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Interim value set for the EQ-5D-5L in Iran using the Crosswalk method

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Abstract

Background: The EuroQol five-dimensional 5 level (EQ-5D-5L) value set is not currently available for the Iranian general public, while the value set for EuroQol five-dimensional 3 level (EQ-5D-3L) is available. The present study aimed to generate an interim EQ-5D-5L value set for the context of Iran.

Methods: The Iranian interim EQ-5D-5L value set was generated using the crosswalk method, which maps EQ-5D-3L and EQ-5D-5L responses. The EQ-5D-3L value set has previously been estimated by Time Trade-Off (TTO) method. The interim value set obtained for EQ-5D-5L was compared with the value set of EQ-5D-3L by using measures of mean, median, and skewness.The analysis was done using STATA version 15.

Results: The mean and median scores of the Iranian interim value set were 0.499 and 0.451 for EQ-5D-5L and 0.455 and 0.459 for Iranian EQ-5D-3L, respectively. The range of value for both EQ-5D-3L and interim EQ-5D-5L was -0.113 to 0.919. Data skewness of EQ-5D-3L and interim EQ-5D-5L was-0.099 and -0.114, respectively. In addition, the figure of distribution of value sets for both data sets had a tail extended towards the left. The states of "good health"(i.e., states with value>0.8) for the EQ-5D-3L value set were proportionally more than the Iranian interim EQ-5D-5Lcrosswalk value set (2.47% vs. 0.448%).

Conclusion: An EQ-5D-5L value set was generated using the crosswalk method for the Iranian general public, and now researchers and policy-makers can apply it to their economic and clinical analyses.

Keywords: Crosswalk, Value set, EQ-5D-5L, Iran

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Introduction

The EuroQol 5 dimensional (EQ-5D) is the most widely used preference-based instrument for calculating quality-adjusted life-years (QALYs) (1, 2). This instrument was developed by the EuroQoL group in two common versions: the EuroQol 3 Dimensional three levels (EQ-5D-3L) (3), the EuroQol 5 Dimensional five levels (EQ-5D-5L) (4). The EQ-5D-3L includes two parts: a classification system of five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) with 3 levels of response options (no problems, some or moderate problems, and extreme problems) per dimension and a visual analogue scale (VAS).The five-dimensional classification system of EQ-5D-3L generally describes 3^5 (243) unique health states. The VAS is a vertical line with a range of 0 (the worst imaginable health) to 100 (the best imaginable health) that respondents record the current health status on

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↑What is "already known" in this topic:
The use of the EQ-5D-5L value set is increasing in measuring health-related quality of life and in economic evaluation studies of healthcare. However, Iranian value set of the EQ-5D-5L is not available.

→What this article adds:
This study contains the Iranian EQ-5D-5L value set based on the cross walk method. Thus, this study provides the use of the EQ-5D-5L in research or clinical practice in Iran.

it (3, 4).

The EQ-5D-5L is another version of EQ-5D that has been improved in the number of dimension levels (4). Similar to the EQ-5D-3L, the EQ-5D-5L has two parts: a classification system of five dimensions, with such a difference that each of the EQ-5D-5L dimensions covers 5 levels of possible responses (no problems, slight problems, moderate problems, severe problems, and unable to/extreme problems) (4); as well as a visual analogue scale (VAS). Therefore, its classification system describes 5^5 (2134) unique health states. Various studies have been increasingly using the EQ-5D-5L in recent years because evidence shows that expanding the range of responses from 3 to 5 levels on each dimension improves the sensitivity of the instrument to changes in health and decreases its ceiling effects (5).

