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Population-Based Preference Weights for the EQ-5D Health States Using the Visual Analogue Scale (VAS) in Iran

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Abstract

Background: Health-related quality of life (HRQoL) is used as a measure to valuate healthcare interventions and guide policy making. The EuroQol EQ-5D is a widely used generic preference-based instrument to measure Health-related quality of life.

Objectives: The objective of this study was to develop a value set of the EQ-5D health states for an Iranian population.

Patients and Methods: This study is a cross-sectional study of Iranian populations. Our sample from Iranian populations consists out of 869 participants, who were selected for this study using a stratified probability sampling method. The sample was taken from individuals living in the city of Tehran and was stratified by age and gender from July to November 2013. Respondents valued 13 health states using the visual analogue scale (VAS) of the EQ-5D. Several fixed effects regression models were tested to predict the full set of health states. We selected the final model based on the logical consistency of the estimates, the sign and magnitude of the regression coefficients, goodness of fit, and parsimony. We also compared predicted values with a value set from similar studies in the UK and other countries.

Results: Our results show that the HRQoL does not vary among socioeconomic groups. Models at the individual level resulted in an additive model with all coefficients being statistically significant, $R^2 = 0.55$, a value of 0.75 for the best health state (11112), and a value of -0.074 for the worst health state (33333). The value set obtained for the study sample remarkably differs from those elicited in developed countries.

Conclusions: This study is the first estimate for the EQ-5D value set based on the VAS in Iran. Given the importance of locally adapted value set the use of this value set can be recommended for future studies in Iran and In the EMRO regions.

Keywords: Visual Analog Scale, Quality of life, Population Groups, EQ-5D, Preference-Based Health Measures , Health Related Quality of Life

1. Background

The quality-adjusted life year (QALY) is a paramount instrument to assess the health outcomes of medical interventions in cost-effectiveness research (1). A preference value set from a sample of populations containing such sets of populations with diverse diseases provides a standard instrument to ensure comparability between outcomes across diseases (2).

Two types of instruments have been developed to capture the HRQoL. Generic instruments measure the general impact of a disease on overall patient life, which allow the benefits of healthcare to be captured. Another type of instrument assesses the specific dimensions of a disease that may not be reflected by a generic instrument (3).

One of most widely used generic instruments for the HRQoL is the EuroQol EQ-5D. It has five generic domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, which are included in the first part of the instrument (2). The second part contains the visual analog scale (VAS) of the EQ-5D. The VAS is a scale from 0 to 100 that evaluates patients' health state from the best health state (score of 100) to the worst health state (score of 0) (4). This instrument as a rating scale is used to capture values given to "societal preferences" around the world (2, 5-12).

The VAS of the EQ-5D is mostly used for specific patient groups; however, there are studies in which it is used to elicit value sets from general populations in different developed countries (7, 13). The valuation of health state can be performed making use of different methods. These methods are the VAS, the time trade-off (TTO), and the standard gamble (SG) method (6). In this study, we used the VAS method to derive values for the EQ-5D.

2. Objectives

The purpose of this study was to describe the HRQoL, expressed with EQ-5D dimensions and in mean VAS scores and in mean EQ-5D index values, in the general population, by socioeconomic groups, in Iran.

3. Patients and Methods

3.1. The EuroQol EQ-5D

The EQ-5D defines the level of "mobility" (MO), "self-care" (SC), "usual activities" (UA), "pain/discomfort" (PD), and "anxiety/depression" (AD) (14). The response options are no problem with health (score of 1), some problems or moderate problems (score of 2), and severe problems (score of 3). Considering all possible health states, 243 (3^5) health states can be obtained (15). Response options would abbreviate the health states of participants. An abbreviation 12133, for instance, shows a health state with no problems in walking, some problems with self-care, no problems with performing regular activities, extreme pain, and extreme anxiety.

The VAS evaluates the health state in a visual analogue anchored to 100 for the "best health state" at the top and to 0 for the "worst health state" at the bottom (7). Patients with the same perceived health state by the EQ-5D may assign different values to their health state in this scale.

