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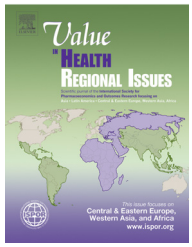

Interim EQ-5D-5L Value Set for Poland: First Crosswalk Value Set in Central and Eastern Europe

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ABSTRACT

Objective: To estimate an interim five-level EuroQol five-dimensional (EQ-5D-5L) value set for Poland on the basis of the crosswalk methodology developed by the EuroQol Group. **Methods:** On the basis of data from 3691 respondents from six European countries, the EuroQol Group has developed a method of obtaining interim value sets for the EQ-5D-5L by means of mapping to the available three-level EuroQol five-dimensional (EQ-5D-3L) value sets ("crosswalk" methodology). A significant part of the data in this study came from Polish respondents (n = 972; 26.3%). Poland is the first Central European country with EQ-5D-3L time trade-off–based social value set published. To obtain an interim EQ-5D-5L value set, we applied the crosswalk methodology to the Polish EQ-5D-3L value set. **Results:** Estimated Polish values for 3125 EQ-5D-5L health states are presented. Both EQ-5D-5L and EQ-5D-3L value sets have the same range (from −0.523 to 1.000), but different means (0.448 vs. 0.380) and medians (0.483 vs. 0.403), respectively. Proportionately fewer states worse than dead were observed in the EQ-5D-5L (5.4%) value set than in the EQ-5D-3L (13.2%) value set. **Conclusions:** The crosswalk-based value set is available for use in EQ-5D-5L studies in Poland to calculate health state utilities. It should be considered an interim value set until values based on preferences elicited directly from a sample representative of the Polish general population become available. This study helps users of the crosswalk algorithm understand the properties of the EQ-5D-5L values generated using this method, in comparison to EQ-5D-3L values obtained with the Polish time trade-off value set. It is likely that similar results would be observed for values sets in other countries because the same crosswalk methodology applies across all countries.

Keywords: EQ-5D, 5-level, models, statistical, quality of life, questionnaires, nonparametric.

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Introduction

The EuroQol five-dimensional (EQ-5D) is the most commonly used preference-based quality-of-life measure deriving health state utilities for use in cost-utility analyses [1]. A new five-level version of the EQ-5D (official name EQ-5D-5L) has been recently developed by the EuroQol Group [2,3]. The EQ-5D-5L appears to be a valid extension of the three-level system. Evidence suggests that it improves the measurement properties of the three-level EuroQol five-dimensional (EQ-5D-3L) by reducing the ceiling and improving discriminatory power, and establishing convergent and known-groups validity [4].

One of the advantages of the EQ-5D is the availability of country-specific value sets. These country-specific value sets, obtained from the general population, enable the derivation of index-based utility scores by applying weights to the dimensions and levels described by the EQ-5D health state classifier system when completed by respondents. EQ-5D-5L value sets based on preferences directly elicited from representative general population samples are under development [5–11].

In the meantime, an interim scoring method for the EQ-5D-5L was published that allows EQ-5D-5L values to be derived from any existing EQ-5D-3L value set [12]. Interim values are available for 10 countries (Denmark, France, Germany, Japan, The Netherlands, Spain, Thailand, the United Kingdom, the United States, and Zimbabwe), but none for Central or Eastern European countries [13].

Poland was the first Central European country to have a EQ-5D-3L time trade-off (TTO)-based social values set [14]. The Polish value set is recommended by the Agency for Health Technology Assessment in Poland guidelines [15], and it is used in health technology assessment dossiers submitted for reimbursement purposes [16] and other clinical studies in Poland [17,18].

In the present study, we aimed to estimate an interim EQ-5D-5L value set for Poland on the basis of the crosswalk methodology developed by the EuroQol Group and to compare and contrast

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values obtained using the EQ-5D-5L crosswalk with values based on the EQ-5D-3L.

Methods

The EuroQol Five-Dimensional

The EQ-5D is a standardized measure of health status developed by the EuroQol Group to provide a simple, generic measure of health for clinical and economic analyses and population health surveys [19]. It is cognitively undemanding and designed primarily for self-completion in paper and pencil version, but it can also be used in face-to-face interviews, by telephone, asking the proxy, or in electronic versions (personal digital assistant, tablet, and worldwide web) [20].

