



Health Measurement Scales

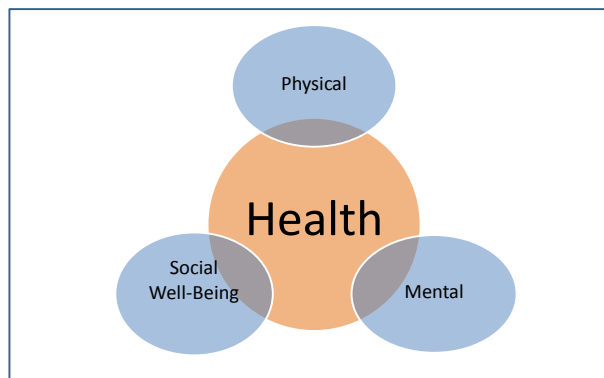
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What is Health?

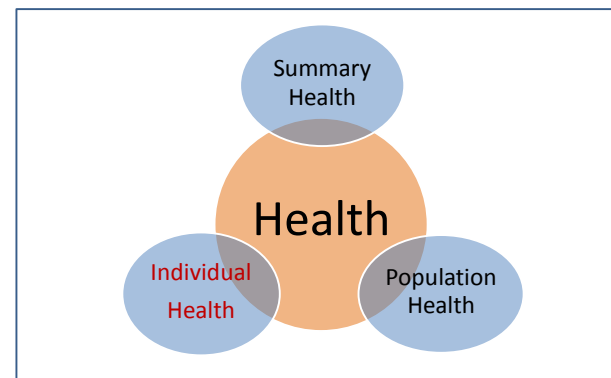
Health
 ↓
 “A state of **complete** physical, mental, and **social well-being** and not merely the absence of disease or infirmity” (WHO, 1948)

↓
 How to measure?

Elements of Health



Measurement of Health



Objective and Subjective

Objective: Mechanical method such as laboratory method

Subjective: Person makes judgment

How to quantify health?

How could you tell by this statement?

- A person who presented blood sugar level > 200 mmol/l
- A person who presented blood pressure > 180/110 mmHg
- A person who BMI > 30
- A newborn baby who has Hemoglobin <10 mmol/l
- A person who present CD4 level <100 copies

Healthy or Unhealthy

- I have low back pain and it has been killing me every night.
- I can't sleep well during the pass 2 weeks.
- I feel uncomfortable after every meal.
- I was injured by car accident and the scar is hurt me during winter.
- I hardly chew meat.

How to measure it?

Subjective states

- Patient satisfaction
- Speech function
- Physical function
- Quality of life after brain surgery
- Arthritic pain

Why Health should be quantified?

1. Understanding the causes and consequences of differences in health
2. Estimating the needs of populations
3. Improving clinical decision
4. Assessing the quality of care
5. Measuring the efficacy, effectiveness and efficiency of medical interventions

Evaluative → change over time.

Categorical and Dimensional concepts

- Categorical model
 - Clearly define case or non-case (DM)
 - Different qualitative and quantitative phenomenon at different severity
 - Often preclude others disease
- Dimensional model
 - No clear dividing line (Depress)
 - Different qualitative phenomenon at different severity
 - Can have varying amount of different disorders

Abundant of HM tools

There are at least 3,000 scales (*MAPITrust, 2011*)

Different tools in different studies



Few evidences accumulate in one field

Issues of Consideration

All of your study subjects are sick, painful, and suffering from their illness.

How to choose measurement?

Consider: Purpose,

Type of patient,

Time frame ,

Single scales or multiple scales

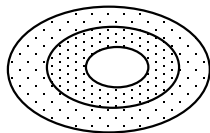
Critical review

- Content validity
 - The scales (tools) comprise of all relevant and important domain regarding expert opinion or theory.
- Reliability
 - The scales (tools) can measure something in reproducible fashion.
 - Look at Cronbach's alpha level (>0.8)

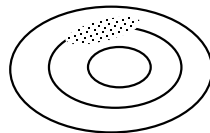
Content validity

Question	Anatomy	Physiology	Function	Pathology
1		x		
2			x	
3	x			
.				x
.				
.				
20		x		

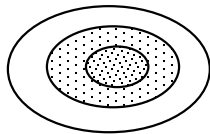
Validity and Reliability



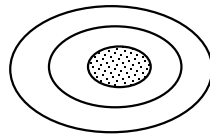
Neither Validity
nor Reliability



No Validity
but Reliability



Present Validity
But No Reliability



Both Validity
and Reliability

Devising the items

- Patients or potential research subjects are an excellent source of items
 - Focus groups
 - Key informant interviews
 - Clinical observations
 - Expert opinions
 - Research findings

