OHE

How is Quality of Life Measured for Health Technology Assessments?

CONSULTING | REPORT
JULY 2021

David Mott
Gayathri Kumar
Chris Sampson
Martina Garau

ohe.org

OHE

JULY 2021

How is quality of life measured for health technology assessments?

David Mott
Office of Health Economics, London

Gayathri Kumar
Office of Health Economics, London

Chris Sampson
Office of Health Economics, London

Martina Garau
Office of Health Economics, London

OFFICE OF HEALTH ECONOMICS
CONSULTING

Please cite this report as:
Mott, D.J., Kumar, G., Sampson, C. & Garau, M., 2021. How is quality of life measured for health technology assessments? OHE Consulting Report, London: Office of Health Economics. Available at: How is Quality of Life Measured for Health Technology Assessments? | OHE

Corresponding Author:
Martina Garau
mgarau@ohe.org

For further information please contact:

Professor Graham Cookson
Chief Executive, OHE
Honorary Visiting Professor in Economics at City, University of London

Tel +44 (0)207 747 1408
Email gcookson@ohe.org

About OHE Consulting Reports

Many of the studies OHE Consulting performs are proprietary and the results are not released publicly. Studies of interest to a wide audience, however, may be made available, in whole or in part, with the client's permission. They may be published by OHE alone, jointly with the client, or externally in scholarly publications. Publication is at the client's discretion.

Studies published by OHE as OHE Consulting Reports are subject to internal quality assurance and undergo external review, usually by a member of OHE's Editorial Panel. Any views expressed are those of the authors and do not necessarily reflect the views of OHE as an organisation.

Funding and Acknowledgements

This consulting report was commissioned and funded by The Pharmaceutical Research and Manufacturers of America (PhRMA).

The authors are grateful to Professor Adrian Towse and Professor Lou Garrison for comments on earlier drafts of the report.

OFFICE OF HEALTH ECONOMICS
CONSULTING

Table of Contents

OFFICE OF HEALTH ECONOMICS
CONSULTING

1 What is CEA and what are QALYs?

Cost-effectiveness analyses (CEAs) compare the relative costs and outcomes of different health treatments. The outcomes in a conventional CEA are usually described using the QALY, which is a composite measure that combines morbidity and mortality, such that that one QALY is of equivalent value to a year in full health (Brazier et al., 2016). The QOL component of the QALY requires health state utilities, which are anchored at 1 (indicating full health) and 0 (indicating being dead).

Figure 1 illustrates how the utilities are used to calculate QALYs. Imagine an individual has a chronic health condition which means that they will live to age 60 and experience an average QOL (or health state utility) of 0.7. This individual will achieve 42 QALYs over their lifetime. In contrast, imagine another individual that has no underlying chronic health conditions and will live to age 80 whilst experiencing full health throughout. This individual will achieve 80 QALYs over their lifetime.

