

What are, when and how to use quantitative methods?

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HOSPICE CASA SPERANȚEI
MAKING EVERY MOMENT COUNT

Aims

- Explore the core principles and processes in the application of quantitative research methods within health care.

Objectives

- Identify the main features of quantitative research
- Describe the process of developing quantitative research
- Introduce core concepts in understanding quant research
- Discuss the strengths and weaknesses of quantitative research on shaping clinical practice
- To apply learning with examples from practice



- Systematic investigation and study of materials and sources in order to establish facts and reach new conclusions – OED



Quantitative Research - Positivism

- Knowledge - gained through observation, including measurement, is trustworthy.
- Measurement - research findings are observable, quantifiable and verifiable
- Objectivity - the researcher distances themselves from personal values in conducting the study.



DEDUCTION

vs

INDUCTION

Theory
 ↓
Hypothesis
 ↓
Observation
 ↓
Confirmation



Theory
 ↑
Hypothesis
 ↑
Pattern
 ↑
Observation



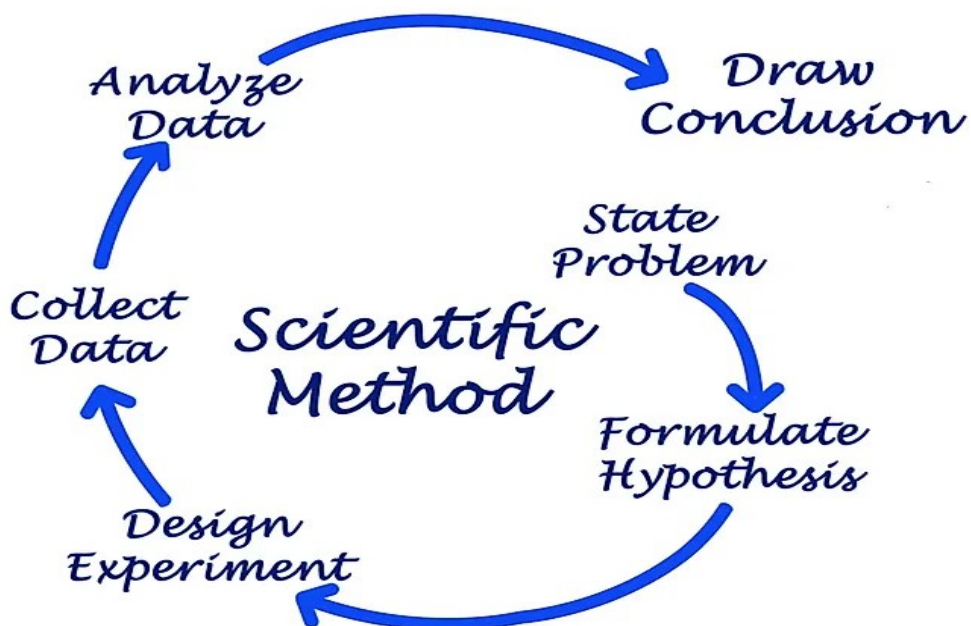
ARISTOTLE

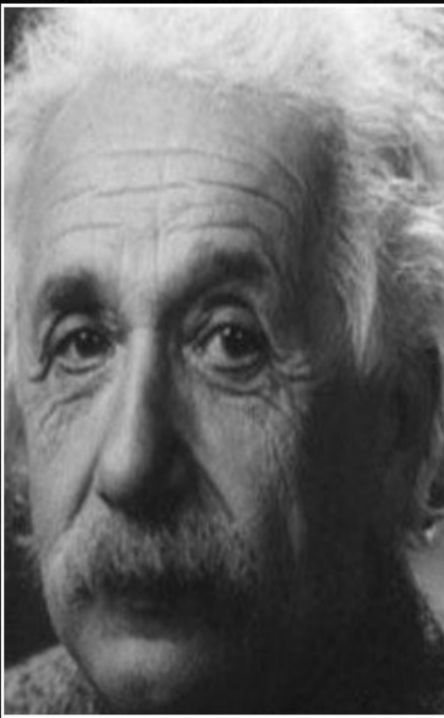


SHERLOCK

The Scientific Method

- Models, Theories and Hypotheses
- Development of Instruments and Methods for Measurement
- Experimental Control and Manipulation of Variables
- Collection of Empirical Data
- Approaches in the Analysis of Data





If I had an hour to solve a problem and my life depended on the solution, I would spend the first 55 minutes determining the proper question to ask, for once I know the proper question, I could solve the problem in less than five minutes.