Both the EQ-5D-3L and the EQ-5D-5L consist of two pages: the EQ-5D descriptive system (page 2) and the EQ visual analog scale (EQ VAS) (page 3). The EQ-5D-5L descriptive system comprises the same five dimensions as the EQ-5D-3L (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression), but it has five levels of severity (no problems, slight problems, moderate problems, severe problems, and extreme problems) compared with three levels (no problems, some problems, and extreme problems) in the EQ-5D-3L. The respondent is asked to indicate his or her health state by ticking (or placing a cross) in the box against the most appropriate statement in each of the five dimensions. The responses for the five dimensions can be combined in a five-digit number describing the respondent's health state (from "11111," meaning no problems at all, to "55555," meaning extreme problems in all the five dimensions) [3]. A total of 243 and 3125 possible health states are defined in this way in the EQ-5D-3L and the EQ-5D-5L, respectively. EQ-5D health states, defined by the EQ-5D descriptive system, may be converted into a single summary index by applying a formula that essentially attaches values (also called weights) to each of the levels in each dimension. Information in this format is useful, especially, in cost-utility analyses. Value sets for all health states defined by the EQ-5D-3L descriptive system have been derived in several countries using the EQ VAS or TTO valuation techniques [14]. The EQ VAS records the respondent's self-rated health on a 20-cm long, vertical, visual analog scale with end points labeled "the best health you can imagine" and "the worst health you can imagine." This derives information about subjective perception of health, measured quantitatively by the individual respondents. The EQ-5D-3L and the EQ-5D-5L have now been translated into more than 170 and 110 languages, respectively.

Crosswalk Study

The objective of the Crosswalk study was to develop values sets for the EQ-5D-5L by means of a mapping ("crosswalk") to the currently available EQ-5D-3L value sets [12]. A total of 3691 respondents from six European countries (Denmark, England, Italy, The Netherlands, Poland, and Scotland) were included in the study. Participants had a range of different conditions (arthritis, diabetes, injuries, rheumatoid arthritis, liver disease, personality disorders, depression, cardiovascular disease, chronic obstructive pulmonary disease, others) and different levels of severity of reported problems. Respondents completed both the EQ-5D-3L and the EQ-5D-5L descriptive systems at the same time.

Crosswalk Methodology

Four mapping models to generate value sets for the EQ-5D-5L were explored: linear regression, nonparametric, ordered logistic regression, and item-response theory. The nonparametric model was chosen as a preferred approach for its simplicity and good predictive power [12]. For each health state described by the EQ-5D-5L system (n = 3125), the probability of reporting each of the 243 EQ-5D-3L health states was estimated (a 3125 × 243 matrix of transition probabilities) [13]. The EQ-5D-5L index value is calculated by multiplying the 243 transition probabilities by their corresponding EQ-5D-3L index values, and subsequently summing them up.

Polish EQ-5D-3L Value Set

Polish EQ-5D-3L valuation study used the modified Measurement and Value of Health protocol (from the Measurement and Value of Health study) [21]. Each of the 305 respondents from the general population valued 23 health states using the TTO method. Modeling, performed on more than 6700 valuations, resulted in the final choice of the classical random-effects model, without any interaction variables. Polish EQ-5D-3L value set characterizes with the lowest value of −0.523 for the 33333 health state and about 13% of states valued worse than dead. International comparisons showed that Polish values differ considerably from those elicited in Western European countries [14].

To obtain a Polish interim EQ-5D-5L value set, we applied the crosswalk methodology developed by the EuroQol Group [12] to the Polish EQ-5D-3L TTO-based value set [14]. We examined the differences between values obtained using each approach by comparing the mean 3L and 5L value scores and the distribution of values across all Polish respondents in the crosswalk study and within the value set. We also estimated the proportion of states with values less than 0 (worse than dead). The statistical analysis was conducted using the StatsDirect 2.7.8 software (StatsDirect Ltd, Altrincham, England).

Results

Estimated Polish values for 3125 EQ-5D-5L health states are presented in Appendix 1 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2014.06.001.

Both EQ-5D-5L and EQ-5D-3L value sets have the same range (from −0.523 to 1.000), but different means (0.448 vs. 0.381) and medians (0.483 vs. 0.406, respectively; Table 1). Sets differ in the distribution of values. In general, the EQ-5D-3L value set has proportionally more states worse than death (13.17% vs. 5.38%; Fig. 1) and also more states of "good health" (9.05% vs. 5.15% health states valued better than 0.8), whereas the EQ-5D-5L value set characterizes with more states valued moderately. Fig. 2 presents a graphical comparison of both sets. Moving from "bad health" to "good health" (from right side to left side on Fig. 2) results in a smaller change in the EQ-5D-5L index value than in the EQ-5D-3L index value.

Predicted Polish 5L values were compared with 3L values observed in the subpopulation of Polish respondents from the Crosswalk study (Table 2). Statistical measures of goodness of fit confirmed good predictive power of the crosswalk mapping algorithm for Polish respondents' data.

Discussion

We applied the crosswalk methodology developed by the EuroQol Group to the existing Polish EQ-5D-3L value set, elicited with the TTO method, to obtain an interim EQ-5D-5L value set. A number of 3125 health state values are presented and ready for use in economic and clinical analyses, based on the EQ-5D-5L, performed in Poland.

