury

MBBS, MPH (Community Medicine),
MPhil (Epidemiology and Biostatistics)

Assistant Professor

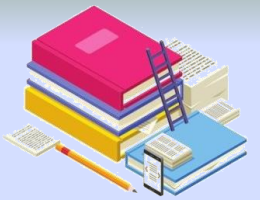
Dept. of Community Medicine

Member Secretary

Research Cell

Green Life Medical College

Things to be discussed



- **Meaning** of Methodology
- Methods **vs.** Methodology
- **Importance** of Research Methodology
- **Types** of Research Methodology
- Study **Design**
- Study **Period**, **Place** & **Population**
- **Sample size** & **Sampling technique**
- Common data collection **Methods** and **Instruments**
- Data **Analysis**
- **Limitation** of a study & **Ethical consideration**

Meaning of methodology

- Research methodology is a **way of explaining** how a researcher intends to carry out his research.

- A research methodology is the **blueprint** of a research or study.

[Ref: Murthy & Bhojanna, 2009, p. 32]

Methods vs. Methodology

Methods	Methodology
Methods are just behavior or tools used to select a research technique.	Methodology is analysis of all the methods and procedures of the investigation.
Methods are applied during the later stage of the research study.	Methodologies are applied during the initial stage of the research process.

Importance of Research Methodology

- Gives research legitimacy
- Provides scientifically sound findings
- Provides a detailed plan
- Allows researchers to document
- Allows the reader to understand the approach and methods

Importance of Research Methodology (Continued)

- Help other researchers who want to replicate the research
- Researchers who receive criticism can refer to the methodology and explain their approach

Types of Research Methodology

- **Qualitative**
- **Quantitative or**
- **Combination of the two**

Qualitative Research Methodology

- Use when the aims and objectives of the research are exploratory
- Involves collecting and analyzing written or spoken words and textual data
- Focus on body language or visual elements

Quantitative Research Methodology

- Use when the objective of the research is to test causal relationship or confirm something

- Focus on collecting, testing, measuring numerical data and testing of hypothesis

Choosing a research methodology

- Always start with research aims and objectives
- To take a step back and look at the big picture
- Asking question that the research is exploratory or confirmatory in nature