To use both EQ-5D-3L and EQ-5D-5L, the relevant value sets are required to transfer the EQ-5D responses into utility values for calculating QALYs (6). Currently, the EQ-5D-3L value set is available for the Iranian general public (7), but the EQ-5D-5L value set is not. The EQ-5D-5L value set is available for some countries in Asia such as South Korea (8), Indonesia (9), and Thailand (10). The EQ-5D-5L value set of these countries is not appropriate to estimate the QALYs for the Iranian population because of differences in demographic and cultural backgrounds, etc. (11) To overcome this problem, the EuroQoL group has developed the crosswalk method (12). This method makes the relationship between EQ-5D-5L and EQ-5D-3L responses and, by doing so, can generate EQ-5D-5L value set when the value set of EQ-5D-3L is available for every country. Considering the report of the EuroQoL group, to date, an interim EQ-5D-5L value set is not available for Iran and for the Eastern Mediterranean Region (EMRO) (13). As pointed out by several studies, compared with EQ-5D-3L, EQ-5D-5L benefits from good psychometric properties (14-16). In line with these findings, the demand for EQ-5D-5L will apparently grow in Iran. The value set of EQ-5D-5L should be determined for the Iranian population in order to use the EQ-5D-5L instrument in cost-utility analysis or other outcome research effectually. Hence, our purpose in the study is to generate an interim EQ-5D-5L value set for the Iranian general public based on the crosswalk method presented by the EuroQol Group.

Methods

Iranian EQ-5D-5L value set

This study is a secondary analysis based on the value set of the EQ-5D-3L generated by Goudarzi et al. in 2019 for the general public in Iran. The Iranian value set of EQ-5D-3L had been previously generated using the standard TTO approach in a sample of the Iranian general public. To develop the EQ-5D-3L value set, a total of 43 (42 plus unconscious health states) of 243 health states had been selected for the interview. Forty of these states were divided into 5 groups, and the remaining 3 states (including unconscious ones) were added into all groups, making 11 states to be evaluated by each interview group. In parallel, each health state had been completed by 20 individuals. The Iranian EQ-5D-3L value set showed that it had a distribution of -0.113 ("33333" indicating the worse health state) to 0.98("11111 "indicating the best health state) (7). Health state "11111" for both the Zimbabwean EQ-5D-3L value set (17) and the Canadian EQ-5D-5L value set (18) was not 1, following the rationale initially put forward by Dolan (19).

We used the Iranian value set of EQ-5D-3L to generate the Iranian interim EQ-5D-5L value set using the crosswalk method developed by the EuroQol Group (12). Then the interim value set obtained for EQ-5D-5L was compared with that of EQ-5D-3L using measures of mean, median, and skewness. In addition, we categorized health states to mild, moderate, and severe based on Oppe's study (20). The health states were classified with a utility value of more than 0.70 as mild conditions, while those with utility values of 0.35 to 0.70 and less than 0.35 were categorized as moderate and severe health conditions, respectively. All analyses were performed using STATA version 15.

Crosswalk Study

The Crosswalk study was conducted to generate value sets for the EQ-5D-5L when EQ-5D-3L is available. Crosswalk value sets had been previously developed for 3,691 respondents from six countries: Denmark, England, Italy, the Netherlands, Poland, and Scotland. The respondents had completed both the EQ-5D-3L and EQ-5D-5L, and then the transition probability of each of the 243 health states in EQ-5D-3L to each of the corresponding health sates in EQ-5D-5L had been estimated. Finally, the EQ-5D-5L index value had been calculated by multiplying the 243 transition probabilities by each of the corresponding utility weight in EQ-5D-3L health states, and subsequently summing them up by the following equation:

$$\text{EQ-5D-5L}_{32145} = \sum_a^3 \sum_b^3 \sum_c^3 \sum_d^3 \sum_e^3 (P_{3L\_abcde \rightarrow 5L\_32145} \times U_{3L\_abcde})$$

Where $P_{3L\_abcde \rightarrow 5L\_32145}$ indicates transition probability from the 'abcde' state in EQ-5D-3L to '21243' state in EQ-5D-5L, and U_{3L_abcde} presents utility weight in the 'abcde' state in EQ-5D-3L (11).

Results

Iranian Interim values for 3125 health states of EQ-5D-5L were estimated (*For the formula and the data, please contact the corresponding author). Therefore, the EQ-5D-5L value set can be used to estimate the QALYs in Iran.

