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South Korean Time Trade-Off Values for EQ-5D Health States: Modeling with Observed Values for 101 Health States

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ABSTRACT

Objectives: This study establishes the South Korean population-based preference weights for EQ-5D based on values elicited from a representative national sample using the time trade-off (TTO) method.

Methods: The data for this paper came from a South Korean EQ-5D valuation study where 1307 representative respondents were invited to participate and a total of 101 health states defined by the EQ-5D descriptive system were directly valued. Both aggregate and individual level modeling were conducted to generate values for all 243 health states defined by EQ-5D. Various regression techniques and model specifications were also examined in order to produce the best fit model. Final model selection was based on minimizing the difference between the observed and estimated value for each health state.

Results: The N3 model yielded the best fit for the observed TTO value at the aggregate level. It had a mean absolute error of 0.029 and only 15 predictions out of 101 had errors exceeding 0.05 in absolute magnitude.

Conclusions: The study successfully establishes South Korean population-based preference weights for the EQ-5D. The value set derived here is based on a representative population sample, limiting the interpolation space and possessing better model performance. Thus, this EQ-5D value set should be given preference for use with the South Korean population.

Keywords: EQ-5D, population values, preference-based measures, time trade-off.

Introduction

Economic evaluations of health-care interventions provide important evidence to decision-makers in charge of making efficient resource allocations within their jurisdictions. Quality-adjusted life year (QALY) is one of a number of measurement units in cost-utility analysis for economic evaluation. QALY stands for both quantity and quality of life. To calculate the value of a QALY, a set of value scores needs to be assigned to each of the various health states indicating weights for quality of life, also known as health-related quality of life (HrQoL). It is recommended that these values be calibrated using social preference weights elicited from the general population [1]. In addition, because the preferences for health states can differ across cultures [2], many countries have measured their own population-based preference weights for all possible health states. Several methods to quantify people's preferences for health status have been developed; these include visual analog scale (VAS), standard gamble, time trade-off (TTO), and person trade-off methods [3].

Together with EQ-5D [4], there are other preference-based health status measures that can be used to classify the health state of individuals and summarize the change of health outcome in a single index score. For example, there are the Health Utilities Index [5], SF-6D [6], and Quality of Well-Being Scale [7]. In Korea, as in many other countries, there is growing interest in EQ-5D due to the increasing need of measuring the change in HrQoL as an outcome of the health care program. The Korean version of EQ-5D has been under development for some time. Its reliability and validity has already been proven [8] and it was included in the Korea National Health and Nutrition Survey, designed to measure population health in 2005.

In order to develop a population-based preference weights for EQ-5D (also known as EQ-5D value set), a valuation study was conducted, in which a subset of health states defined by the EQ-5D descriptive system was directly valued. Based on these observed values, a regression modeling approach is adopted to exploit values for all 243 health states defined by EQ-5D. It must be noted here that there appears to be reported in the literature only one earlier study that attempted to develop the EQ-5D value set for the population in South Korea [9]. However, due to drawbacks in the design of its valuation study and modeling, the sample was not nationally representative and the average of absolute differences between observed and estimated scores was as great as 0.071. To the authors' knowledge, to this day the demand for a representative and reliable EQ-5D value set for South Korean population is still not met.

The current study establishes the South Korean population-based preference weights for EQ-5D based on the values elicited from a national representative sample using the TTO method. One of the main features of the survey where the preference data were collected is the number of health states involved in the study. Unlike previous valuation studies performed in Korea or in other countries, where either 43 health states defined by EQ-5D or less were directly valued, here the values for a total of 101 EQ-5D health states have been directly observed. Thus, with this unique dataset it is expected that the interpolation spaces in estimating a value set are minimized in comparison to other value sets.

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Methods

Study Subjects

The target population for the study is Korean adult citizens, aged 20 and older, estimated at 36.786 million based on the official residential registries on December 31, 2006 [10]. A multistage stratified random sampling was employed aiming at generating a sample representing the age and sex distribution in the target population. Due to limited resources, the target sample size was restricted to 1307. The sampling procedure is explained below.