3.2. Health State Valuation

We make use of Dolan et al.'s (5) approach to select health states in this study. Based on this approach, as a minimum set of health states, 43 states are required to allow the value set to be estimated for a population.

All respondents valued 13 imaginary EQ-5D states. These states belong to 8 EQ-5D health states, which are drawn from a set of 40 states. These sets of health states contain severity and "11111," "22222," "33333," "unconscious," and "death" states given to all respondents using the VAS from 0 to 100.

Overall, there are 43 health states, which were divided into 5 groups of health states. Five scenarios were common in all groups and therefore were evaluated by all respondents, and 8 other scenarios are specific. A list of value sets is presented in Table 1.

Table 1. Sets of Health States Valued by the Respondents for Each Category

Group A	Group B	Group C	Group D	Group E
Common for all Respondents				
11111[a]	11111[a]	11111[a]	11111[a]	11111[a]
Dead[a]	Dead[a]	Dead[a]	Dead[a]	Dead[a]
22222	22222	22222	22222	22222
33333[a]	33333[a]	33333[a]	33333[a]	33333[a]
Unconscious	Unconscious	Unconscious	Unconscious	Unconscious
Very Mild States				
11112	11121	11211	12111	21111
Mild States				
11122	11131	11113	11312	21222
21312	12211	11133	21133	12121
Moderate States				
13212	32331	13311	22122	12222
21323	32211	12223	22331	21232
Severe States				
33232	23232	23321	13332	22233
22323	32223	32232	33321	33323
23313	33212			

[a]These health states are valued twice because they are presented on both pages.

3.3. Study Sample

This survey is the cross-sectional study of the Iranian general adult population (18 years of age and older). We select a sample from this population via a stratified probability sampling method. Assuming that around 170 respondents were required to evaluate each health state (16), a total of 870 people were selected for the interview.

Sampling and data collection has three steps. In step 1, the entire population of Tehran was stratified using 22 regions (districts) of the city. The number of subjects assigned per region was in proportion to the population size. Each district is then divided into several fields. In step 2, the data collection fields were randomly selected per district. In step 3, 10 households per field were randomly invited for the interview. Families who were unwilling to participate in the study were replanced by new ones on a random basis.

The study was approved by the ethics committees in the Tehran University of Medical Sciences (number 17591, dated May 1, 2012). All participants signed a consent form before completing the questionnaire.

3.4. Data Management and Statistical Analyses

The data were collected in the city of Tehran, Iran from July to November 2013. Eight trained interviewers interviewed the study participants. Two training workshops were conducted by Reza to practically tutor interviewers on how to interview the participants. Workshop lasted for 3 hours during which a detail guide for the interview was given to interviewers using audiovisual materials. A guide contains a basic description of methods for capturing health preferences based on theories of VAS and EQ-5D-specific interviewer's tasks. A number of interviews were simulated to improve interviewers' skills.

The quality of field work was monitored both through direct supervision and cross-examination of 15% of the entire sample size. As such, 120 respondents were re-interviewed by telephone to evaluate the validation of interviews and double-check some of the demographic characteristics, e.g., age, household dimension, and occupational status. No incentives (monetary or non-monetary) were given to the respondents before or after the interviews. All statistical analyses were conducted using STATA SE 12.0.

3.5. Valuation Method

Respondents received a copy of the EuroQol instrument with a description of health states. The instrument consists of two pages. Per page, there are also 2 columns. Eight health states are listed on page 1 and six on page 2, which will be valued on a 20 cm thermometer similar to the VAS. Two extreme endpoints represent the "best imaginable health" (score of 100) and the "worst imaginable health" (score of 0). Participants rated the health states by drawing a line from the health state box to a point on the VAS that reflects their value for the health state. Having valued 14 health states, all respondents determined their value for death based on the VAS.