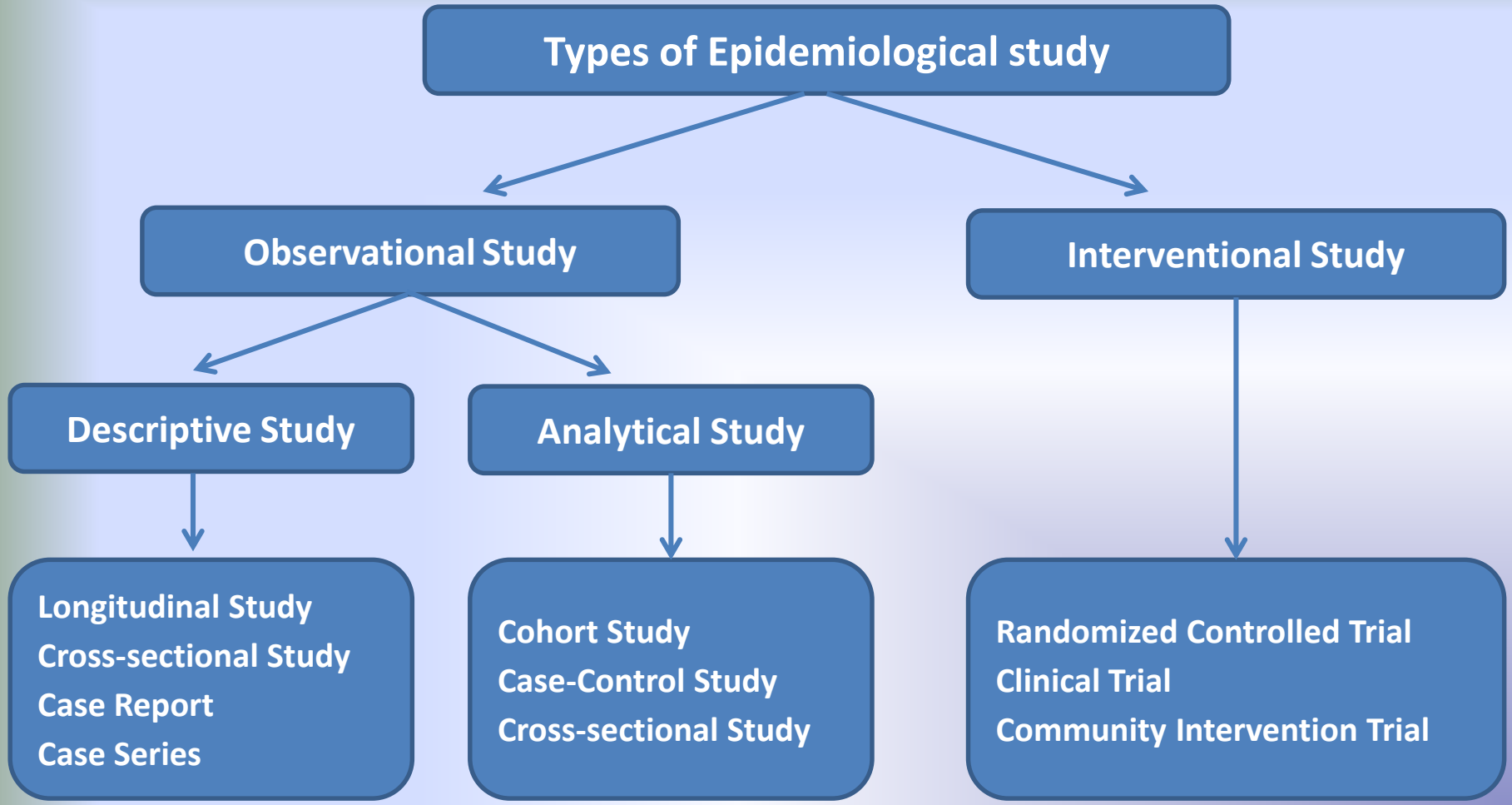
Choosing a research methodology (Continued)

- If the aims and objectives are primarily exploratory …… qualitative in nature

- If aims and objective are looking to measure or test something …… quantitative in nature

Study Design

- Ethical, economic and appropriate to the objective.
- Capable to obtain most reliable and valid data to avoid wrong conclusion.


Types of Epidemiological study
Observational Study
Interventional Study
Descriptive Study
Analytical Study
Longitudinal Study
Cross-sectional Study
Case Report
Case Series
Cohort Study
Case-Control Study
Cross-sectional Study
Randomized Controlled Trial
Clinical Trial
Community Intervention Trial

Study Place

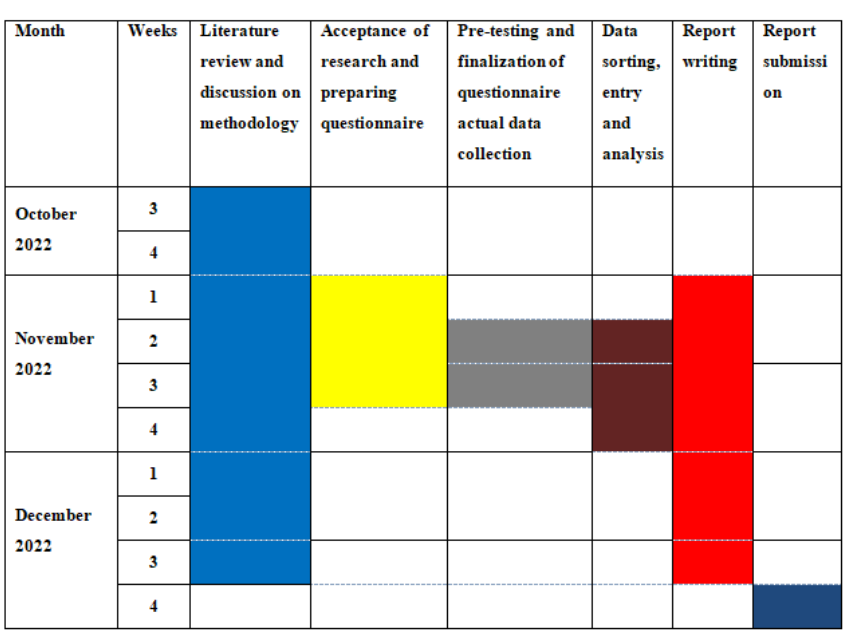
- **Geographically to focus on**
  - Basic administrative area
  - Particular hospital
  - Health facility
  - Neighborhood