Table 1 shows that the mean and median of interim value sets for EQ-5D-5L were 0.499 and 0.451, while those for Iranian EQ-5D-3L were 0.455, 0.459, respectively. The range of values for both the EQ-5D-3L and interim EQ-5D-5L was -0.113 to 0.919. Data skewness for the Iranian interim EQ-5D-5Lvalue set (sk=-0.099) was lower than that of the Iranian EQ-5D-3Lvalue set (sk=-0.114). Also, Figure 1 shows that both data sets have their tail extended towards the left. The states of "good health"(i.e., states with value>0.8) for the EQ-5D-3L value set were proportionally more than the Iranian EQ-5D-5Lcrosswalk value set (2.47% vs. 0.448%) (Table 1).

Table 2 presents that values for level 1 of the EQ-5D-3L are the same as level 1 of the EQ-5D-5L, values for level 2

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Table 1. Comparison of EQ-5D-3L value set and interim EQ-5D-5L value set

Parameter	EQ-5D-3Lvalue set	Interim EQ-5D-5L value set
Number of health states	243	3125
Mean(SD)	0.455 (0.177)	0.449 (0.141)
Range	-0.113 to 0.919	-0.113 to 0.919
Median (IQR)	0.459 (0.253)	0.451 (0.919)
Centile 5 – Centile 95	0.160 to 0.741	0.214 to 0.678
Skewness	-0.099	-0.114
States with index > 0.8, n (%)	6 (2.47)	14 (0.448)

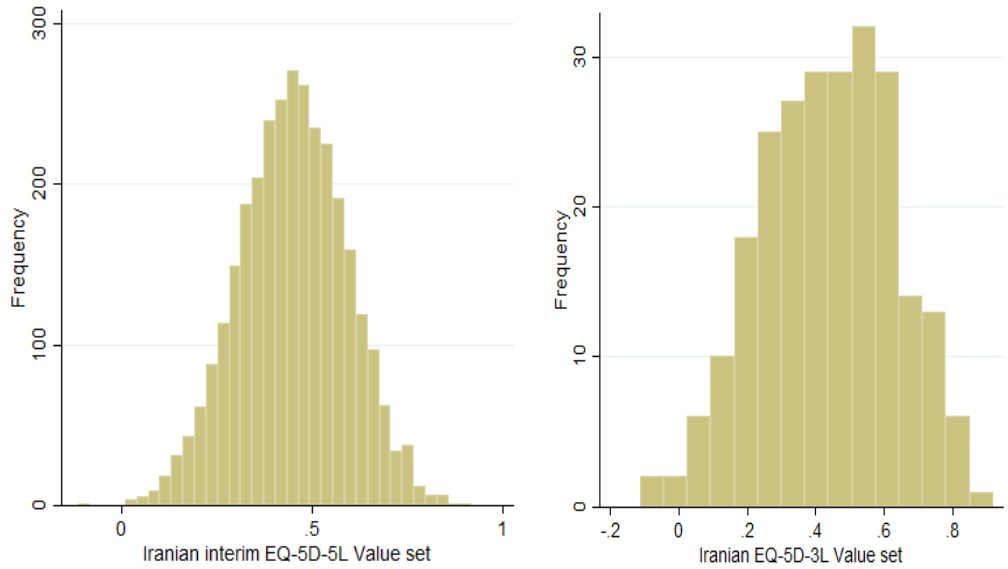

Fig. 1. Distribution of value sets of Iranian interim EQ-5D-5L and Iranian EQ-5D-3L

of the EQ-5D-3L are the same as level 3 of the EQ-5D-5L, and those for level 3 of EQ-5D-3L are the same as level 5 of the EQ-5D-5L. In addition, the values of intermediate states of equivalent levels from the two descriptive systems are the same. For example, the value of intermediate state 23212 on the EQ-5D-3L was the same as the 35313 state on the EQ-5D-5L.