Based on a basic assumption set by the EuroQol EQ-5D (7), a value given to a health state by a respondent is a description of the health state for only one year and quality of life afterwards is not known.

Since the cost utility analysis requires values between 0 and 1 from death to full health, values for the VAS were modified at the patient level. The "best health" (100) was modified to 11111 (full health) and "worst health" to 0 (Death). For the modification, the following formula was applied:

$$V_h = \frac{S_h - S_{\text{dead}}}{S_{11111} - S_{\text{dead}}} \quad (1)$$

Where V_h is a VAS-adjusted score for a health state h, Sh is a respondent's unadjusted VAS score for state h, S_{dead} is the respondent-assigned VAS score for the health state "death," and S_{11111} is respondent-assigned VAS score for a state 11111. Modified VAS values lower than –1 and larger than +1 have been truncated to –1 and +1, respectively (8).

3.6. Modeling

We modeled data by introducing responses into appropriate regression models. Since respondents may have different patterns of responses, the heteroscedasticity of responses throughout all health states was checked using the Breusch-Pagan test. Subsequently, we compared the simple generalized least-squares (GLS) regressions with random effects (RE) or fixed effects (FE) models. The GLS regression model and FE models were developed based on Hausman's test.

The number of dependent variables in the regression models was computed as 1 minus the observed rescaled VAS value ranging from 0 to 2, where lower numbers correspond to a higher utility. We investigated several models to find a best fit regression model for our data. A different set of independent variables is therefore investigated where the selection of these variables was based on an evidence of previous research (2, 5, 8-11, 14, 15, 17-22). All models were tested and compared regarding the number of incoherent coefficients, the statistical significance of coefficients, the amount of explained variance (R^2), the mean absolute error (MAE), and the Akaike information criterion (AIC). MAE is the absolute difference between the observed and the estimated value in each health state. We examined the assumptions of the model using various tests.

We reported the results of the model that better satisfy all the criteria specified below and compared them the main effects, the UK model (23), and the US model (24). Subsequently, some variables were adopted to account for interactions between different dimensions in an Iranian model, which is further called a final model.

Thus, the value y placed on a health state was as follows:

$Y = \alpha + \beta_{dl} X_{dl} + \epsilon$

Where β is the vector of coefficients and X is the vector of dummy variables for dimension d at level l, where X_{dl} represents ten dummy variables indicating the presence of either level 2 or level 3 in a given health dimension; d stands for dimension and l for either level 2 or level 3.

The dependent variable (y) in the regression analysis was computed as 1 minus the modified VAS value. It represents the measure of disutility by subtracting the value of a given health state from the value of full health.

The model included the following independent variables:

- A dummy variable for level 2 in each dimension (some problems=1; otherwise 0).

- A dummy variable for level 3 in each dimension (extreme problems=1; otherwise 0).

- N2 = 1 if any dimension is at either level 2 or level 3; otherwise 0 (deviation from full health).

- N3 = 1, if any dimension is at level 3; otherwise 0.

- An ordinal variable D1 that represents number of deviations from full health beyond the first (i.e., values ranging from 0 to 4).

- An ordinal variable I3 that represents the number of dimensions at level 3 beyond the first.

- The square of I3 term allowing for non-linearity in an association with the dependent variable.

- The square of I2, an ordinal variable that represents number of dimensions at level 2 beyond the first (5, 11, 17, 24).

3.7. Exclusion Criteria

Respondents were excluded from the dataset when they satisfied the following criteria:

- Completely missing VAS data,
- The same value is given to all health states,
- < 4 health states valued,
- Death ≥ 11111,
- 11111 and / or death that are/is not valued, and
- The number of logical inconsistencies is more than 1 (2, 8, 20-23, 25)

An inconsistency is present when a state that is logically worse is ranked higher than a logically better health state. To clarify more, for a pair of health states, if state 13111 is valued higher than state 12111, respondent expresses a preference for 13111 over 12111. This form of inconsistency is defined as internal inconsistency. However, it is worth noting that a valuation can only be logically inconsistent within the same dimension. If in above mentioned case, respondent has different preferences across different dimensions, ceteris paribus, it cannot be said that 13111 is logically worse than 11121 (8).