Study Period

The period when the study is conducted from the

- preparation of outline
- review of literature
- data gathering
- conduct of survey

to writing of the manuscript



Month	Weeks	Literature review and discussion on methodology	Acceptance of research and preparing questionnaire	Pre-testing and finalization of questionnaire actual data collection	Data sorting, entry and analysis	Report writing	Report submission
October 2022	3						
	4						
November 2022	1						
	2						
	3						
	4						
December 2022	1						
	2						
	3						
	4						

Study population

- A well-defined collection of individuals or objects known to have similar characteristics

- Groups of individuals of interest in a particular study

e.g.: All doctors of Bangladesh, All private medical colleges etc.

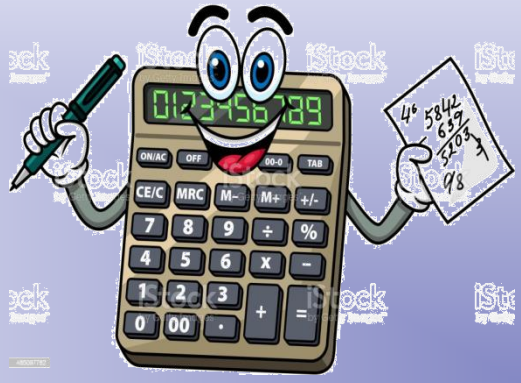
Sample Size Calculation (Continued)

- **Sample:** part or subset of population which represent the population describing the characteristics of that population

- **Sample size:** is defining the number of individuals included in a research study to represent a population.

Sample Size Calculation (Continued)

- To calculate sample size we usually prefer statistical formula
- Choice depends on statistical and practical consideration

