Methods & Tools of Data Collection

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Content to be covered…….

- Concepts of data collection
- Data sources, methods /techniques quantitative and qualitative.
- Tools for data collection – types, characteristics and their development
- Validity and reliability of tools

Data Collection

- Data- Piece of information about the phenomenon under study.

- Aim of gathering and summarizing the data- Transform data into meaningful information in order to identify and measure variables.

- An ideal data collection procedure should be clear, unbiased, reliable and valid.

Data Collection

- The 5 W's of data collection are:

  1. What data is to be collected?

  2. From whom data is to be collected?

  3. Who will collect data?

  4. From where the data will be collected?

  5. When is the data collected?

Data Collection Method

Primary Data collection method

- Involves data collection directly from the subjects by the researcher or trained data collector.

Data collected are specifically for the purpose of research e.g. Surveys, Interview, Observations etc

Secondary Data collection method

- It involves of use of the data that were collected for various purposes other than current research.
- Eg., diaries, nurses notes, care plans, patient medication record, statistical abstracts, census reports neither published or unpublished data

Primary Data

Advantage

- Tailored according to research needs
- The researcher can determine exactly what data will be collected and can identify the specific tools that will be used.
- Defined and consistent protocol
- Completeness of data is ensured.

Disadvantage

- Time consuming
- Rely on subjects recall and communication abilities
- Bias may occur due to various factors.
- Need to check reliability of raters.

Secondary Data

Advantage

- It is easier and quicker.
- Absence of researcher's biases.
- Economical and time saving
- Participant's co-operation may not be necessary & it eliminates the biases related to participant awareness.

Disadvantage

- Accuracy, completeness and reliability depend upon original individual collecting the data.
- May not be suitable for answering current research question.
- Missed data and inaccuracy are common.
- Biases are commonly expected

Tools & Methods of Data Collection

- **Tools**

    A device/ instrument used by the researcher to collect data **(**to measure the concept of interest **)**

- **Methods**

    Various steps or strategies used for gathering and analyzing data in a research

Types of Data Collection Methods

1. Self reports
   - Interview
     - Unstructured
     - Semi structured
     - Structured questionnaire
   - SAQ
2. Observational method.
3. Bio-physiologic measurements.
4. Psychometric measurements.
5. Other - projective technique.

Tools for Data Collection

- Self report:
  - Questionnaire, attitude scale, semantic differential scale, visual analog scale.

- Observation :
  - Rating scale, check list, anecdotal record, Process recording video tapes etc.,

- Bio physiological :
  - In-vitro
  - In-vivo

SELF-REPORTS

Self - Reports

- It is a method in which information is gathered by questioning people.

- By questioning, good amount of information can be gathered.

- Self - Reports
  - Interview methods.
  - Self administered questionnaire (SAQ) (or) paper and pencil test

Self-Reports

Qualitative Self-Reports

1. Unstructured Interviews
2. Semi-Structured Interviews
3. Focus Group Interviews
4. Joint Interviews
5. Life Histories
6. Oral Histories
7. Critical incidents
8. Diaries & Journals
9. The Think-Aloud Method
10. Photo Elicitation Interviews

Quantitative Self-Reports

1. Structured interview
2. Questioning
3. Scales
4. Q-Sorts
5. Vignettes

Qualitative Self-Reports

Interview

- Involves verbal communication between the researcher and the subject during which information is provided to the researcher.

- Interview is a conversation carried art with the definite purpose of obtaining certain information by means of spoken word.

- Most common method in qualitative and descriptive studies.

- Investigator collect data directly from the participants by having face to face contact, to obtain factual data about opinion, attitude etc.

Interview: Benefits

1. Provides in–depth and detailed information
2. Data from illiterate subjects
3. Higher Response
4. Clarify mis-understanding
5. Ask questions at several levels
6. Helps to gather supplementary information
7. Use of special devices
8. Accuracy can be checked
9. Flexible and adaptable

Types of Interview

1. Unstructured interview (non directive or non standardized)
2. Semi structured interview (or) focused interview
3. Completely structured interview

Unstructured Interview

- Characterized by a flexibility of approach to questioning.

- Interviewer freely asks the questions according to his own wish when required or omit the certain questions.

- Subjects are encouraged to talk freely and only very few questions asked to direct the trend of the interview.

- Researcher is having greater freedom to record or omit the responses.

- It may be also called as 'Grand Tour' technique.