4. Results

In total, 869 respondents participated in the survey. Having excluded 16 participants due to meeting at least one of the exclusion criteria, a total of 853 respondents are included in the valuation sample. The interviews lasted 25 min on average.

Table 2 presents the demographic characteristics of respondents. The observed distribution of responses demonstrates an expected distribution in the general public. However, we could directly compare the observed distribution of responses with the Iranian population only per sex and age (stratification variables). Population data are unavailable for the other characteristics to make use for comparison with our data.

Table 2. Sociodemographic Characteristics and Comparison With the General Adult Population[a]

Variables	Total Sample (n = 869)	Iranian General Population[b]
Sex		
Male	480 (55.24)	42407049 (50.48)
Female	389 (44.76)	41585166 (49.52)
Age		
18 - 24	176 (20.25)	11275668 (20.94)
25 - 34	246 (28.31)	15644578 (29.05)
35 - 44	166 (19.10)	10477767 (19.46)
45 - 54	147 (16.92)	7557889 (14.03)
55 - 64	87 (10.01)	4543026 (8.43)
65 >	47 (5.41)	4343091 (7.98)
mean (SD)	38.16 (14.73)	29.86 (NA)
Educational status		
Low (< 10)	186 (21.45)	NA
Middle (10 - 13)	317 (36.56)	NA
High (14 >)	364 (41.98)	
Smoking behavior		NA
Current smoker	121 (13.94)	NA
Former smoker	44 (5.07)	NA
Non-smoker	703 (80.99)	NA
Average household size		
1 - 2 elements	148 (17.03)	5402339 (25.5)
3 - 4 elements	544 (62.60)	11313136 (53.4)
5 or more elements	177 (20.37)	4470172 (21.1)
mean (SD)	3.71 (1.31)	3.55 (NA)
EQ-5D related health problems		
Mobility (MO)	94 (10.82)	NA
Self-care (SC)	11 (1.27)	NA
Usual activities (UA)	35 (4.03)	NA
Pain/discomfort (PD)	299 (34.41)	NA
Anxiety/depression (AD)		
EQ-VAS own health	79.49 (16.01)	NA
81 - 100	405 (46.61)	NA
61 - 80	340 (39.13)	NA
41 - 60	98 (11.28)	NA
21 - 40	20 (2.30)	NA
0 - 20	6 (0.69)	NA
mean (SD)	290 (33.37)	NA

Abbreviation: NA, not available.
[a]Values are expressed as No. (%).
[b]18 years old or more according to the national statistical center, the Islamic Republic of Iran, 2012 (26).

The most common health state problem is pain/discomfort, with 34.41 % of the sample suffering from this. Anxiety/depression is in second place; 33.37 % of the sample are living with anxiety/depression. The average overall health state value in this study sample based on the VAS is 79.58 (SE = 0.54), ranging between 10 and 100.

Each respondent valued 13 health states (including "unconscious" and "death") using the VAS procedure. The mean values for 42 health states (after the transformation) range from 0.784 for a best observed health state (11121) to -0.07 for the worst observed state (33333). The mean value for the "unconscious" states is -0.167 (SD = 0.82).

The models presented in Table 3 are the best among several models relying on diverse combinations of independent variables. The final model best fits our responses. All parameters made significant contributions to this model. Thus, this model presents a societal tariff for the EQ-5D in Iranian adults. Based on Hausman's test, RE specifications are not presented since the estimates of the FE models are consistent with the sample.

As an example, we calculate the predicted values for state "21232" based on the above formula for the Iranian model (Table 4).