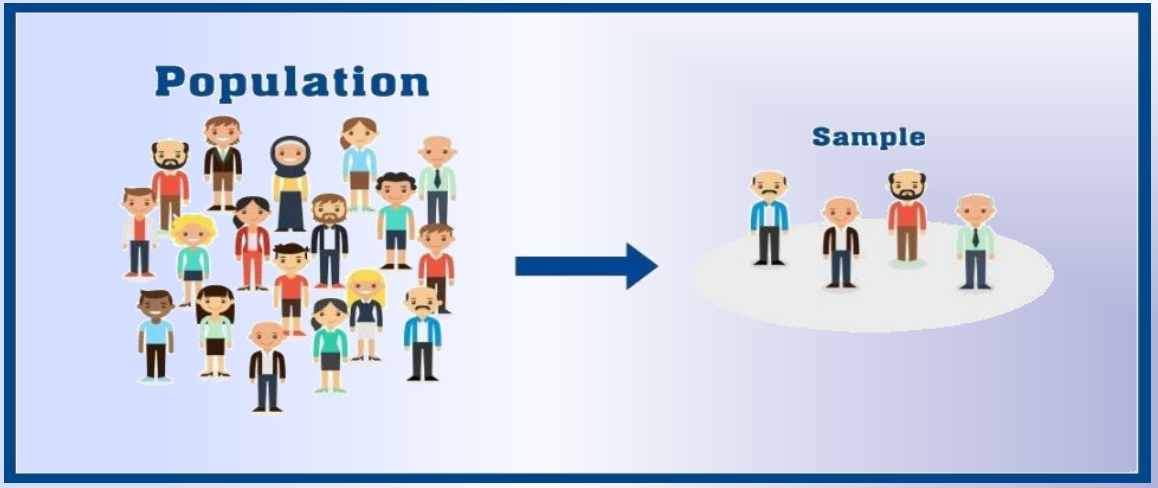


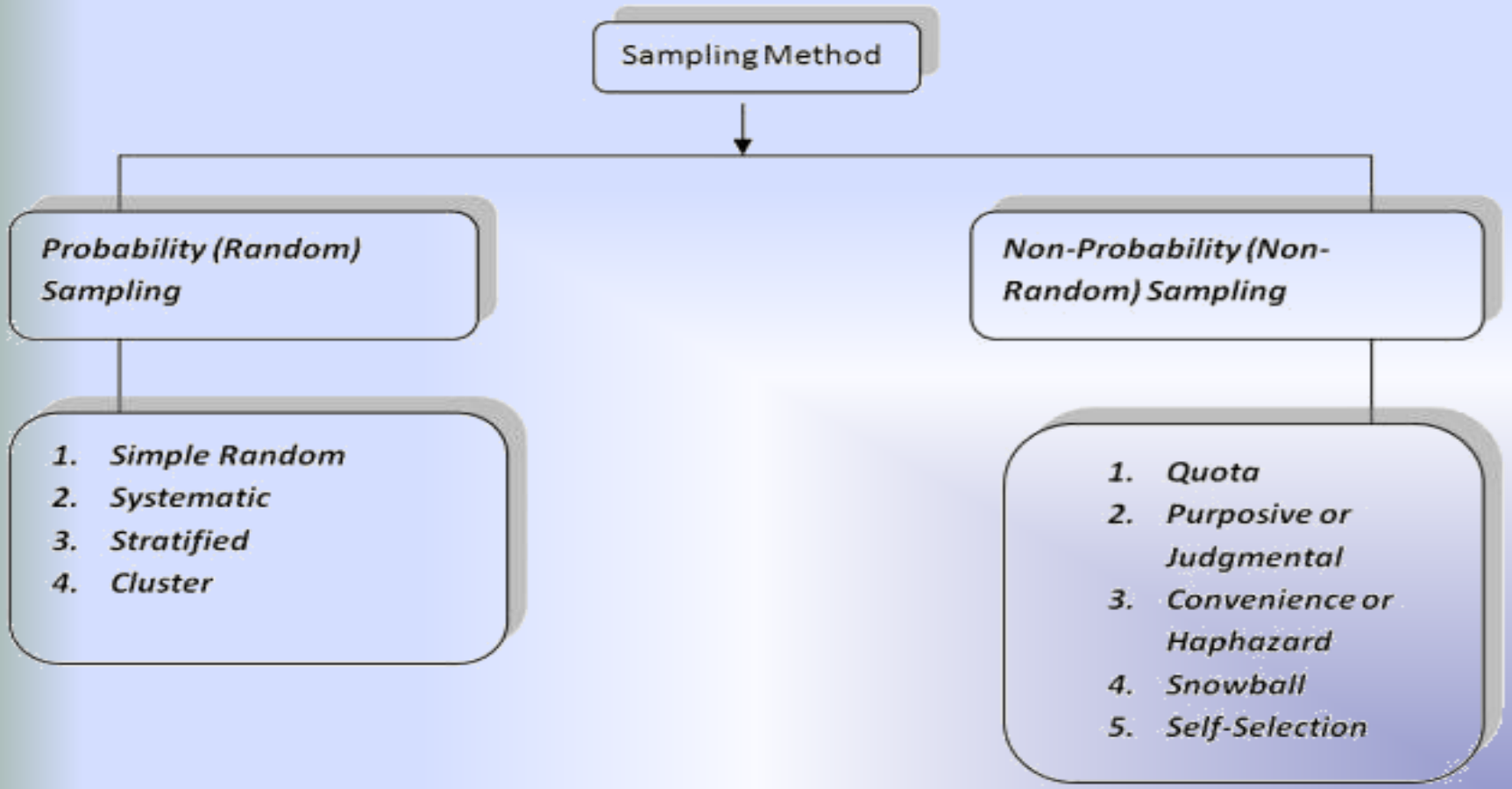
Sample Size Calculation (Continued)