— *Albert Einstein* —

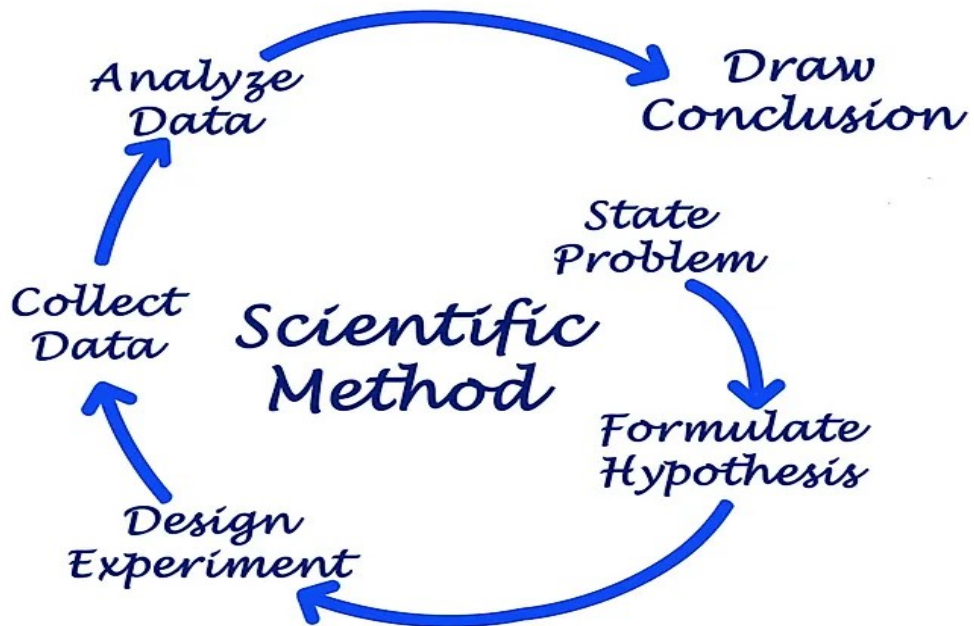
AZ QUOTES



Qualitative

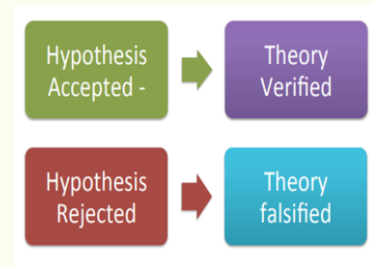


Quantitative

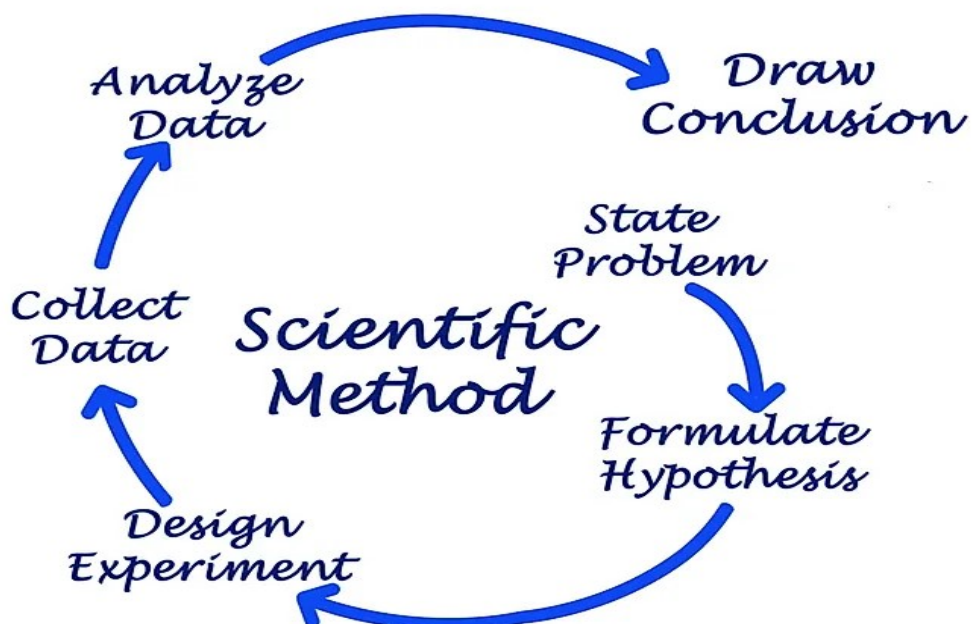


Why bother with null Hypothesis (Ho)?

- It is possible to provide evidence to falsify a statement
 - $p < 0.05$ = less than a 5% chance of seeing these results in the real world.
- It is not possible to provide all evidence to support a statement
 - All that is needed is one indication that it is false
- We can only reject Ho



Science does not prove anything?



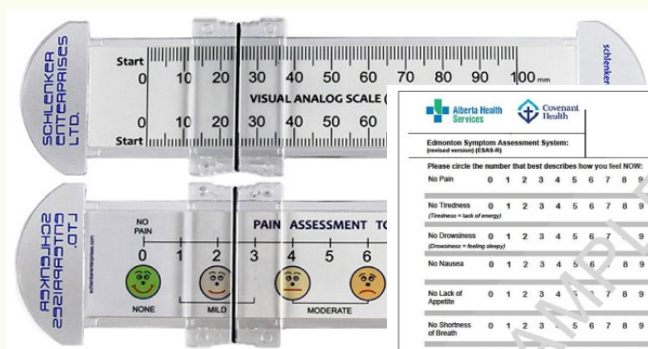
Selecting and Operationalising Variables

Independent
Variable



Dependent
Variable

Operationalisation: “Defining a variable so that it can be measured and understood by others”

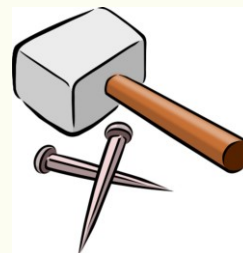


Edmonton Symptom Assessment System:
(revised version) (ESAS-R)

Please circle the number that best describes how you feel NOW:

No Pain	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Pain
No Tiredness (Tiredness = lack of energy)	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Tiredness
No Drowsiness (Drowsiness = feeling sleepy)	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Drowsiness
No Nausea	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Nausea
No Lack of Appetite	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Lack of Appetite
No Shortness of Breath	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Shortness of Breath
No Depression (Depression = feeling down)	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Depression
No Anxiety (Anxiety = feeling nervous)	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Anxiety
Best Wellbeing (Wellbeing = how you feel overall)	0 1 2 3 4 5 6 7 8 9 10	Worst Possible Wellbeing
No Other Problems (for example constipation)	0 1 2 3 4 5 6 7 8 9 10	Worst Possible