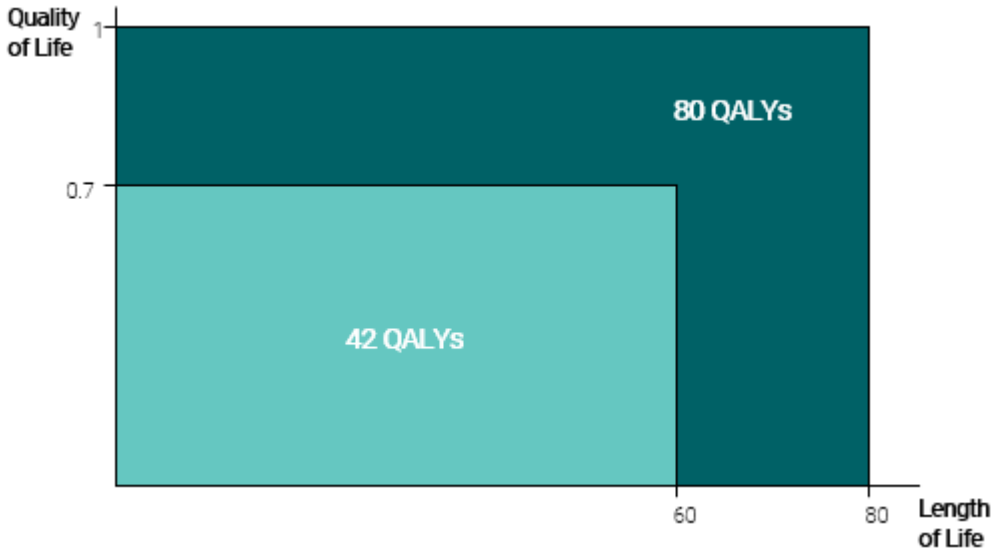

FIGURE 1: QUALITY-ADJUSTED LIFE YEARS

Treatments can increase survival or QOL (or both), and data on both are required for calculating QALY gains. Survival data typically come from models based on extrapolations from clinical trial observations. QOL data typically come from validated measures designed to provide quality of life assessments that are completed by patients (or proxies) at several time points before, during, and after experiencing the treatment.

OFFICE OF HEALTH ECONOMICS
CONSULTING

2 What are QOL measures and how do they provide health state utilities?

QOL measures — a type of patient-reported outcome measure — are questionnaires that ask about the patient's health-related quality of life. The type of questions included in the measure depends on the type of measure. Broadly, there are two types: generic and condition-specific. Generic measures aim to provide an overall picture of the patient's QOL and may be applied across all health conditions. In contrast, condition-specific measures focus more specifically on the health condition that the patient is experiencing.

Some QOL measures are preference-based, which means that they have an accompanying value set (also referred to as a utility tariff), typically derived from the preferences of the general population. Value sets enable the conversion of every possible response to the questionnaire into a single health state utility (or value). If patients complete the preference-based measure before, during, and after a treatment, then the change in utility can be estimated and used in QALY calculations.

BOX 1: EXAMPLES OF DIFFERENT QOL MEASURES

	GENERIC	CONDITION-SPECIFIC
PREFERENCE-BASED	EQ-5D, SF-6D, HUI3	EORTC-8D (Cancer), DEMQOL-U (Dementia), MSIS-PBM (Multiple Sclerosis)
NON-PREFERENCE-BASED	WHOQoL-Bref, NHP, PedsQL*	FACT-G (Cancer), PDQ-39 (Parkinson's Disease), PAC-QOL (Constipation)

**Designed specifically for use in younger populations.*

There are a wide range of QOL measures, as illustrated in Box 1. HTA agencies such as the National Institute for Health and Care Excellence (NICE) in the United Kingdom and the Institute for Clinical and Economic Review (ICER) in the United States generally recommend that generic, preference-based measures are used to generate QALYs for CEAs, with a specific recommendation for EQ-5D (NICE, 2013; ICER, 2018).

In summary, the predominant approach for measuring QOL is to use a generic preference-based measure (e.g., EQ-5D), which is a questionnaire that is completed by patients. Each response to EQ-5D has an associated utility, which are typically derived from the preferences of the general population in the country of relevance. Utilities provide the information on QOL, which together with information on survival gains or life expectancy is used to calculate QALYs.

3 What is EQ-5D and what are the advantages and disadvantages of using it?

EQ-5D contains five broad questions about health as indicated in Box 2 (Devlin and Brooks, 2017).

BOX 2: SUMMARY OF THE EQ-5D

THE DIMENSIONS	THE RESPONSE LEVELS	OBTAINING UTILITIES
The five dimensions of the EQ-5D: • Mobility (walking about) • Self-care (washing or dressing oneself) • Usual activities • Pain/discomfort • Anxiety/depression	For the five-level version of EQ-5D, the person indicates for each dimension, whether they have: • No problems • Slight problems* • Moderate problems • Severe problems* • Unable to / extreme problems **These levels are not included in the three-level version*	Value sets are available for many countries, which are based on general population preferences (this is what makes EQ-5D preference-based). This means that responses to the EQ-5D can be translated into a health state utility.

Several HTA agencies worldwide recommend the use of the EQ-5D (Rowen et al., 2017a). As a short, generic questionnaire, it is low burden to patients and can be readily applied in a wide range of health settings. The latter is appealing to decision makers that make funding decisions or recommendations in systems facing limited resources, as it enables treatments for different health conditions to be assessed using the same metrics. Furthermore, studies have indicated that EQ-5D is responsive to changes in health in several different contexts, such as diabetes, skin diseases, urinary incontinence, chronic obstructive pulmonary disease, and asthma (Finch, Brazier and Mukuria, 2018).