Unstructured Interview

- Advantages

1. Information obtained in such a casual manner enhances reliability and credibility of data.

2. Explorative and qualitative studies

3. Less prone to interviewer biases.

4. "Probs" questions can be assuring additional information to clarify.

- Disadvantages

1. Interviewer requires great deal of knowledge and skill in order to analyse the data.

2. Information cannot be compared.

3. Analysis will be difficult.

4. Data interpretation based on researcher's perception and subjective feelings.

5. Time wasting.

Semi- structured Interview

- Used when researcher have a list of topics or broad questions that must be addressed in an interview

- Interviewer's make a topic guide/interview guide containing broad list of topics to be covered in an interview.

- Topic guide- A set of questions or list of topics

- Participants are assured to talk freely about the topic mention in topic guide.

- Researcher will ask questions to different ways to different participants.

- Includes both closed ended and open ended questions.

Semi- structured Interview

- Advantages
1. Less prone to interviewer's bias.
2. More information can be explored from the respondent's.
3. Needed data is collected.
4. Guides the interview.

- Disadvantages
1. Some of the information may not be revealed.
2. Need to prepare a topic guide.

Structured Interview

- It involves asking the same questions, in the same order, and in same manner of all respondents in a study.

- It commonly have fixed type, and closed ended questions.

- It also known as standardized interview.

- Interviewers are not permitted to change even specific wording also.

- It increases the reliability and credibility of data.

Structured Interview

- Advantages
1. Data of two interviews are easily comparable.
2. Recording, coding and analysis of data is easy.
3. Avoids irrelevant purposeless conversation.

- Disadvantages
1. In-depth information may not be possible.
2. Exploration of data is limited.
3. It may not cover all the possible responses or respondent views.

Focus – Group Interviews

- In this interviews, homogenous group of 5-10 people whose opinions and experiences are solicited simultaneously.

- The interviewer/ researcher guide the discussion according to written set of questions or topics.

- It is a planned discussion.

- Duration of the interview ranges from 1.5-2 hours.

- All the verbal & non-verbal information is recorded.

- Ample opportunity is given to respondents to express their views.

Focus – Group Interviews

- Advantages

1. Efficient and can generate a lot of information.
2. Stimulates new ideas and creative concepts
3. Involves many participants at one time.
4. Participants may feel comfortable to answer in a group with similar interests.

- Disadvantages

1. Chances of client or researcher's bias.
2. May be difficult to moderate by one person.
3. Data difficult to code, analyze and interpret.
4. Focus group may not be representative of entire population.

Joint Interviews

- They are conducted simultaneously to understand the phenomenon involving two or more parties. People involved in the interview are intimately related.
- *Example:* Experiences of AIDS patients and their caretakers.
- **Merits:**
1. Helpful in observing dynamics between two key actors.
- **De-merits:**
1. Only supplements information.
2. May be un-comfortable to participants as some things can not be discussed in front of other people.

Life Histories

- They are narrative self-disclosures about individual life experiences.
- Researchers ask respondents to provide, often in chronologic sequence, a narration of their ideas and experiences, either orally or writing.
- Life histories are usually done in the ethnographic studies.
- *Example:* A study involving experiences of women who had simultaneously experienced abuse and physical disability.

Critical Incidents

- It is a method of gathering information about people's behaviors by examining specific incidents relating to the behavior under investigation.
- The word 'critical' means that the incident must have had a positive or negative impact on some outcome.
- *Example:* A study involving the outcomes of stress management program. The 5-week program taught 'mind-body-spiritual' technique of silently repeating a mantra with spiritual meaning. 3-months later, critical incident interviews with 55 participants yielded 147 incidents involving application of the technique.

Diaries and Journals

- Personal diaries and journals provide an intimate and detailed description of person's everyday life.

- They can be unstructured or semi-structured.

- They provide information about how people prevent illness, maintain health, experience morbidity and treat health problems.

- They can be used for people with literacy skills and depend on high level of participant cooperation.

- *Example*: Older Adults with chronic health problems can be asked to maintain a diary over 2-week period for 15 mins per day to explore various strategies used by them to manage health problems.

Photo- Elicitation Interviews

- It involves an interview stimulated and guided by photographic images.
- Photographs of the participant's world are taken up by the researcher themselves or by the participants and become a stimulus for discussion.
- *Example:* In an attempt to explore meaning and experience of hope among young people living in Australia, participants can be given a disposable camera to take photos showing hope for them and then questioned during interviews.
- Participants need to be continually reassured that their taken-for granted explanations of the photos are providing new and detailed information.