ESAS-R
Revised November 2010

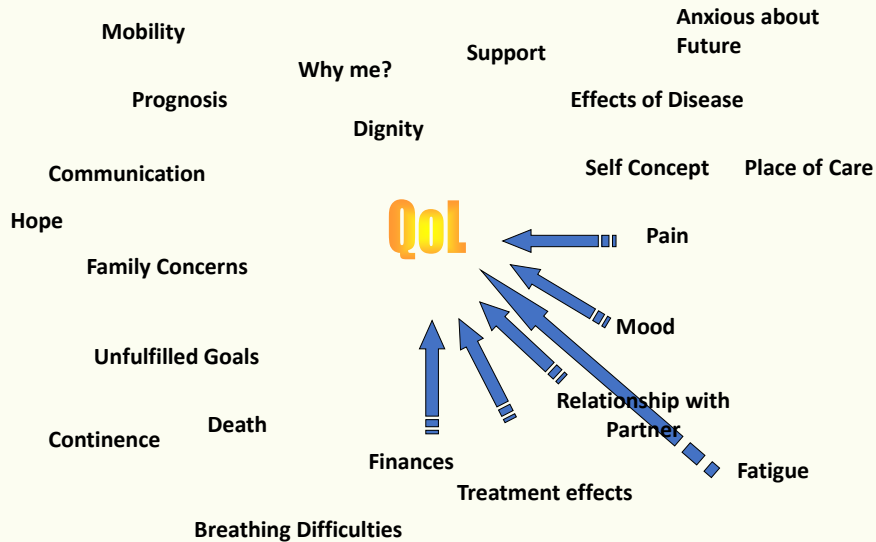


Types of Data

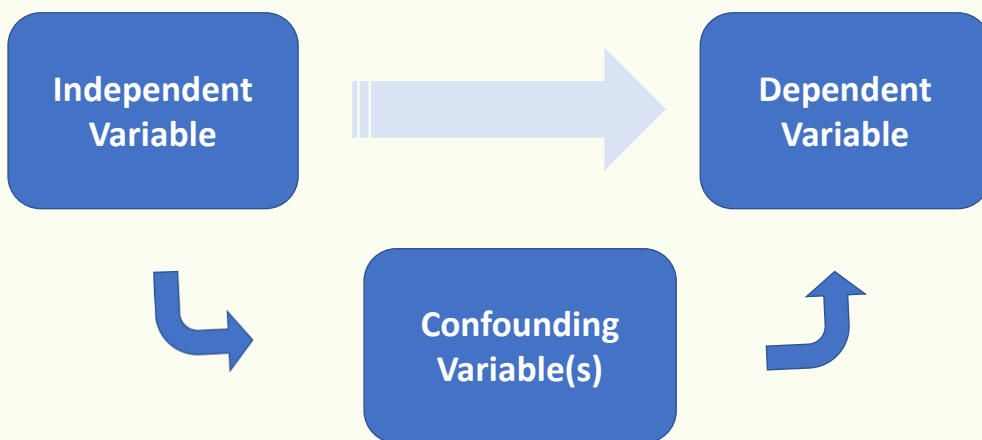
	Nominal	Ordinal	Interval	Ratio
Categorizes and labels variables	✓	✓	✓	✓
Ranks categories in order		✓	✓	✓
Has known, equal intervals			✓	✓
Has a true or meaningful zero				✓

Selecting and Operationalising Variables





Control and Confounding Variables

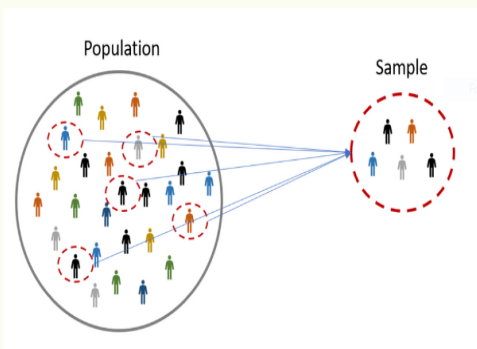


Measurements and Assessment Tools



- Validity - extent by which it measures what it was designed to measure
- Reliability - extent to which it consistently and accurately measures learning
- Pragmatics – is it practical

Sampling



- Define the population
- Select our sampling frame
- Sampling Methods
 - Probability – Random, Stratified
 - Non-Probability – Convenience, Snowball
- Determine Sample Size
 - Power & Generalisation