- **To determine the sample size**
  - Find out the size of the population
  - Determine the margin of error (usually set as 0.05 maximum)
  - Set confidence level (at 5% level of significance, permissible error is 5% but confidence is 95%)
  - Predict expected variance
  - Finalize your sample size

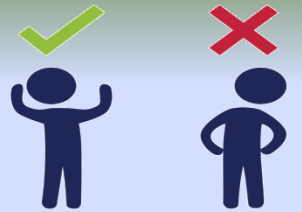
Sampling

- Process of selecting a sample from the population for study




Sampling Method
Probability (Random) Sampling
1. Simple Random
2. Systematic
3. Stratified
4. Cluster
Non-Probability (Non-Random) Sampling
1. Quota
2. Purposive or Judgmental
3. Convenience or Haphazard
4. Snowball
5. Self-Selection

Selection criteria



- **Inclusion criteria:**
- Identify the study population in a consistent, reliable, uniform and objective manner

  demographic,

  clinical and

  geographic characteristics

  e.g. age, gender, race, ethnicity, marital status, educational experience, language, type of occupation, physical activity and the presence of medical, psychosocial, or emotional conditions

Selection criteria

- **Exclusion criteria:**

The exclusion criteria include factors or characteristics that make the recruited population ineligible for the study.

e.g. Patients who are severely ill

Common data collection methods

Research Instrument

- Eyes and other senses
- Pen, paper, scale
- Microscope
- Rating scales
- Checklist
- Interview schedule
- Tape recorder
- Telephone set
- Questionnaire/ schedule
- Data collection sheet or recording form
- Likert scale

Data Analysis

- Is summarization of data and extraction of meanings or interferences from observed data

- Its purpose to interpret information and to generalize it to the target population

Data Analysis

(Continued)

- After collection of data, each questionnaire is checked for inconsistency

- Before compilation and processing, it is called raw data and is unlikely to show any information

Data Analysis

(Continued)

- **Data can be analyzed**
  - manually or
  - using computer based software- MS Excel or
  - statistical software named SPSS, Epi info etc.

Data Analysis

(Continued)

- **Qualitative research:**
  - Data analysis begins with data coding after which one (or more) analysis technique is applied.
  - Descriptive data are expressed by frequency & percentage (%).

- **Quantitative research:**
  - Descriptive statistics (e.g. expressed in means, medians, modes, mean ± SD)
  - Inferential statistics (e.g. correlation, regression, structural equation modeling)

Test of Hypothesis

- Statistical test used by researcher to determine whether null hypothesis is rejected in favor of alternative hypothesis

Choice of statistical test

Choice of statistical test depend on:

- **Study design:** paired design / unpaired design
- **Type of data collected:** qualitative / quantitative
- **Number of groups** used in study design
- **Nature of data distribution:** normal distribution / skewed distribution
- **Purpose of analysis:** comparison, association, prediction, correlation etc.

Choice of statistical test

(Continued)

- **To make difference between two groups**

Data type	Test for Unpaired design	Test for Paired design
Quantitative with normal distribution	Unpaired t-test,	Paired t-test
Quantitative with skewed distribution	Mann-Whitney U test, Wilcoxon rank sum test	Wilcoxon signed rank sum test, Sign test
Ordinal	Mann-Whitney U test, Wilcoxon rank sum test	Wilcoxon signed rank sum test
Nominal	Proportion test, X^2 test, Fisher exact test	Mc Nemar's test

Choice of statistical test

(Continued)

- **To make out difference among three or more groups**

Data type	Test for Unpaired design	Test for Paired design
Quantitative with normal distribution	One way ANOVA (F-test)	Repeated measure-ANOVA test
Quantitative with skewed distribution	Kruskall- wallis test	Friedman's test
Ordinal	Kruskall- wallis test	Friedman's test
Nominal	X^2 test	Cochran's Q test