Quantitative Self-Reports

Questioning

- This method allows the researcher to gather information by asking the questions orally (interview) or by means of a formal, written document (questionnaire).

- **<u>Questionnaire</u>** - is a structured instrument consisting of a series of questions prepared by researcher on a paper and that a subject is asked to complete either through pencil or through a computer and is used to gather data r/t phenomenon under study.

Questioning

- The instrument is called a SAQ when respondents complete the instrument themselves, usually in a paper & pencil format.

- SAQ also known as 'survey' .

- **Methods of Questionnaire Administration:**

1. Direct Administration-Researcher will distribute the questionnaire and respondent answer items by writing or checking against correct response.

2. Post or e-mail including all electronic means. (Mailed questionnaire)

Questionnaire: Types of Questions

- **Open-ended questions**
- Provide opportunity to the respondents to express their opinions and answers in their own way.
- No predetermined set of responses.
- Provide true, insightful and unexpected suggestions.

Example:

- What did you do when you discovered you had AIDS?

Questionnaire: Types of Questions

- **Closed-ended questions**

- Closed–ended questions or fixed-alternative questions- Response alternatives are pre-specified by the researcher.

- Facilitate easy statistical analysis.

- Can be asked to different groups at different intervals.

Questionnaire: Types of Questions

- **<u>Closed-ended questions</u>**
  1. Dichotomous Questions
  2. Multiple-choice Questions
  3. Cafeteria Questions
  4. Rank-order Questions
  5. Contingency Questions
  6. Rating Questions
  7. Likert Questions
  8. Bi-polar Questions
  9. Matrix Questions

Closed-ended questions: Types

1. <u>Dichotomous Questions</u>
- Require respondent to make choices between two responses such as
  - yes/no
  - male/female
2. <u>Multiple-choice Questions</u>
- Require respondents to make choice between two- or more than two response alternatives.
- Example:

Closed-ended questions: Types

3.   Cafeteria Question

• Requires respondents to select a best response that most closely corresponds to their views.

E.g. What do you think about hormone-replacement therapy (HRT) ?

A.   It is dangerous, should be avoided.

B.   One should be cautious while using it.

C.   I am uncertain about my views.

D.   It is beneficial, should be promoted.

Closed-ended questions: Types

4. Rank-Order Questions
- Requires respondents to rank their responses from most favorable to least favorable.
- E.g. What according to you is most important for your life?
  - Money ( )
  - Education ( )
  - Family ( )
  - Health ( )

5. Contingency Questions
- A next question is asked if a respondent gives a particular response to previous question only.
- E.g. Are you stressed?
  - No   Yes (If yes what are the reasons…………)

Closed-ended questions: Types

6. Rating Questions

- Requires respondents to judge something along an ordered dimension.

- Respondent is asked to rate a particular issue on a scale that ranges from poor to good. They may provide a number of choices.

- E.g.

Question	1	2	3	4
How do you rank a quality of education in India?	**Good**	**Fair**	**Poor**	**Very Poor**

Closed-ended questions: Types

7. Likert Questions

- Helps to know how strongly the respondent agrees with a particular statement thus helping to assess the feelings of the respondents towards certain issue.

- E.g.

Question	1	2	3	4	1
This community is a good place to raise children.	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

Closed-ended questions: Types

8. Matrix Questions

- Include multiple questions and identical response categories, placed one under the other, forming a matrix.

- E.g. Please let me know your weekly schedule of the following:

	Mon	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**	**Sun**
Gym	√	√	√	√	√		
Aerobics						√	
Eating Out						√	√
Drink						√	

Scales

- Scale is a device designed to assign a numeric score to people to place them on a continuum with respect to attributes being measured.

- Used to measure subjective variables objectively.

- Measuring the score between two opposite concepts tells about the attitude of a subject towards the direction of positive or negative attitude in a scale.

Scales: Types

Likert Scale

Semantic Differential Scale

Visual Analogue Scale

Likert Scale

- A Likert scale consists of several declarative items that express a view point on a topic.

- Respondents are asked to indicate the degree to which they agree or disagree with the the statement.

- Usually contains five degrees (but 3 - 7 may used).

- Developed using item analysis approach.

Likert Scale: Example

How do you personally evaluate the importance of the following aspects of coordinated care?

