

Dimensions and attributes used in QALY instruments: a systematic review

Moustapha Touré, Christian R.C. Kouakou, Thomas G. Poder

January 2021

3rd International Electronic Conference on Environmental Research and Public Health (ECERPH-3)

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- ▶ **Economic assessment** is highly important in healthcare decision-making process.
- ▶ **The quality-adjusted life-year (QALY)** concept provides a rare opportunity to combine two crucial aspects of health, i.e., mortality and morbidity, into a single index, in order to perform **cost-utility comparison**.
- ▶ Many tools are available to measure morbidity in terms of health-related quality of life (HRQoL) and a large literature describes how to use them.

- ▶ The **Coronavirus disease 2019 (Covid-19)** pandemic challenged all healthcare systems and recommended measures (e.g., confinement, social distancing) that produced **negative effects on population's health as regards to HRQoL**.
- ▶ To correctly assess the impact of the virus, it is important to use the most relevant QALY instruments.
- ▶ **Understanding their characteristics and development process is a key point** when choosing a QALY instrument for a study.
- ▶ In this aim, we conducted a **systematic review**.

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- ▶ **Research strategy**

- Search in:

- ⇒ 4 databases: Medline EBSCO, Scopus, ScienceDirect (Elsevier) and PubMed;

- ⇒ Google scholar, bibliographical references of articles and website concerned by public health;

- ⇒ Key words used: 'QALY', 'quality adjusted life year', 'instrument', 'multiattribute', 'utility'.

- No restriction on date of publication;

- ▶ Studies selection

- Selection criteria:

- ⇒ Studies published in French or English;

- ⇒ Studies describing a QALY's measure instrument development;

- ⇒ Studies targeting general population or patients;

- Exclusion criteria

- ⇒ Studies describing the development of instruments' preliminary version; Studies that not describing instruments' dimensions and levels; Studies describing instruments not measuring preferences; Studies adressing pediatric population.

- 2 reviewers proceeded to the studies selection and a referee performed an arbitration when necessary.

- ▶ Data analysis

- Data collected

All data collected are related to the different stages of an instrument elaboration: **development, validation and measure**. In this aim, we focused on:

- ⇒ Target population;

- ⇒ Type of instrument developed;

- ⇒ Number and nature of dimensions and levels;

- ⇒ Preferences elicitation's method;

- ⇒ Models used in the utility score determination;

- ⇒ Instrument validation's method;

- ⇒ Algorithm validation's method;

- Studies quality is assessed by the **COSMIN grid**.

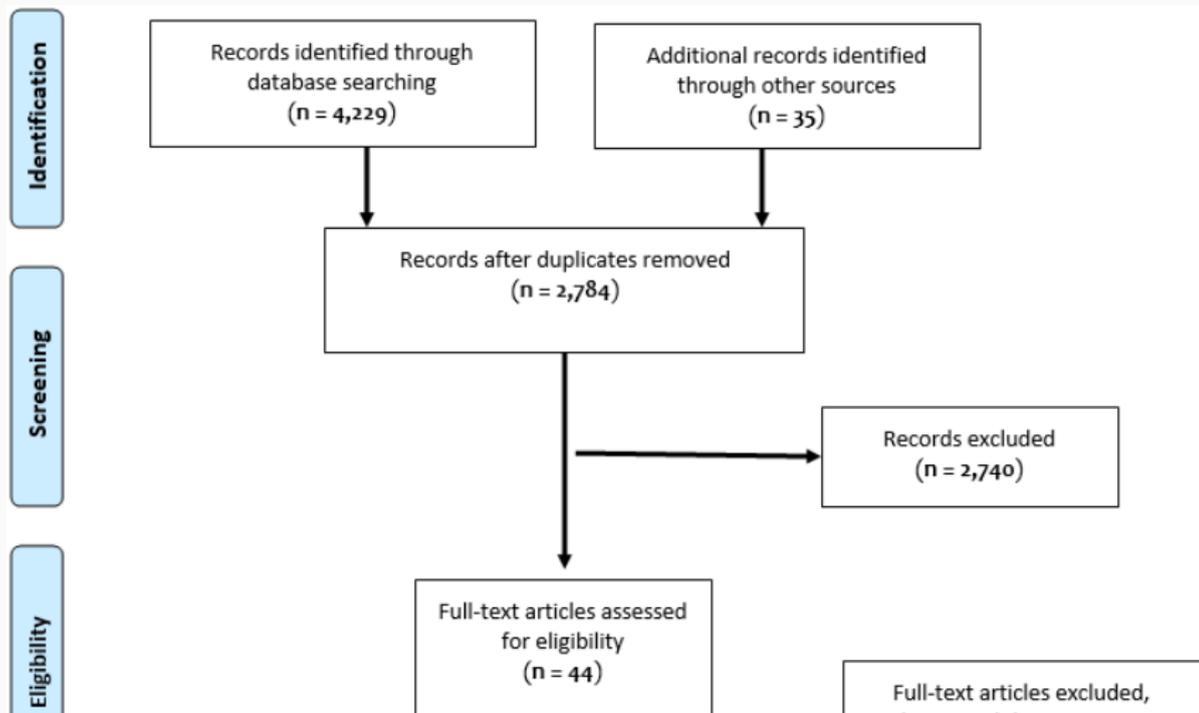
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► Studies selection (PRISMA diagram, June 18, 2020)