In the first step, the entire sample was stratified using 15 regions (seven large cities and eight provinces) with the exception of Jeju province, which is an island with a population number equivalent to 1.2 % of the total population. Due to the relatively small number of residents in this province, its exclusion was expected to have only a limited impact on the sampling. The number of subjects was assigned to 15 regions in proportion to the population size of each region. The same process was subsequently repeated within each region using three categorized administrative units: "Dong," "Eup," and "Myun" ("Dong" is a town in a district of a city, "Eup" is a main town in a county, and "Myun" is a township in a county; every address can be categorized into one of these units). In the second step, the final fieldwork locations "Ban" and "Village" ("Ban" is a subdivision of "Dong" or "Eup," and "Village" is a subdivision of "Eup" or "Myun") were selected randomly within the strata defined in the first step. In the third step, 8 to 10 households were randomly selected for interview in each "Ban" or "Village." In those cases where a selected household had more than two persons aged 20 years or more, the interviewers invited the person whose birthday was closest within the next 12 months to the day of interview. Persons residing temporarily at a selected household, such as a lodger, family member in military service, and persons in long-period official trips or overseas duty were excluded.

EQ-5D

EQ-5D is one of the most widely used generic index measures of HrQoL [4]. It consists of two parts, the EQ-5D descriptive system and the EQ-5D VAS. The descriptive system contains five items that measure five dimensions of health including mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is represented by a single item with three levels of responses: no problem, some problems, and extreme problems. A total of 243 health states are defined by this descriptive system. The EQ-5D VAS records the respondent's self-rate health status on a VAS, where the endpoints are labeled "best imaginable health state" and "worst imaginable health state." As mentioned earlier, the Korean version of EQ-5D has already been developed, and its validity and reliability has been proven [8].

Health State Selection

The survey included 100 EQ-5D health states together with states "33333" and "11111" for direct valuations. The 100 health states chosen comprise 25 mild, 50 moderate, and 25 severe states. The degree of severity was defined by a standard city-block distance metric in which any movement away from "11111" is simply counted for each dimension and aggregated. For instance, state "11121" and state "21113" are categorized into distance groups 1 and 3, respectively. Mild states are those within the distance groups 1 to 4, where there are no level 3 problems and up to three level 2 problems. Severe states are those within the distance groups 7 to 9, in which there are no level 1 problems and at least two level 3 problems. If a state is neither mild nor severe, then it is classified as a moderate state. For example, although state "21113" is in distance group 3, it would be categorized not as mild but as a moderate state due to having a problem of level 3. The 100 health states selected were distributed into 25 blocks (P. Kind, pers. comm.). To ensure that each block contained health states across different severities, each block had six health states composed of two randomly selected mild states, two severe states, and two moderate states. In the current study, each participant was assigned two blocks; one was picked following the numerical order assigned to 25 blocks (i.e., the 100th respondent evaluated the 25th block) and the other was randomly selected. Thus, each participant evaluated 12 health states from two blocks, in addition to the "11111" and "33333" states. The selection of health states for each of the 25 blocks can be found at: http://www.ispor.org/Publications/value/ViHsupplementary/ViH12i8_Nam.asp.

Data Collection

The survey instruments and protocol used were similar to those of the Measurement and Valuation of Health (MVH) study in the UK [11]. The details of the survey are as follows:

The survey was based on a face-to-face interview that can be divided into three stages. In the first stage, respondents described their own health at the time of the interview using the validated Korean version of EQ-5D, including answering the five-item descriptive system and self-rated VAS. In the second stage, the respondents were asked to rank the 12 health states from the two blocks assigned plus the states "11111" and "33333" by putting the "best" health state on top and the "worst" at the bottom. It was assumed that each state was experienced for 10 years followed by immediate death. Subsequently, respondents rated the above ranked 14 health states and the state of immediate death using VAS.

Finally, each respondent evaluated the same set of health states but without state "11111" and immediate death using TTO technique with the double-sided time board and a set of health state cards. The method is also known as TTO props method. A thorough description of the method can be found elsewhere [12] and is therefore not repeated in detail here. In short, the respondents were first asked to decide whether a state is better or worse than death. For states regarded as better than death, respondents decided a period of time t in the state "11111," which they consider as equivalent to 10 years in the target state. The shorter t is, the worse the target state. For the states worse than death, the choice was between dying immediately and spending a length of time $(10 - t)$ in the target state followed by t years in the state "11111." Consequently, the longer the time chosen to be in the state "11111" to compensate for a shorter time in the target state, the worse the target state is [12]. In TTO valuation scale, the states "11111" and immediate death were treated as anchors and assigned values of 1 and 0, respectively. Respondents were also surveyed on socioeconomic background questions after completing the TTO valuation.

The data were collected between February 6 and April 3, 2007. A total of 61 trained interviewers were recruited for this purpose. On completing the survey, each respondent was rewarded a gift certificate equivalent to about 10 US dollars.

Logical Consistency and Exclusion Criteria

The logical consistency approach was applied to examine the quality of data. Logical consistency is defined as follows: for a given pair of health states, if state A of a pair is better than the state B in at least one dimension and not worse in any other, then