Scaling response

- When using a health measurement instrument attention should be paid to **the type of scoring that the instrument** is based on as the selection of a scaling technique has important implications for the valuations of health states, **differences in results being obtained using different techniques.**

Category scaling (CS)

- Nominal scale:** Male and female
- Ordinal scale:** Mild moderate and severe
- Interval scale:** Temperature
- Ratio scale:** Real meaningful of zero

Ex. Provided that disability progressed steadily from one activity to another, this method of scaling yields a single rating from 1 (no disability) to 6 (disabled on all five).

Example

Exhibit 4.11

- | | |
|---|--|
| <p>35. Have you been worried about things happening to your relatives without good reason in the last 2 weeks?</p> <p>1 <input type="checkbox"/> I have not worried without reason.</p> <p>2 <input type="checkbox"/> Once or twice I worried.</p> <p>3 <input type="checkbox"/> About half the time I worried.</p> <p>4 <input type="checkbox"/> Most of the time I worried</p> <p>5 <input type="checkbox"/> I have worried the entire time.</p> <p>8 <input type="checkbox"/> Not applicable; my relatives are no longer living.</p> | <p>39. Have you been able to talk about your feelings and problems with your partner during the last 2 weeks?</p> <p>1 <input type="checkbox"/> I could always talk freely about my feelings.</p> <p>2 <input type="checkbox"/> I usually could talk about my feelings.</p> <p>3 <input type="checkbox"/> About half the time I felt able to talk about my feelings.</p> <p>4 <input type="checkbox"/> I usually was not able to talk about my feelings.</p> <p>5 <input type="checkbox"/> I was never able to talk about my feelings.</p> |
|---|--|

Psychometric scaling

- Direct estimation technique:** mark the response on a line or check in a box such as **visual analogue scale(VAS)**

1. Rate work problems—stresses
 none severe difficulties

Reproduced from the Social Functioning Schedule obtained from Dr. PJ Tyler. With permission.

Exhibit 5.9

16. How RELAXED or TENSE have you been?
 (DURING THE PAST MONTH)

0 1 2 3 4 5 6 7 8 9 10

|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

Very relaxed Very tense

How to set items/questions?

There two approaches:

- Empirical approach: practical approach such as discharge prediction
- Theoretical approach: base on theory

Example

Nominal

- Is the respondent in state X or Y?

Ordinal

- How does having X rank compared to having Y?

Interval

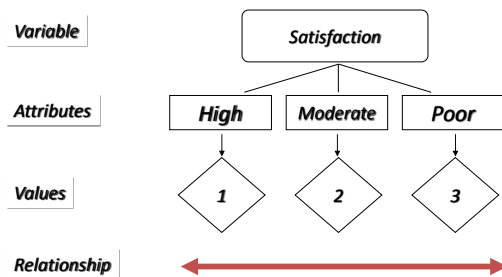
- How different is X from Y?

Ratio

- What is the proportional difference of X from Y?

What is Level of Measurement?

*The relationship of the values that are assigned to the attributes **for a variable***



Single item measures or Multiple items

Overall how would you rate your health?

- Poor
- Fair
- Good
- Excellent

Short multi-item scales: EuroQol 5D

Three levels and five domains

+ visual analogue scale

Domains include:

- Mobility
- Self-Care
- Usual Activities
- Pain/Discomfort
- Anxiety or Depression

By placing a tick in one box in each group below, please indicate which statements best describe your own health state today.

Mobility

- I have no problems in walking about
- I have some problems in walking about
- I am confined to bed

Self-Care

- I have no problems with self-care
- I have some problems washing or dressing myself
- I am unable to wash or dress myself

Usual Activities (e.g. work, study, housework, family or leisure activities)

- I have no problems with performing my usual activities
- I have some problems with performing my usual activities
- I am unable to perform my usual activities

Pain/Discomfort

- I have no pain or discomfort
- I have moderate pain or discomfort
- I have extreme pain or discomfort

Anxiety/Depression

- I am not anxious or depressed
- I am moderately anxious or depressed
- I am extremely anxious or depressed

Performance of measures

Reliability: Does the measure consistently produce the same results when applied in similar circumstances (*0.8 is accepted*)

Number of item and scale can affect it.