The Polish EQ-5D-5L crosswalk value set is the first and only 5L set in Central and Eastern Europe and as such may constitute an option in countries of the region in which the reimbursement

Table 1 – Comparison of Polish EQ-5D-3L and Polish EQ-5D-5L crosswalk value sets.

Parameter	Polish EQ-5D-5L crosswalk value set	Polish EQ-5D-3L value set
Number of health states	3125	243
Range	−0.523 to 1.000	−0.523 to 1.000
Mean ± SD	0.448 ± 0.254	0.381 ± 0.310
Median (lower quartile – upper quartile)	0.483 (0.282 – 0.642)	0.406 (0.155 – 0.630)
Centile 5 – Centile 95	−0.014 – 0.803	−0.150 – 0.848
Skewness	−0.542	−0.347
States worse than dead (index < 0), n (%)	168 (5.38)	32 (13.17)
States with index > 0.8, n (%)	161 (5.15)	22 (9.05)

EQ-5D-5L, five-level EuroQol five-dimensional; EQ-5D-3L, three-level EuroQol five-dimensional.

process is based on health technology assessment [22,23]. EQ-5D-5L crosswalk value sets are used worldwide in different clinical populations [24–26].

We found that the Polish interim EQ-5D-5L value set generated values that are to some extent more narrow than those generated by the EQ-5D-3L TTO value set; that is, there are relatively less health states valued "worse than death" or as good health (>0.8) and at the same time relatively more health states are valued moderately (0.4–0.8). A similar relationship can be observed for interim EQ-5D-5L value sets from other countries (Table 3). One of the possible explanations is a restriction on the range of the scale. A crosswalk method does not allow the value of 55555 to be lower than that of 33333 (the range of index values is restricted to the range of the EQ-5D-3L value set). Whether it is only the case of crosswalk methodology, or may be, to some extent, characteristic of the EQ-5D-5L, is unresolved at the moment.

This study helps users of the crosswalk for the EQ-5D-5L understand the properties of the EQ-5D-5L values generated using the crosswalk in comparison to values that would otherwise be obtained using the EQ-5D-3L algorithm for the Polish population. It is likely that similar results would be observed for value sets in other countries because the same crosswalk methodology applies across all countries.

There are limitations to the mapping approach, which is data dependent and requires additional assumptions and introduces additional errors. Although many approaches were explored by the EuroQol research team that published the crosswalk algorithm [12], it should be considered second best to direct utility measurement. The crosswalk mapped between descriptive systems, which did not allow the value set to address some of the limitations that a five-level system could ameliorate in theory, such as extending the continuum of the scale and reducing the gap in values between health states with mild problems and no problems.

Conclusions

A EQ-5D-5L value set was estimated using the crosswalk methodology, based on the Polish EQ-5D-3L values, and can now be applied to studies using the EQ-5D-5L. It should be considered an interim value set until supplanted by a value set for the EQ-5D-5L that is derived from preferences elicited directly from a representative sample of the Polish general population. This study helps users of the crosswalk algorithm understand the properties of the EQ-5D-5L values generated using this method, in comparison to EQ-5D-3L values obtained with the Polish TTO value set. It is likely

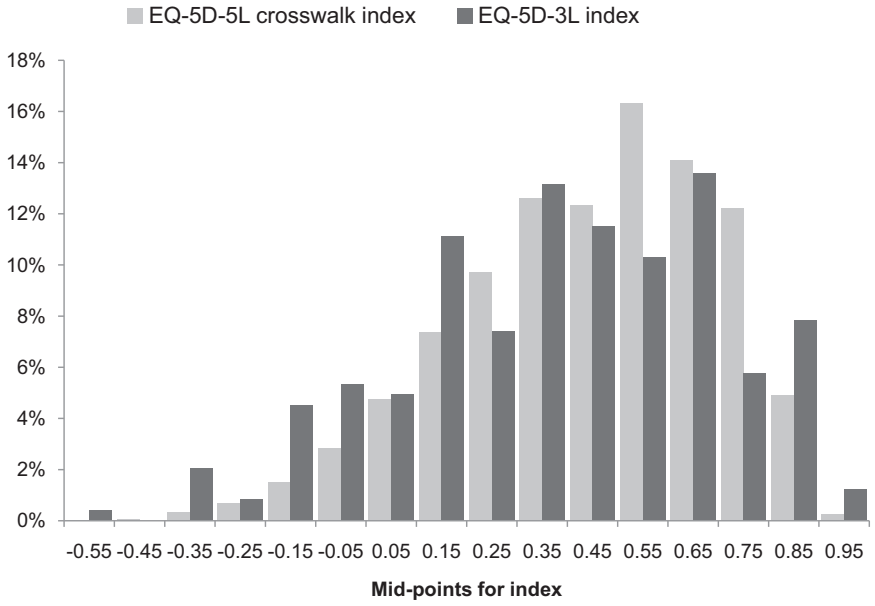

Fig. 1 – Histograms for Polish EQ-5D-3L and Polish EQ-5D-5L crosswalk value sets. EQ-5D-5L, five-level EuroQol five-dimensional; EQ-5D-3L, three-level EuroQol five-dimensional.