Limitations of Research

- To address the limitations you have encountered during your research work

- If there were issues, you may encounter in the process indicate your reason why you still decide to use the methodology despite the risk

Limitations of Research

(Continued)

Example:

- Sampling by purposive type of non-probability technique
- The study was conducted in a single Upazilla of Bangladesh so caution should be taken regarding generalization of the study findings
- Time frame limitation

Ethical Considerations

- Nature of participation must be voluntary
- have the right to withdraw from the process
- must provide their consent first
- Privacy and anonymity of respondents

Ethical Considerations

(Continued)

- Avoid use of offensive, discriminatory or other unacceptable language
- Acknowledgement of works of other authors
- Maintenance of the highest level of objectivity

Where can I get an ethical research clearance?

- Institutional Review board for Data Collection
- Approval from the Ethics Committee must be obtained before research begin

Where can I get an ethical research clearance?

- **Scientific Review Committee** analyzes whether the research proposal is of good scientific quality and value.

- The **NREC** gives final ethical approval to research proposals

- **Bangladesh Medical Research Council (BMRC)** is the secretariat for the National Research Ethics Committee (NREC)

Where can I get an ethical research clearance?

- NREC has always been on the forefront to set the standards for ethics in **biomedical and health research**. Also vulnerable group like **pregnant women, adolescents and children**.

- New version of **'Ethical Guidelines for conducting Research Involving Human Subjects'**

Example

Research title: Access to Health Care Services of Rural Women in Dhamrai Upozilla of Bangladesh

3.1 Study design:

- This was a cross-sectional study, which was a descriptive type of observational study.

3.2 Period of study:

- The entire duration of the study was from January 2019 to March 2019; over a period of three (3) months.

3.3 Study place:

- The study was conducted in villages of Dhamrai Upazilla namely Barigaon, Keliya and Shuapur.

Example

(Continued)

3.4 Study population:

- The study was carried out on women of 18 years and above in rural areas of Dhamrai Upazilla.

3.5 Sample size: The sample size for the study was 523

- Calculated by 'formula of proportion' $n = \frac{z^2 pq}{d^2}$;
- Where, n = sample size,
- z = the standard normal distribution, usually set at 1.96 at 5% level which corresponds to 95% confidence level
- p = Proportion of the event: 74.6% or 0.746 [Reference]
- q = 1- p
- d = allowable error: 5% of p (0.0373),
- So, the sample size for this study was 523.2 = 523.

Example

(Continued)

3.6 Sampling technique:

- Purposive type of non-probability sampling was done to collect the required sample.

3.7 Research instrument:

- Semi-structured questionnaire was developed, pre-tested and then finalized before data collection.

3.8 Data collection technique:

- Data were collected by the researchers by face-to-face interviewing of women aged ≥ 18 years in Dhamrai Upazilla.

Example

(Continued)

3.9 Data analysis:

- After collection of data, each questionnaire was checked for inconsistency. Then the data were analyzed manually and some portions by using computer based software- MS Excel.

3.10 Ethical implications:

- Participants were informed that their identities would remain anonymous and that the participation would be voluntary. They were also informed that they could discontinue participation at any time during the study.

3.11 Limitations of the study:

Take home massage

- Research methodology is all about **how** a researcher **systematically designs a study**.

- **Considering factors:**
  - The research objective
  - Nature of the research
  - Sample size
  - Available Time
  - Significance of statistics

Take home massage

- Statistical test/methods used for **data analysis** with the rational for using the test
- **Avoid** including irrelevant details
- **Do not ignore** the problems you might encounter during the data gathering process.
- Give emphasis on **ethical consideration**

"A good researcher is the one who reduces the distance between imagination and reality."

— Prof. Dr. P.S. Jagadeesh Kumar

Thank You

For Keeping Our Research Running Smoothly

Questions & Answers

If you have any questions, please feel free to ask!


QUESTIONS
ANSWERS


Questions
?
?
Answers
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&
Q Q
A A