Comparability: Does the measure produce consistent results when applied in different circumstances e.g. across cultures, social strata

Validity: Does the indicator actually measure true underlying differences in health status

Other: Generalizability, sensibility, relevance, practicality

Classification of Health measurements

1. Functional assessment measures
2. Generic measures
3. Specific measures
4. Psychological well-being scale
5. Utility measures

Functional assessment measures

Three different considerations:

- i. an impairment refers to a reduction in physical or mental capacities;
- ii. a disability might result when the effects of an impairment are not corrected it implies a restriction on a person's ability to perform a function considered normal for a human being;
- iii. a handicap refers to the social disadvantage (e.g. loss of earnings) that might derive from disability.

Examples

Activities of Daily Living (ADL):

- basic ADL (bathing, dressing, toileting, transfer, continence, feeding);
- instrumental ADL (shopping, cooking, housekeeping, laundry, use of transport, managing money, etc.);
- mobility.

Barthel index (Feeding, grooming, transfer, toileting, bathing, walking/locomotion, continence)

ADL

Exhibit 3.7 The Index of Independence in Activities of Daily Living: Evaluation Form

For each area of functioning listed below, check description that applies. (The word "assistance" means supervision, direction, or personal assistance.)

Bathing—either sponge bath, tub bath, or shower

- | | | |
|--|--|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Receives no assistance (gets in and out of tub by self if tub is usual means of bathing) | Receives assistance in bathing only one part of the body (such as back or a leg) | Receives assistance in bathing more than one part of the body (or not bathed) |

Dressing—gets clothes from closets and drawers—including underclothes, outer garments and using fasteners (including braces if worn)

- | | | |
|--|---|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Get clothes and gets completely dressed without assistance | Gets clothes and gets dressed without assistance except for assistance in tying shoes | Receives assistance in getting clothes or in getting dressed, or stays partly or completely undressed |

Toileting—going to the "toilet room" for bowel and urine elimination; cleaning self after elimination, and arranging clothes

- | | | |
|---|---|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Goes to "toilet room," cleans self, and arranges clothes without assistance (may use object for support such as cane, walker, or wheelchair and may manage night bedpan or commode, emptying same in morning) | Receives assistance in going to "toilet room" or in cleansing self or in arranging clothes after elimination or in use of night bedpan or commode | Doesn't go to room termed "toilet" for the elimination process |

Transfer—

- | | | |
|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--------------------------|--------------------------|--------------------------|

The Barthel Index

Exhibit 3.3 The Barthel Index

Note: A score of zero is given when the patient cannot meet the defined criterion.

	With help	Independent
1. Feeding (if food needs to be cut up=help)	5	10
2. Moving from wheelchair to bed and return (includes sitting up in bed)	5-10	15
3. Personal toilet (wash face, comb hair, shave, clean teeth)	0	5
4. Getting on and off toilet (handling clothes, wipe, flush)	5	10
5. Bathing self	0	5
6. Walking on level surface (or if unable to walk, propel wheelchair) *score only if unable to walk	10	15
7. Ascend and descend stairs	0*	5*
8. Dressing (includes tying shoes, fastening fasteners)	5	10
9. Controlling bowels	5	10
10. Controlling bladder	5	10

Reproduced from Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. *Maryland State Med J* 1965;14:62. With permission.

Exhibit 3.6 Scoring for the 15-Item Modified Barthel Index

Independent		Dependent		
I Intact	II Limited	III Helper	IV Null	
10	5	0	0	Drink from cup/feed from dish
5	5	3	0	Dress upper body
5	5	2	0	Dress lower body
0	0	-2	0	Don brace or prosthesis
5	5	0	0	Grooming
4	4	0	0	Wash or bathe
10	10	5	0	Bladder continence
10	10	5	0	Bowel continence
4	4	2	0	Care of perineum/clothing at toilet
15	15	7	0	Transfer, chair
6	5	3	0	Transfer, toilet
1	1	0	0	Transfer, tub or shower
15	15	10	0	Walk on level 50 yards or more
10	10	5	0	Up and down stairs for one flight or more
15	5	0	0	Wheelchair/50 yards—only if not walking

Exhibit 3.4 Instructions for Scoring the Barthel Index

Note: A score of zero is given when the patient cannot meet the defined criterion.