However, it also has its disadvantages, particularly when the key objective is to assess a treatment in relation to outcomes that are important to specific patient groups. The EQ-5D was not designed with involvement from patients and, as it contains only five questions, is unlikely to adequately cover the full range of outcomes that are of importance to patients with different conditions. The generic nature of the EQ-5D can also mean that it is not responsive to changes in health in all contexts. For example, vision, energy, cognition, and hearing are not directly captured within the EQ-5D. Finally, it has been found that EQ-5D does not perform well, for different reasons, in some conditions such as multiple sclerosis, personality disorders, schizophrenia, and dementia, and has mixed results in visual disorders and some cancers (Finch, Brazier and Mukuria, 2018).

4 What are the other dimensions of QOL and how can they be captured?

EQ-5D captures five specific dimensions of QOL. A number of additional dimensions can be relevant to patients, as illustrated visually in Figure 2. The outer circle represents the concept of wellbeing, which is broader than QOL and therefore encompasses it. Each white oval represents an individual dimension of QOL or wellbeing. The five dimensions from EQ-5D are in the inner dotted circle; those in the middle circle represent QOL dimensions that are not captured by EQ-5D and include, for example, cognition and fatigue.

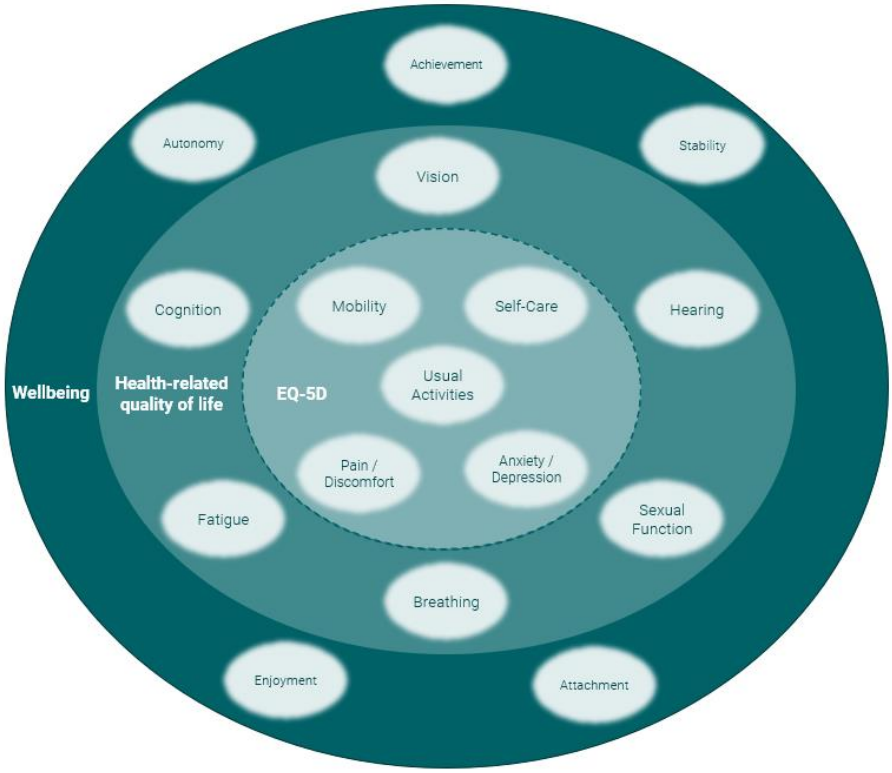

FIGURE 2: DIMENSIONS OF WELLBEING AND HEALTH-RELATED QUALITY OF LIFE

Note: this figure does not capture all the dimensions of QOL and wellbeing that have been identified in the literature.