How important is......?	very important	important	so-so	less important	not important
The surgery hours of the doctor/service provider are flexible.	○	○	○	○	○
The doctor/service provider takes a proactive approach with me (far-sighted, preventative) and agrees check-up appointments or reminds me that an appointment is due.	○	○	○	○	○
My doctor/service provider is available around the clock in case of emergencies.	○	○	○	○	○
The health insurer actively supports me.	○	○	○	○	○

Likert Scale: Uses

- Measure the attitudes, values, and feelings of the people about specific concepts such as situations, people, places, objects, programs, practices, policies and so on.

- Quantified measurement of qualitative attributes.

- Assess opinions of the respondents about particular abstract concept.

Likert Scale

Advantages

1. Easy to construct
2. More reliable and valid tool to measure psychosocial variables
3. Easy to administer
4. Less time consuming during construction and administration

Disadvantages

1. Respondents may feel forced to answer pre-planned items
2. Feelings of the respondents may not be fully assessed.
3. Difficulty in justifying the selection of number of categories & numerical assignment to these categories.
4. Casual approach on part of respondent may mislead

Semantic Differential Scale

- Semantic Differential Scale consists of two opposite adjectives with a 7-point scale between them.

- Respondent is asked to rate a given concept by selecting one point on the scale that best describes his or her point of view.

- The adjectives commonly used such as
  - effective/ineffective,
  - good/bad, or
  - important/unimportant.

Semantic Differential Scale: Example

NURSE PRACTITIONERS							
Competent	7	6	5	4	3	2	1	Incompetent
Worthless	7	6	5	4	3	2	1	Valuable
Pleasant	7	6	5	4	3	2	1	Unpleasant

Semantic Differential Scale: Uses

1. Patient Satisfaction Survey

2. Customer Satisfaction Survey

3. Employee Survey

4. Marketing Survey

5. Operational Research

6. Personality Measurements

7. Clinical psychology

Semantic Differential Scale

- Advantages
1. Easy to construct
2. Highly flexible.
3. Useful in evaluating several concepts such as person, place, situation, abstract idea, controversial issue etc
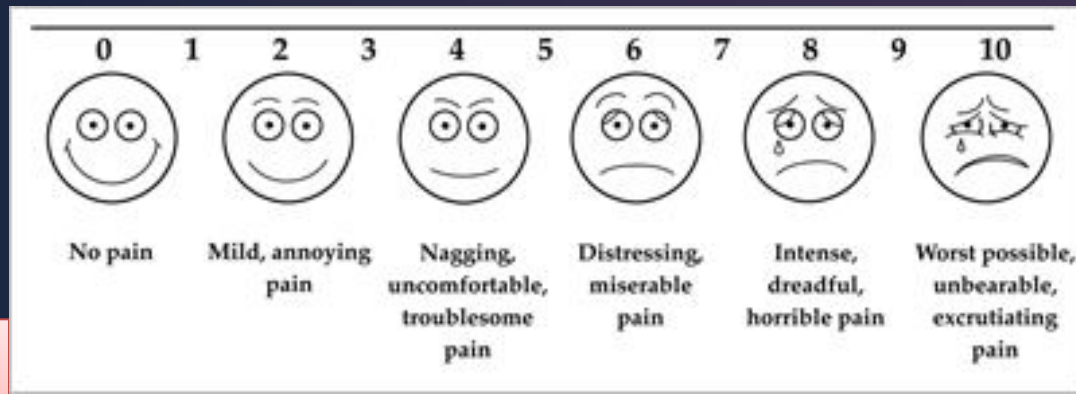
- Disadvantages
1. Difficult to select relevant concepts appropriate for a given study.
2. Time consuming to find bipolar adjectives.

Visual Analogue Scale

- It is used to measure the intensity of certain sensations and feelings such as pain, discomfort, anxiety, alertness, severity of clinical symptoms, functional ability, and attitude towards environmental conditions.

- It is a 100 mm horizontal or vertical line with a statement at either end representing one extreme of the dimension being measured.

- It requires subjects to respond for particular phenomenon measured, which is later measured by using a ruler from left end.

Visual Analogue Scale: Example

No Pain

Worst Pain

Visual Analogue Scale

- Advantages

1. Reliable and Valid tool to measure the intensity of certain sensations and feelings.

2. Rating of highly subjective phenomenon is possible by this scale.

3. Most useful in studying changes in the phenomenon.

- Disadvantages

1. Cannot be used to compare results across group of individuals at same time.

Vignettes

- It is a method that can elicit perceptions, opinions, beliefs and attitudes from responses or comments to stories depicting scenarios and situations.