Table 3. Parameter Estimates and Fit Statistics of Individual's Level Models Using GLS Regression and FE Models[a,b,c]

	GLS/Fix Effect									
	Main Effects Model		**UK Model (N3)**		**US Model (D1)**		**I3 Model**		**Final Model (I3 Square)**	
	β	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Statistical parameters										
MO2	0.1061	0.0064	0.1012	0.0064	0.2974	0.0100	0.1012	0.0064	0.0990	0.0064
MO3	0.1217	0.0082	0.1197	0.0082	0.4810	0.0150	0.2455	0.0112	0.1556	0.0091
SC2	0.1993	0.0067	0.2101	0.0066	0.3710	0.0091	0.2101	0.0066	0.1993	0.0067
SC3	0.2153	0.0081	0.2127	0.0080	0.5356	0.0141	0.3385	0.0110	0.2464	0.0088
UA2	0.1636	0.0076	0.1195	0.0079	0.3174	0.0117	0.1194	0.0079	0.1469	0.0078
UA3	0.2344	0.0078	0.1670	0.0088	0.4867	0.0115	0.2931	0.0085	0.2427	0.0079
PD2	0.0997	0.0059	0.1152	0.0060	0.2695	0.0086	0.1152	0.0060	0.1038	0.0059
PD3	0.1836	0.0066	0.1532	0.0068	0.4637	0.0117	0.2791	0.0088	0.2078	0.0071
AD2	0.1432	0.0064	0.1384	0.0064	0.2674	0.0087	0.1384	0.0064	0.1452	0.0064
AD3	0.2280	0.0069	0.1882	0.0072	0.4870	0.0110	0.3142	0.0086	0.2545	0.0074
Constant (N2)	0.1111	0.0039	0.0960	0.0040	0.0308	0.0047	0.0960	0.0040	0.1059	0.0040
N3			0.1259	0.0078						
D1					-0.2332	0.0092				
I2square					0.0111	0.0013			-0.0089	0.0010
I3					-0.1402	0.0144	-0.1259	0.0077		
I3square					0.0054	0.0018				
Goodness-of-fit statistics										
R^2	0.55		0.56		0.56		0.56		0.55	
MAE	0.20		0.20		0.19		0.20		0.20	
AIC	-2523		-2801		-3547		-2802		-2607	
BIC	-2442		-2713		-3437		-2714		-2518	

Abbreviations: AIC, Akaike information criterion; MAE, mean absolute error; SE, standard error.
[a]Notes: Dummy dimentions 2 (equal 1 if the Dimensions level = 2, 0 for otherwise); Dummy dimentions 3 (equal 1 if Dimensions level = 3, for otherwise = 0); N2 = 1 if any dimension is at either level 2 or level 3, N3 (1 if any dimension is at level 3; otherwise = 0). D1 (the number of dimensions at level 2 or level 3 beyond the first, ranging from 0 to 4); I3 (the number of dimensions at level 3 beyond the first, ranging from 0 to 4), I3sq (the square of I3), and I2sq (the square of the number of dimensions at level 2 beyond the first).
[b]All β are statistically significant at $P < 0.05$.
[c]Statistical Results: Breusch-Pagan test, $\chi2(1) = 578.13$, $P = 0.0001$; Hausman's test, $\chi2(1) = 23.96$, $P = 0.0077$.

Table 4. Iranian VAS Tariff for EQ-5D Health State 21232

Iranian VAS Tariff	Values
Full health (11111)	1.0000
Constant term	-0.1059
Mobility (MO)	-0.0990
Self-care (SC)	-0.0000
Usual activities (UA)	-0.1469
Pain/discomfort (PD)	-0.2078
Anxiety/depression (AD)	-0.1452
I3 Square	-0.0000
Tariff value for health state 21232	0.2952

Table 5. Comparison of Observed and Predicted Values Based on the Fixed Effects Model[a,b]