5 How can alternatives to EQ-5D fill the gaps?

Consider Figure 2, where the dotted inner circle represents EQ-5D. Moving the dotted circle to capture a different selection of dimensions represents an **alternative generic measure** to EQ-5D (Brazier et al., 2017). The selection may solely contain dimensions of QOL (e.g., SF-6D) or it could contain dimensions of wellbeing (e.g., ICECAP-A). It is also possible to have a measure that combines aspects of both QOL and wellbeing (e.g., EQ-HWB; currently under development). Expanding the dotted circle to include one (or potentially more) additional dimensions represents a **bolt-on** (or bolt-ons) for the EQ-5D (Finch, Brazier and Mukuria, 2019). Focusing the scope more specifically on QOL dimensions relevant to a particular patient group would represent a **condition-specific measure**. In practice, there are many different measures available, which include different dimensions. However, only **preference-based** measures, i.e., those with accompanying value sets (as described in Box 1), facilitate the estimation of utilities for QALY calculations (Rowen et al., 2017b).

When QOL data has not been collected using preference-based measures, it may be possible to use a **mapping** algorithm to predict utilities based on patients' responses to non-preference-based measures (Mukuria et al., 2019).

Much like the EQ-5D itself, each of these alternatives have advantages and disadvantages, as summarised in Box 3.

BOX 3: ADVANTAGES AND DISADVANTAGES OF EQ-5D ALTERNATIVES

	ADVANTAGES	DISADVANTAGES
ALTERNATIVE GENERIC PREFERENCE-BASED MEASURES	• May be more sensitive to changes in health than EQ-5D in some contexts such as multiple sclerosis, personality disorders, and dementia • Similar to the EQ-5D, due to their generic nature, they can be used in a range of therapeutic areas	• It is unlikely that a single alternative measure will outperform EQ-5D in all contexts • No generic measure is likely to capture all outcomes that are of importance to patients
BOLT-ON QUESTIONS FOR EQ-5D	• There is no loss of information as the 'core' EQ-5D dimensions are retained • Ability to detect changes in health status may be improved relative to using the normal version of EQ-5D	• Bolt-ons are under development and there are currently no official bolt-ons or accompanying value sets • Including bolt-on questions on an ad-hoc basis will reduce comparability between CEAs
CONDITION-SPECIFIC PREFERENCE-BASED MEASURES	• Are typically derived with patient input and are therefore more patient-centric relative to generic measures • Due to the specific focus on a condition, these measures	• These measures focus on specific conditions and therefore are unable to provide a broad overview of a patient's health status – an effective treatment may increase utility substantially as the treatment directly affects

	ADVANTAGES	DISADVANTAGES
	are likely to be more sensitive to changes in health status because of treatment, relative to generic measures	the dimensions covered in the questionnaire, whereas broad HRQOL (captured by generic measures) might not have improved substantially • Utilities based on these measures can only be compared across CEAs that use the same measure
MAPPING TO EQ-5D FROM CONDITION-SPECIFIC NON-PREFERENCE-BASED MEASURES	• Mapping is a useful post-hoc solution when QOL data were not collected using preference-based measures • Mapping may also be helpful when synthesising evidence for a CEA	• The use of mapping (as opposed to direct measurement using generic preference-based measures) may increase the uncertainty around the HRQOL data in economic models, and therefore around CEA results • The use of mapping reduces comparability between CEAs

OFFICE OF HEALTH ECONOMICS
CONSULTING

6 Conclusion

Obtaining utilities using EQ-5D to capture QOL is recommended by numerous HTA agencies worldwide, including NICE and ICER. Whilst this enables comparisons across different health conditions, EQ-5D is limited in its ability to measure QOL and changes in QOL in some conditions. This is because EQ-5D is not broad enough in some cases to adequately capture all QOL dimensions of relevance to patients, and in other cases is not sensitive enough to identify changes in patients' QOL resulting from a treatment.

There are several alternatives to EQ-5D for describing QOL and obtaining utilities. As each has their own advantages and disadvantages, there is no single approach that can be viewed as always superior to others.

References

Brazier, J., Ara, R., Rowen, D. and Chevrou-Severac, H., 2017. A Review of Generic Preference-Based Measures for Use in Cost-Effectiveness Models. *PharmacoEconomics*, 35(S1), pp.21–31. 10.1007/s40273-017-0545-x.