- They can be hypothetical or factual.

- They can be written or oral.

- Provides face-to-face contact with the respondents and explore the topics in-depth.

Box 1. An example of a specific health state vignette

"A woman of about your age. Recently she was treated for breast cancer which involved surgery to remove her breast and underarm glands. She takes a daily tablet as continuing treatment. She now finds herself in physical health as good as before with the exception of occasional discomfort around her chest wall and stiffness in her shoulder as a result of the treatment. The nature of the surgery means that she must now take extra care with her appearance, especially with the clothes she can wear. Mentally, her state of health has also returned to its former level. She is not unduly anxious about her diagnosis of cancer."

Example presented by Ritu Sadana at the WHO informal consultation in January 2000 (17).

OBSERVATION

Observation

- It is a technique of collecting all the data or acquiring information through occurrences that can be observed through senses, with or without mechanical devices.

- **Use to :**

1. understand an ongoing process or situation.
2. gather data on individual behaviors or interactions between people.
3. know about physical setting.
4. where other methods are not possible.

Observation……

Advantages:
1. Collect data where and when an event or activity is occurring.
2. Does not rely on people's willingness or ability to provide information.
3. Validity of data is more.

Disadvantages:
1. Susceptible to observer's biases.
2. Howthrone Effect
3. Expensive & Time consuming.
4. Do not provide data about the rationale of people's activities.

Observation

Qualitative Observation

Log (Field Diary)

Field notes

Anecdotes

Video Recording

Quantitative Observation

Checklist

Rating Scale

Qualitative Observation

Log (Field Diary)

- It is a daily record of events and conversations in the field.

- A log is a historical listing of how researchers have spent their time and can be used for planning purposes, for example
  - for keeping track of responses, and
  - for reviewing what work has already been completed.

Anecdotes

- They focus on behavior of particular interest.

- Anecdotes typically selects specific kinds of events or behaviors for observation before hand.

- The observer objectively & accurately records the information.

Video Recording

- Video-tapes are mechanical devices used to capture complex behaviors that might elude notice by on-spot observers.

Video Recording

Advantages:

1. Captures even the fine units of behavior such as micro-momentary facial expressions.
2. Offers possibility of checking the accuracy of coders or the recording skills of participant observers.
3. Useful as training guide.
4. Easier to conceal camera than human behavior.

Dis-advantages:

1. Technical problems with lightening, camera lens etc.
2. Camera angle adopted could present a lop-sided view of an event or situation.
3. Participants may be more self-conscious in front of camera.

Quantitative Observation

Checklist

- Checklists includes several items on a topic and require same response format of all items.

- It consists of a list of items with a place to check or to mark "Yes or No".

- A checklist enables the observer to record present or absence of trait.

- It consists of a listing of steps, activities, and behaviours which the observer records when an incident occurs.

- Useful for evaluating skills, behaviour, conditions, personality, manifestations etc.

Checklist: Example

To evaluate student's performance during surgical dressing

Sr. No	Behaviors	Yes	No	Remarks
1.	Explains procedure			
2.	Arrange equipment for convenient use			
3.	Prepares patient			
4.	Washes hands			
5.	Maintains aseptic techniques			
6.	Removes dressing			
7.	Observes condition of wound			
8.	Cleans wound			
9.	Applies dressing			
10.	Makes patient comfortable			
11.	Complete charting			

Checklist…..

Advantages:

1. Allow inter-individual comparisons.

2. Simple method to record observation.

3. Useful in evaluating learning activities.

4. Useful in containing the attention of the observer.

5. Decreases the chances of error in observation.

Checklist…..

Dis-Advantages:

1. Does not indicate quality of performance, so usefulness is limited.

2. Only a limited content of overall clinical performance can be evaluated.

3. Only the presence or absence of an attribute, behavior or performance parameter may be assessed.

4. Degree of accuracy cannot be assessed.

Rating Scales

- Resemble check lists but used when finer discriminations is required and indicate the degree to which a trait is present.

- Rating scales provide systematic procedures for obtaining, recording and reporting the observer's judgement.

- By a rating is meant the judgement of one person by another.

Rating Scales: Types

1. Graphic Rating Scale

2. Descriptive Rating Scale

3. Numerical Rating Scale

Rating Scales: Types

Graphic Rating Scale

In this scale , performance is printed horizontally at various points   from lowest to highest. It includes numerical points on the scale. It is anchored by two extremes presented to respondents for evaluation of a concept or object.