- Feeding
 - 10 = Independent. The patient can feed himself a meal from a tray or table when someone puts the food within his reach. He must put on an assistive device if this is needed, cut up the food, use salt and pepper, spread butter, etc. He must accomplish this in a reasonable time.
 - 5 = Some help is necessary (when cutting up food, etc., as listed above).
- Moving from wheelchair to bed and return
 - 15 = Independent in all phases of this activity. Patient can safely approach the bed in his wheelchair, lock brakes, lift footrests, move safely to bed, lie down, come to a sitting position on the side of the bed, change the position of the wheelchair, if necessary, to transfer back into it safely, and return to the wheelchair.
 - 10 = Either some minimal help is needed in some step of this activity or the patient needs to be reminded or supervised for safety of one or more parts of this activity.
 - 5 = Patient can come to sitting position without the help of a second person but needs to be lifted out of bed, or if he transfers, with a great deal of help.
- Doing personal toilet
 - 5 = Patient can wash hands and face, comb hair, clean teeth, and shave. He may use any kind of razor but must put in blade or plug in razor without help as well as get it from drawer or cabinet. Female patients must put on own make-up, if used, but need not braid or style hair.
- Getting on and off toilet
 - 10 = Patient is able to get on and off toilet, fasten and unfasten clothes, prevent soiling of clothes, and use toilet paper without help. He may use a wall bar or other stable object of support if needed. If it is necessary to use a bed pan instead of a toilet, he must be able to place it on a chair, empty it, and clean it.
 - 5 = Patient needs help because of imbalance or in handling clothes or in using toilet paper.
- Bathing self
 - 5 = Patient may use a bathtub, a shower, or take a complete sponge bath. He must be able to do all the steps involved in whichever method is employed without another person being present.

Interpretation Brathel index 15 item

Reliability 0.91

- scores: 0–19: dependent;
- 20–59: self-care assisted;
- 60–79: wheelchair assisted;
- 80–89: wheelchair independent;
- 90–99: ambulatory assisted,
- whereas 100 indicates independence

Generic measures

- **Generic measures**

- **Aggregate**

All items are merged into one score, such as QALYs

- **Profile**

Individuals are profiled in a series of dimensions. A key feature of the profile approach is to capture health status in a comprehensive manner. All items are merged to certain domain, such as

Sickness Impact Profiles (SIP)

Examples

Aggregate

- SF-36
- WHO-QoL
- EuroQol

Profile

- Nottingham Health Profile
- Duke-UNC Profile

Specific measures

Those specific measures are important for clinical decision-making. They are designed to assess specific diagnostic groups or patient populations, often with the goal of measuring responsiveness or “clinically important” changes.

Disease-specific measures are available for arthritis (e.g. Arthritis Impact Measurement Scale), back pain, cancer, chronic lung disease, diabetes, digestive diseases, cardiovascular diseases and multiple sclerosis.

Examples

Arthritis

- McMaster-Toronto Arthritis patient
- Arthritis Impact Measurement Scales

Cancer

- Breast cancer questionnaire
- EORTC quality of life questionnaire

Psychological well-being (PWB)

These measures cover short-term psychological states rather than lasting traits and describe human psychological responses in adapting to the environment. One of the major problems of these scales is the difficulty of establishing firm conceptual definitions and thus comparisons between studies.

Two approaches have been used in constructing those scales:

- checklists of somatic and behavioral symptoms of distress
- questions about positive and negative feelings of well-being

Examples

Symptom checklist approach

- Langner's Scale, 1962: The 22 Item Screening Score of Psychiatric Symptoms
- The Health Opinion Survey, Macmillan, 1957

Well-being approach

- The General Well-being Schedule
- The Mental Health Inventory

Utility measures

- Utility measures are used when the outcomes cannot be measured in natural units, so a utility or value scale has to be employed. This may be because the important outcomes are not directly comparable or that they are multifaceted.

Examples

- Quality of life
- Quality adjusted life year
- Euro-QoL

Recommend Reading

1. McDowell I. Measuring Health: A guide to Rating scales and questionnaires 3rd ed. Oxford university Press. New York 2006.
2. Garcia P and McCarthy M. Measuring Health: A step in the development of city health Profiles. WHO. Geneva. 2000
3. Streiner DL and Norman GR. Health Measurement Scales: A practical guide to their development and use

Recommend Websites

- <http://buros.unl.edu/buros/jsp/search.jsp>.
- http://www.wiley.com/legacy/products/subject/reference/salek_index.html
- www.qolid.org