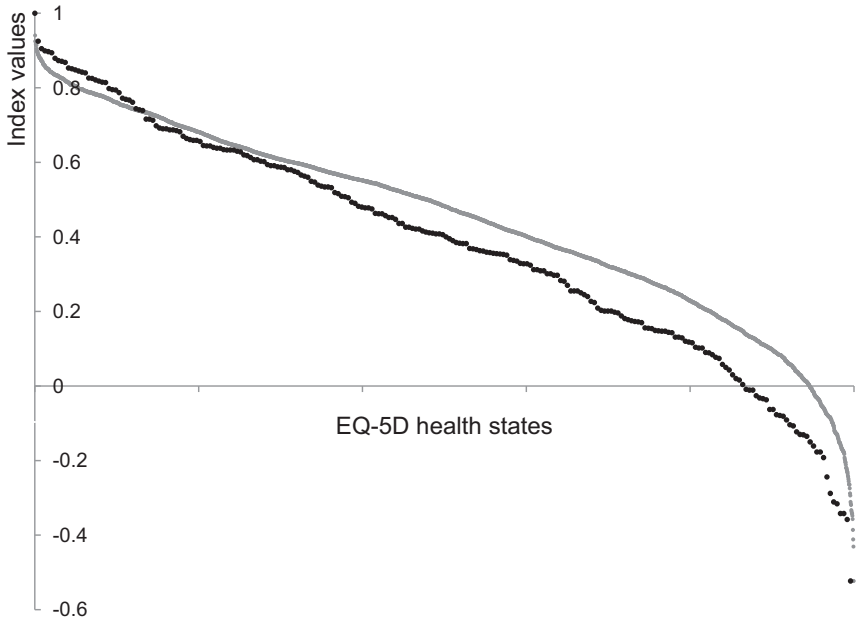

Fig. 2 – Graphical comparison of Polish EQ-5D-3L and Polish EQ-5D-5L crosswalk value sets (3L, black dots; 5L, gray line). EQ-5D, EuroQol five-dimensional; EQ-5D-5L, five-level EuroQol five-dimensional; EQ-5D-3L, three-level EuroQol five-dimensional.

Table 2 – Mean observed EQ-5D-3L indexes (Polish TTO value set) and EQ-5D-5L indexes based on Polish crosswalk value set in subpopulation of Polish respondents in the crossover study (n = 972).

EQ-5D-5L health state	n	Mean observed EQ-5D-3L value	SE	EQ-5D-5L crosswalk index value	MSE
11112	92	0.951	0.005	0.940	0.002
11113	16	0.928	0.008	0.925	0.001
11121	28	0.918	0.009	0.915	0.002
11122	63	0.896	0.006	0.887	0.003
11123	20	0.890	0.010	0.879	0.002
11222	24	0.844	0.008	0.848	0.002
21222	12	0.740	0.038	0.805	0.020
55533	12	0.090	0.000	0.090	0.000
55544	14	−0.142	0.068	−0.171	0.061

Note. Only health states with frequency > 10 are presented.
EQ-5D-5L, five-level EuroQol five-dimensional; EQ-5D-3L, three-level EuroQol five-dimensional; MSE, mean squared error; SE, standard error.

Table 3 – Distribution of health state values in EQ-5D-5L crosswalk value sets and EQ-5D-3L TTO value sets in 10 countries.

Country	% of states worse than dead (index < 0)		% of states with index > 0.8	
	5L crosswalk set	3L TTO set	5L crosswalk set	3L TTO set
Denmark	11.0	19.8	0.5	2.5
France	29.1	32.5	0.5	1.6
Germany	4.5	9.9	6.0	8.2
Japan	0.8	2.5	0.2	0.8
The Netherlands	9.5	14.8	1.2	4.5
Spain	27.9	37.4	1.1	4.1
Thailand	18.2	28.0	0	0
United Kingdom	26.7	34.6	0.6	2.5
United States	1.3	4.1	1.9	5.3
Zimbabwe	0.4	2.1	0.9	3.3

EQ-5D-5L, five-level EuroQol five-dimensional; EQ-5D-3L, three-level EuroQol five-dimensional; TTO, time trade-off.

that similar results would be observed for value sets in other countries because the same crosswalk methodology applies across all countries.

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Supplemental Materials

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