Example: To what extent, does the staff nurse participate in clinical conference?

| Never | Seldom | occasionally | frequently | always |

Rating Scales: Types

Descriptive Rating Scale

This scale does not use numbers but divide the assessment into series of verbal phrases to indicate the level of performance.

E.g.

Judge the level of performance of nursing personnel in an ICU?

Nursing Personnel	Level of Clinical performance			
	Very Active	Active	Moderately Active	Passive
A				
B				
C				

Rating Scales: Types

Numerical Rating Scale

It divides evaluation criteria in to a fixed number of points, but defines numbers at the extremes only.

Indicate the degree to which the staff nurse practices universal precautions in General Medical Ward? The numbers represent the following values:

5-very good,4-good,3-Fair,2-Poor, 1-very poor.

Rating Scale

Advantage

1. Easy to make and administer.
2. Easy to score.
3. Less time – consuming.
4. Can be used for large population.
5. Can be used to evaluate performance, skills and product outcomes.

Disadvantage

1. Difficult or dangerous to fix-up rating about many aspects of an individual.
2. Chances of subjective evaluation, thus scales may become unscientific and unreliable.

BIO-PHYSIOLOGICAL METHODS

Bio-Physiological Methods

- It involves the collection of bio-physiological data from subjects by using the specialized equipments to determine physical and biological status of objects.

- Purpose:

1. To study physiological outcome of nursing care.
2. To evaluate nursing interventions.
3. To study correlation of physiological functioning in patients with health problems

Bio-Physiological Methods: Types

In vivo

- Performed directly to measure processes occurring internally within living organisms through medical or surgical instruments.
- E.g. TPR, BP Monitoring.

In vitro

- Physiological processes are measured and analyses done outside the organism.
- E.g. Blood tests, X-Ray, CT- Scan, MRI, PET Scan, Culture & Sensitivity Tests etc.

Bio-Physiological Methods

Advantage

1. More accurate and error-less.
2. More objective in nature.
3. Provide valid measures for targeted variables.
4. Easy access to most of the instruments used for bio-physiological measurements.

Disadvantage

1. Requires use of expensive instruments.
2. Requires significant amount of training, knowledge & experience.
3. Use of instruments may cause fear & anxiety.
4. May have harmful effects on participants such as repeated X-Ray exposure.

Quality of Tools

Quality of tools

- An ideal data collection procedure is one that captures a construct in such a way that is relevant, credible, accurate, truthful and sensitive.

- Criteria for assessing quantitative tools are

1. Reliability

2. Validity

3. Sensitivity and specificity

4. Efficiency

Reliability

- Reliability: Consistency and accuracy of the measuring instrument.

- Three aspect of reliability:

1. Stability

2. Internal consistency

3. Equivalence

Reliability

1. Stability

- It is the extent to which the similar result are obtained on two separate administration.

- Test-retest reliability- Administration of same tool on same sample on two different occasion and then compare the scores by computing reliability coefficient (correlation coefficient between two scores)

Reliability

2. Internal consistency

- The extent that tool measure the same trait.

- Split-half technique- Items are split in two group, usually odd and even items.

- Tool is administered and two set of score (odd and even) is summed from each subjects.

- Calculation of correlation coefficient between two set of score.

Reliability

3. Equivalence:

- Equal in value, amount between observer.

- Inter-rater / inter-observer reliability: Two or more trained observer watch an event simultaneously and independently, and record data.

- Ensure the delivery of the tool in same manner again and again.

Validity

- The degree to which an instrument measures what is supposed to measure.

- Difficult to establish as compared to reliability

- Face validity- Refers to whether instrument looks as though it is measuring the appropriate construct.

- Content validity- Concern the degree to which an instrument has an appropriate sample of items of the construct being measured. Done by panel of experts.

Validity

- Criterion related validity- determining the relationship between an instrument and external criterion.

- Instrument is valid if the its score correlates highly with the score on the criteria .

- Example: Nurses professionalism scale and no. of research publications (criterion).

- Score was correlated with no. of research publications. More research articles ----more score on professionalism.

Validity

- Sensitivity- Ability of the instrument to identify the case correctly. (True positive)

- Specificity – Ability to identify non cases correctly. (True negatives)

- Efficiency- Instruments which need less time and energy/training to measure the construct correctly.

To Conclude……..

Thanks