State	Observed	Predicted	Difference	State	Observed	Predicted	Difference
11111	0.9727	0.8941	0.0786	21323	0.1621	0.2030	-0.0409
11112	0.7500	0.7488	0.0012	22112	0.3574	0.4505	-0.0931
11113	0.4642	0.6396	-0.1754	22121	0.3771	0.4919	-0.1148
11121	0.7837	0.7903	-0.0066	22122	0.2249	0.3467	-0.1218
11122	0.6461	0.6450	0.0010	22222	0.2205	0.1998	0.0207
11131	0.5795	0.6862	-0.1068	22233	0.0746	-0.0046	0.0792
11133	0.3041	0.4407	-0.1366	22323	0.1607	0.0036	0.1570
11211	0.6452	0.7472	-0.1020	22331	0.1499	0.1541	-0.0041
11312	0.4315	0.5061	-0.0747	23232	0.2739	0.0576	0.2163
12111	0.6125	0.6947	-0.0823	23313	0.1119	0.0871	0.0248
12121	0.5999	0.5909	0.0090	23321	0.2564	0.2111	0.0453
12211	0.4961	0.5478	-0.0517	32211	0.2558	0.3922	-0.1364
12222	0.2163	0.2988	-0.0825	32223	0.2358	0.0429	0.1930
12223	0.1417	0.1896	-0.0479	32232	0.0800	0.0480	0.0320
13212	0.2660	0.3556	-0.0895	32313	0.1619	0.0775	0.0844
13311	0.2763	0.4139	-0.1376	32331	0.1225	0.1242	-0.0017
13332	0.1454	0.0876	0.0579	33212	0.2862	0.2089	0.0773
21111	0.6261	0.7950	-0.1689	33232	0.0386	0.0275	0.0111
21133	0.2325	0.3417	-0.1092	33321	0.0996	0.1807	-0.0811
21222	0.3455	0.3991	-0.0536	33323	-0.0593	-0.0287	-0.0305
21232	0.2593	0.2951	-0.0358	33333	-0.0742	-0.0704	-0.0038
21312	0.3964	0.4071	-0.0106	NA	NA	NA	NA

Abbreviation: NA, not available.
[a]Mean absolute difference: 0.077.
[b]Spearman's correlation coefficient: 0.941 ($P < 0.0001$).

The Iranian model specifications indicate that the differences between no problems and extreme problems (MO3, SC3, UA3, PD3, AD3) are greater than ones representing the difference between no problems and some problems. The respondents ascribe the greatest importance to "anxiety/depression" and "self-care" among the five health dimensions, indicating that disutility of level 3 in one of these two dimensions is greater than that at any level of other dimensions.

Table 5 compares the mean values for the valuations of the 43 health states by the respondents with the predicted value by the final model. As shown, the absolute difference between them is very small. Furthermore, our analysis shows that the sample observed mean values are strongly correlated with the final model value. Given these, such a small difference (0.077) can be disregarded (27).

5. Discussion

The present study is the first attempt to elicit population-based value sets for health states in Iran and the Middle East. The research sample consists of the Iranian urban population or households and in respect to Iran's sociodemographic characteristics (26). Thanks to limited resources for recruiting a larger sample of Iranian adults, our elicited values my not be a perfect reflection of value sets in the Iranian adult population.

At level 3, "anxiety/depression" has the highest coefficient, which is followed by "self-care." "Usual activity," "pain/discomfort," and "mobility" are in further ranks. As a general pattern, our predicted values reflect lower values in comparison with the developed countries, such as Belgium, the UK, Spain, etc. (5, 9, 28). Except MO3, nearly all domains and severity levels highly impact VAS valuations when benchmarked against the UK study (5). All regression coefficients in the final model were statistically significant according to the Wald-type test. The order of these coefficients also differed from those in the UK, Malaysia, and Denmark (5, 8, 22) although the overall value set showed a similar pattern among countries.

In the majority of countries benchmark European counties (such as Germany and Spain) (5, 9, 29) respondents have the least problems in "mobility" among the five domains. In contrast, Iranian people are moderately worried about mobility. This worry stems from the perceived lack of a social security system and negative social norms regarding the use of wheelchairs or staying in nursing homes. On the other hand, in most benchmark countries, "usual activities" has the lowest weight in calculating the social valuation of EQ-5D health states, whereas in Iran this dimension is in third place.