Brazier, J., Ratcliffe, J., Saloman, J. and Tsuchiya, A., 2016. *Measuring and Valuing Health Benefits for Economic Evaluation*. 2nd ed. *Measuring and Valuing Health Benefits for Economic Evaluation*. Oxford: Oxford University Press.

Devlin, N.J. and Brooks, R., 2017. EQ-5D and the EuroQol Group: Past, Present and Future. *Applied Health Economics and Health Policy*, 15(2), pp.127–137. 10.1007/s40258-017-0310-5.

Finch, A.P., Brazier, J.E. and Mukuria, C., 2018. What is the evidence for the performance of generic preference-based measures? A systematic overview of reviews. *The European Journal of Health Economics*, 19(4), pp.557–570. 10.1007/s10198-017-0902-x.

Finch, A.P., Brazier, J.E. and Mukuria, C., 2019. Selecting Bolt-On Dimensions for the EQ-5D: Examining Their Contribution to Health-Related Quality of Life. *Value in Health*, 22(1), pp.50–61. 10.1016/j.jval.2018.07.001.

ICER, 2018. *A Guide to ICER's Methods for Health Technology Assessment*. [online] ICER. Available at: http://icer-review.org/wp-content/uploads/2018/08/ICER-HTA-Guide_082018.pdf .

Mukuria, C., Rowen, D., Harnan, S., Rawdin, A., Wong, R., Ara, R. and Brazier, J., 2019. An Updated Systematic Review of Studies Mapping (or Cross-Walking) Measures of Health-Related Quality of Life to Generic Preference-Based Measures to Generate Utility Values. *Applied Health Economics and Health Policy*, 17(3), pp.295–313. 10.1007/s40258-019-00467-6.

NICE, 2013. *Guide to the methods of technology appraisal*. London: NICE.

Rowen, D., Azzabi Zouraq, I., Chevrou-Severac, H. and van Hout, B., 2017a. International Regulations and Recommendations for Utility Data for Health Technology Assessment. *PharmacoEconomics*, 35(S1), pp.11–19. 10.1007/s40273-017-0544-y.

Rowen, D., Brazier, J., Ara, R. and Azzabi Zouraq, I., 2017b. The Role of Condition-Specific Preference-Based Measures in Health Technology Assessment. *PharmacoEconomics*, 35(S1), pp.33–41. 10.1007/s40273-017-0546-9.

About us
Founded in 1962 by the Association of the British Pharmaceutical Society, the Office of Health Economics (OHE) is not only the world's oldest health economics research group, but also one of the most prestigious and influential.

OHE provides market-leading insights and in-depth analyses into health economics & health policy. Our pioneering work informs health care and pharmaceutical decision-making across the globe, enabling clients to think differently and to find alternative solutions to the industry's most complex problems.

Our mission is to guide and inform the healthcare industry through today's era of unprecedented change and evolution. We are dedicated to helping policy makers and the pharmaceutical industry make better decisions that ultimately benefit patients, the industry and society as a whole.

OHE. For better healthcare decisions.

Areas of expertise

- Evaluation of health care policy
- The economics of health care systems
- Health technology assessment (HTA) methodology and approaches
- HTA's impact on decision making, health care spending and the delivery of care
- Pricing and reimbursement for biologics and pharmaceuticals, including value-based pricing, risk sharing and biosimilars market competition
- The costs of treating, or failing to treat, specific diseases and conditions
- Drivers of, and incentives for, the uptake of pharmaceuticals and prescription medicines
- Competition and incentives for improving the quality and efficiency of health care
- Incentives, disincentives, regulation and the costs of R&D for pharmaceuticals and innovation in medicine
- Capturing preferences using patient-reported outcomes measures (PROMs) and time trade-off (TTO) methodology
- Roles of the private and charity sectors in health care and research
- Health and health care statistics

CONSULTING | REPORT
JULY 2021

ohe.org

The Office of Health Economics A Company Limited by Guarantee of Registered No. 09848965
OHE Consulting Ltd Registered Company No. 09853113
OHE is a Charity Registration No. 1170829
Registration Office Southside, 105 Victoria Street, London SW1E 6QT