- ▶ **Characteristics of studies selected**

- ⇒ All studies included in this review are about the development of preference-based instruments for use in utility;

- ⇒ 40 studies selected which deal with the development of **11 generic** instruments and **31 specific** instruments, a total of 42 instruments;

- ⇒ **Countries of study:** Canada(n=3), United Kingdom (UK)(n=19), United states of America (USA)(n=4), Australia(n=4), Netherlands(n=3), Spain(n=1), Finland(n=1), England(n=1), and South Korea(n=1);

- ⇒ **Main fields covered by specific instruments:** Cancer, geriatric, dependency, diabetes, reproductive system, skin infections, epilepsy, digestive functions, vision, mobility and pulmonary functions.

- ▶ Instruments and studies included in the review

- ⇒ 40 studies discussing the development of 42 instruments (24 are updated version of preliminaries versions and 18 have been created *de novo*);

- ⇒ 2/3 of studies used the general population to measure preferences via interviews;

- ⇒ 82% of studies communicated informations about the participants to these studies and only 45% assumed to have used a representative sample of the target population.

- ▶ **Generic instruments (N=11)**
 - **Instruments development**
 - ⇒ All instruments account for dimensions related to bodily sensations, symptoms/discomfort and pain;
 - ⇒ 7 instruments contain dimensions related to psychological well-being;
 - ⇒ 2 instruments contain dimensions related to fertility or sexual activity.
 - ⇒ Number of dimensions varies between 4 and 15 and the number of levels is embodied between 3 and 7.
- ▶ **Main methods used:** literature review, Rasch analysis, exploratory factorial analysis (EFA), confirmatory factorial analysis (CFA), interviews.

- ▶ **Generic instruments**
 - **Instruments validation**
 - ⇒ Only 5 studies provided the validation method used;
- ▶ **Main methods used:** Item response theory (IRT), Lovinger's H, DIF, test-retest, comparison with other instruments.

- ▶ **Generic instruments**
 - Preferences measure and algorithms elaboration
- ▶ **Elicitation methods:** the time trade off (TTO) is the most used elicitation method followed by visual analogue scale (VAS) and the standard gamble (SG);
- ▶ **Models for algorithms determination:** The additive models, the conditionnal logit and the multiplicative models have been widely used;
- ▶ **Algorithms validation:** Comparison with preliminary instruments (correlation coefficient), heterogeneity test, correlation analysis with sub-samples and test of the discrimination capacity have allowed to confirm the algorithm.

- ▶ **Specific instruments (N=31)**
 - **Instruments development**
 - ⇒ Almost 2/3 of specific instruments were developed due to **inadequation** of generic instruments in their fields (lack of sensitivity or non-validity);
- ▶ **Main methods used:** literature review, expert advices, Rasch analysis, standards psychometric criteria, factorial analysis and differential item functioning (DIF).

- ▶ **Specific instruments**
 - **Instruments validation**
 - ⇒ 1/3 of studies provided the validation process used.
- ▶ **Main methods used:** expert advices; standardised response mean (SRM) on random sample; comparison with other well known instruments using Cohen criteria, Spearman and Pearson correlation; test-retest.

- ▶ **Specific instruments**
 - Preferences measure and algorithms elaboration
- ▶ **Elicitation methods:** Over 50% of studies used the TTO;
- ▶ **Models for algorithms determination:** Random effects models, ordinary or generalised least squares, multiplicative models, conditional logit, maximum likelihood, multivariate models.
- ▶ **Algorithms validation:** Models specification (R^2 , mean quadratic error, SRM, coefficients significance, etc.); comparison with others instruments; comparison with scores obtained by using random samples were the main methods used to validate the scores obtained.

- ▶ Studies quality assessment:
 - COSMIN grid:
 - ⇒ Allows to assess the studies quality according to 10 different aspects (reliability; structural and content validity of the instrument, internal consistency, representativity of the sample used, responsiveness, etc.)
 - ⇒ 4 responses level (very good, adequate, doubtful and inadequate) for each characteristic measured.
 - ⇒ The next table gives the proportion of responses given by each study for all the characteristics measured.
- ▶ On average, 55% of the different characteristics measured were rated 'very good', 38% received the mention 'doubtful/undetermined' and only 6% received the mention 'inadequate'. ⇒ Studies quality is acceptable.

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- ▶ Implemented measures to fight the Covid-19 pandemic have revealed important **adverse consequences**. There is a need to consider these indirect consequences along with the more direct ones related to the COVID-19 on **people's health and well-being**.
- ▶ To elaborate/update instruments to this aim, **the comprehension of the process of creating an instrument is fundamental**.
- ▶ This systematic review shows the main steps and methods used to develop preferences-based instruments.
⇒ **40 studies were selected and represent the elaboration of 42 instruments** (11 generic instruments and 31 specific instruments).

- ▶ Dimensions' and levels' selection, the item response theory, the Rasch analysis and literature review were mostly used.
- ▶ Dimensions and levels were validated by methods like the Loevinger H, the standardised response mean or discussions with fields' experts.
- ▶ TTO has been the most used elicitation method and random effects models served a lot in determining utility scores.