Given the absence of an Iranian tariff, the UK value set has been used in Iran before the early 2020s. We compared values sets for Iran and the UK to understand degree to which the UK tariff differs from the Iranian tariff. We observed that the VAS values estimated in this study deviate from the UK. This implies that previous economic evaluations may have provided inaccurate information for Iranian decision makers.

Figure 1 compares the valuation from different utilities of selected EQ-5D health states between the European countries and Iran. This comparison shows a strong correlation between the Iranian model and the official model for Europe (r = 0.967, P < 0.0001), UK (r = 0.970, P < 0.0001), Denmark (r = 0.976, P < 0.0001), Spain (r = 0.966, P < 0.0001), and Slovenia (r = 0.958, P < 0.0001), respectively, reported by (5, 8, 11, 19, 30). We choose these countries because we used a model specification similar to the one used in the corresponding studies in the countries mentioned above. We also directly evaluated a set of health states that are also evaluated in all of these countries.

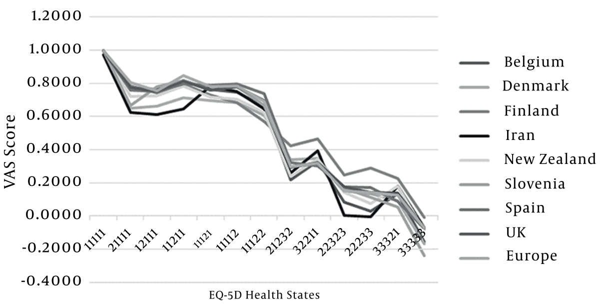

Figure 1. Comparison Between the Mean Value Sets of Selected EQ-5D Health States

We applied the same exclusion criteria used in other national valuation studies, except for the way in which we dealt with inconsistencies. Inconsistent valuations may occur for two reasons. First, respondents give inconsistent responses. This may occur when they do not understand the valuation task. Second, inconsistencies could also be caused by the difficulty of the VAS practice. Regardless of the reasons, inconsistent values influence the parameter estimates of the regression equation, as they can produce contrary effects to the ones expected. Thus, the exclusion of the inconsistent responses allows a quality dataset and improves the validity of the resulting value set.

The Iranian EQ-5D valuation study differs from the original UK measurement and valuation health (MVH) study, most notably with regard to the sample size and timespan or duration of health states. The UK study has a sample size of 3395 and the health states last for 10 years, whereas our study sample is 869 and lasts only one year. With regard to the number of valued health states, there is a marginal difference. Our study takes 13 scenarios into account compared with 15 scenarios in the UK study.

Health status decreases with age. Women have also reported a worse health status than men, which is supported by studies in other countries (30-32). The EQ-5D instrument distinguishes between the effects of education on health states. Higher education has a positive association with the HRQoL in the study sample. Among the sociodemographic characteristics, smoking status, hospitalization, and marital status did not make a significant contribution to the regression model to explain individuals' health state.

This study has several strengths and limitations. We are not able to judge the representativeness of the study sample for Iranian adults. The number of health states assigned to each interview might be insufficient to elicit entire preferences. Respondents valued a subset of 13 out of 43 health states. This process was time consuming and patients were reluctant to participate in a second interview. Hence, the sample size is remarkably larger than the sample sizes in studies conducted in France, the Netherlands, Italy etc.

A large number of the participants reported good health, i.e., no problems on any of the EQ-5D dimensions, which might be a valid representation of health status or might be caused by a ceiling effect. A ceiling effect may be caused by the insensitivity of instruments to the severity of health status (33) or culture differences (34), which are worthy of further exploration.

5.1. Conclusions

This study confirmed substantial differences between the Iranian population's health-related preferences and other countries. These differences between populations warrant the use of locally derived tariffs for preference-based health measures. Researchers can apply the derived value sets to generate QALYs based on Iranian preferences.

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Footnotes

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