Data Collection and Analysis

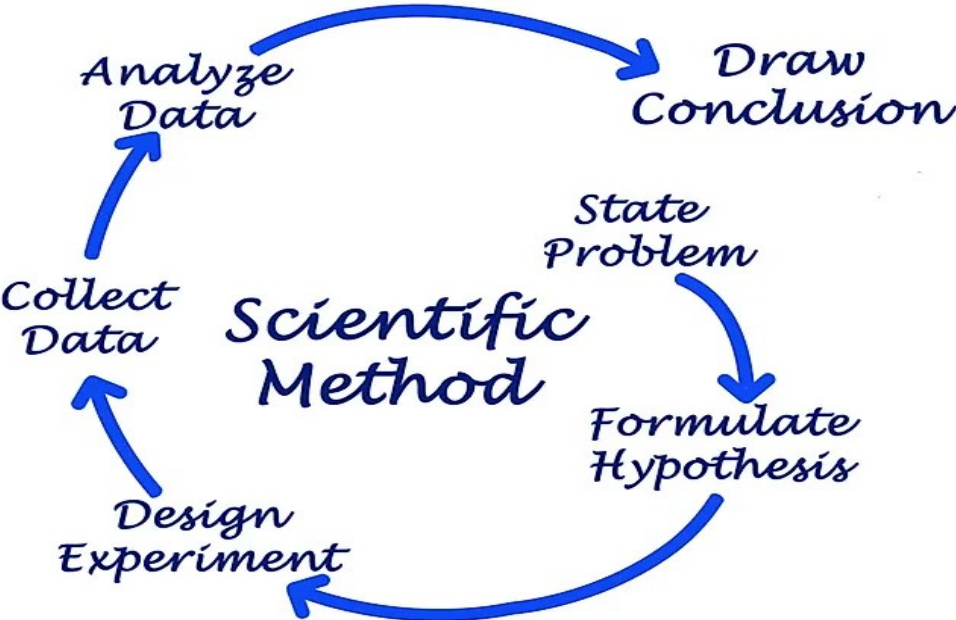


- Descriptive
 - Summaries, Patterns
- Inferential
 - Predictive, Causality, Probability testing



Types of Quantitative Design







Enhancing the QUALity and
Transparency Of health Research

 EQUATOR resources in
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Spanish

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Library for health research reporting

The Library contains a comprehensive searchable database of reporting guidelines and also links to other resources relevant to research reporting.

-  Search for reporting guidelines
-  Not sure which reporting guideline to use?
-  Reporting guidelines under development
-  Visit the library for more resources

Reporting guidelines for main study types

Randomised trials	CONSORT	Extensions
Observational studies	STROBE	Extensions
Systematic reviews	PRISMA	Extensions
Study protocols	SPRINT	PRISMA-P
Diagnostic/prognostic studies	STARQ	TRIPOD
Case reports	CARE	Extensions
Clinical practice guidelines	AGREE	RIGHT
Qualitative research	SRQR	COREQ
Animal pre-clinical studies	ARRIVE	
Quality improvement studies	SQUIRE	Extensions
Economic evaluations	CHEERS	

[See all 529 reporting guidelines](#)

STROBE Statement—checklist of items that should be included in reports of observational studies

Item No	Recommendation
Title and abstract	1 (a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction	
Background/rationale	2 Explain the scientific background and rationale for the investigation being reported
Objectives	3 State specific objectives, including any prespecified hypotheses
Methods	
Study design	4 Present key elements of study design early in the paper
Setting	5 Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6 (a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	7 Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/measurement	8* For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9 Describe any efforts to address potential sources of bias
Study size	10 Explain how the study size was arrived at

Key Characteristics

- Tends to be theory testing - Deductive
- Values detachment and impartiality (objectivity)
- Seeks to identify relationships between variables
- Generates broad, but 'shallow' data
- Seeks consensus, norms or general patterns
- Has a fixed method
- Measurement is key!

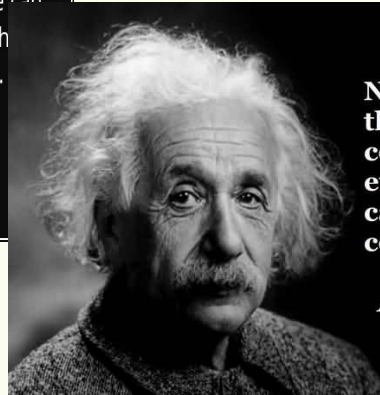




If it can't be expressed in figures, it is not science; it is opinion. It has long been known that one horse can run faster than another - but which one? Differences are crucial.

— Robert A. Heinlein —

AZ QUOTES



Not everything that counts can be counted, and not everything that can be counted counts.

Albert Einstein

THANK YOU

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