Figure 2 shows that the mean of value sets of health states with a utility value of more than 0.70 (mild) and between 0.35 to 0.70 (moderate) for interim EQ-5D-5L was larger

Table 2. Equivalent levels from the two descriptive systems

EQ-5D-3L		Interim EQ-5D-5L	
Health state	Value state	Health state	Value set
11111	0.919	11111	0.919
22222	0.465	33333	0.465
33333	-0.113	55555	-0.113
23212	0.408	35313	0.408

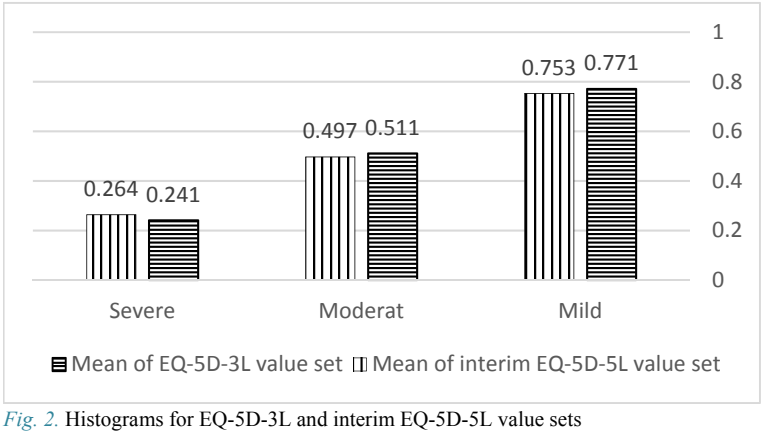

Fig. 2. Histograms for EQ-5D-3L and interim EQ-5D-5L value sets

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than that of the EQ-5D-3L.

Discussion

The EQ-5D-5L is the improved version of the EQ-5D instrument that is used for calculating QALYs. Its use has recently been increased in health technology assessment and clinical studies. In parallel, we generated the interim EQ-5D-5L value set for the Iranian general public using the crosswalk method by the EuroQol Group. Therefore, now, there is a value set for EQ-5D-5L in order to be used in economic and clinical analyses done in Iran.

When comparing value sets generated by instruments, the interim EQ-5D-5L value set generated values that are to some extent narrower than those generated by the EQ-5D-3L value set; that is, the health states valued "good health"(i.e., states with value>0.8) in the EQ-5D-3L value set were more than those of the Iranian EQ-5D-5Lcrosswalk value set (2.47% vs. 0.448%). In fact, the crosswalk method generated more values in the middle of the possible range, while EQ-5D-3L generated more values at the extremes. These results are consistent with findings obtained from the crosswalk-based value sets of EQ-5D-5L in other countries (21). This similarity can be explained by considering the restriction on the range of the scale. In the crosswalk method, the value of 55555 cannot be lower than that of 33333 (the range of index values is restricted to the range of the EQ-5D-3L value set). It is not clear whether it is only the case of crosswalk methodology, or maybe, somehow, a characteristic of the EQ-5D-5L.

Distribution of value sets of both the interim EQ-5D-5L value set and the EQ-5D-3L value set showed that there was the negative skewness in a unimodal distribution of both instruments. In fact, they generated a mass of observations at 0.919 corresponding to individuals who are in the best health state.

Based on the findings, values of health states of EQ-5D-3L match the values of corresponding health states in interim EQ-5D-5L. This result is in line with the fact of transition probability that was used in the crosswalk method to map EQ-5D-5L and EQ-5D-3L responses. In addition, the findings of the 'equivalent' levels of the two descriptive systems of instruments confirmed this fact. The findings are consistent with the results reported in comparing value set characteristics for matched states between EQ-5D-3L and interim EQ-5D-5L for UK (22).

There is a limitation to this study, which should be taken into account. The use of the mapping method for generating the EQ-5D-5L value set, though not ideal, is the only available method for transferring the EQ-5D -3L to EQ-5D -5L value sets. Some of the limitations such as expanding the continuum of the scale and decreasing the gap in values between health states with mild and no problems could be improved by a five-level system in theory, whereas the crosswalk mapping between descriptive systems did not allow the value set to address these limitations.

Conclusion

Interim EQ-5D-5L value set was generated for the Iranian general public. It enables researchers and policymakers to do economic and clinical analyses using the EQ-5D-5L. The general findings for the interim value set of this study were similar to those of the other countries because the applied crosswalk method is the same for all countries.

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Conflict of Interests

The authors declare that they have no competing interests.

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