

Data Types in Research

Understanding Data for Effective Research

Md. Yunus Abedin

Data Management Assistant

Nutrition Research Division



Research



Data



Health

Presentation Outline

1



What is data and information

2



Data and its classification

3



Primary, Secondary, and Mixed Data

4



Qualitative vs Quantitative Data

5



Discrete vs Continuous Data

6



Scales of Measurement

7



Data Collection Methods

8



Data Quality and Validation

9



Ethical Considerations in Data Collection

What is Data and Information



Research

A **systematic investigation** to establish facts and reach new conclusions



Data Collection

The **foundation** of any scientific research



Understanding Data Types

Helps in choosing **appropriate analysis methods**

Data and Its Classification

How researchers organize and categorize information



By Source

- ✓ **Primary** - First-hand data
- ✓ **Secondary** - Existing data
- ✓ **Mixed** - Combined sources

Determines data collection approach



By Nature

- ✓ **Qualitative** - Descriptive
- ✓ **Quantitative** - Numerical
- ✓ **Discrete** - Countable
- ✓ **Continuous** - Measurable

Influences analysis methods



By Measurement

- ✓ **Nominal** - Categories
- ✓ **Ordinal** - Ordered ranks
- ✓ **Interval** - Equal intervals
- ✓ **Ratio** - True zero point

Determines statistical techniques

Primary, Secondary, and Mixed Data



Primary Data

- ✓ **First-hand** information
- ✓ Collected **specifically** for your research
- ✓ Provides **original insights**
- ✓ **Time-consuming** to collect

Collection Methods

Interviews

Surveys

Observations

Experiments



Secondary Data

- ✓ **Previously collected** by others
- ✓ **Saves time** and resources
- ✓ May **not perfectly match** research needs
- ✓ Requires **evaluation** of quality

Sources

Government Data

Academic Journals

Databases

Reports



Mixed Data

- ✓ **Combines** qualitative and quantitative
- ✓ Provides **comprehensive** analysis
- ✓ Offers **multiple perspectives**
- ✓ Requires **specialized** analysis methods

Research Designs

Sequential

Convergent

Embedded

Transformative

Qualitative vs Quantitative Data



Qualitative Data

Data that describes **qualities, characteristics, or attributes**. Answers questions like "What? Why? How?" instead of "How many?" or "How much?"

Collection Methods

Interviews Focus Groups Observations Case Studies

Document Analysis

Examples

Interview Transcripts Social Media Comments Photos

Videos Open-ended Survey Responses

VS



Quantitative Data

Numeric information that can be measured, counted, and analyzed statistically. Answers questions like "How many?", "How much?", "How often?"

Collection Methods

Surveys (Close-ended) Experiments

Observations (Numeric) Databases Official Statistics

Examples

Age Height Weight Exam Scores Income

Number of Customers

Discrete vs Continuous Data



Discrete Data

Countable, separate, and distinct values



- ✓ Represents **whole numbers**
- ✓ No fractions or decimals
- ✓ **Gaps exist** between values

Examples

Number of children

Number of cars

Number of students

Shoe size

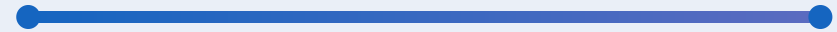
Population count

VS



Continuous Data

Measurable through measurement rather than counting



- ✓ **Infinite** possible values within a range
- ✓ Decimals/fractions are possible
- ✓ **No gaps** between values

Examples

Height of a person

Weight of a bag

Time taken to run

Temperature

Volume of liquid

Scales of Measurement

Nominal Data

1

Categories with **no intrinsic order**. Used for labeling variables without any quantitative value.

Σ Statistical Measures

Percentage

Proportion

Mode

Interval Data

3

Ordered data with **equal intervals** but no true zero point. Differences are meaningful but ratios are not.

Σ Statistical Measures

Mean

Median

Mode

Standard Deviation

Ordinal Data

2

Categories with a **specific order or rank**. The intervals between values are not necessarily equal.

Σ Statistical Measures

Frequency

Mode

Median

Ratio Data

4

Ordered data with **equal intervals and a true zero point**. Both differences and ratios are meaningful.

Σ Statistical Measures

All possible measures

Mean

Median

Mode

Standard Deviation

Ratios

Data Collection Methods

Process for Choosing the Right Method



Define Objectives

Clarify research questions and information needed



Consider Audience

Identify target population and accessibility



Assess Resources

Evaluate time, budget, and expertise available



Evaluate Methods

Compare advantages and limitations



Select & Implement

Choose suitable method and execute properly

Common Data Collection Methods



Surveys

Structured questionnaires designed to gather specific information from respondents



Interviews

Direct conversations with participants to gather detailed insights and perspectives



Observations

Systematic watching of behaviors and interactions in natural settings



Experiments

Controlled procedures that manipulate variables to establish cause-effect relationships



Focus Groups

Group discussions facilitated to explore collective views on specific topics



Existing Data

Using **previously collected** information from various sources for new research

Data Quality and Validation

Data Quality Dimensions



Accuracy

Degree to which data **correctly represents** real-world values



Completeness

Measure of **presence or absence** of required data attributes



Consistency

Uniformity of data across different datasets or systems



Timeliness

Availability of data when needed and how current it is



Validity

Conformity of data to **defined rules, formats, and standards**



Uniqueness

Absence of **duplicate records** or redundant data elements

Data Validation Process

1

Data Profiling

Examine data sources to understand **structure, content, and quality issues**

2

Validation Rules

Define and implement rules to check data **accuracy, completeness, and consistency**

3

Data Cleaning

Identify and **correct errors, inconsistencies, and missing values**

4

Monitoring

Continuously track data quality metrics and implement improvement processes

Ethical Considerations in Data Collection

Key Ethical Principles



Informed Consent

Voluntary agreement to participate with full understanding of risks and benefits



Privacy & Confidentiality

Protecting personal information and ensuring data is not disclosed without permission



Data Security

Measures to protect data from unauthorized access, use, or disclosure



Ethical Review Boards

Committees that review and monitor research involving human subjects



Responsible Data Sharing

Ethical practices for sharing research data while respecting privacy



Cultural Sensitivity

Respecting cultural differences and values when conducting research

Ethical Decision-Making Framework

1

Identify Ethical Issues

Recognize potential ethical concerns in data collection and management

2

Assess Risks & Benefits

Evaluate potential harms to participants against research benefits

3

Consult Guidelines

Review relevant ethical codes, regulations, and best practices

4

Implement Safeguards

Develop and apply measures to protect participants and data

5

Key Resources

Belmont Report, Declaration of Helsinki, CIOMS Guidelines, GDPR, HIPAA

THANK YOU

QUESTIONS & DISCUSSION



FEEDBACK



INSIGHTS



COLLABORATION