

Description and valuation of health-related quality of life among the general public in Japan by the EuroQol

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Abstract : Objective. Health-related quality of life plays an important role in assessing the effectiveness of health care. The EuroQol is a generic instrument for describing and valuing health-related quality of life. To elicit health state descriptions and their preferences among the general public in Japan and compare them with cross-national data, a feasibility study for applying the EuroQol to the general public in Japan was carried out.

Subjects and methods. The subjects were 120 people aged 40s-60s randomly selected in a suburban area at Aichi Prefecture in Japan. In assessing health states and their preferences, the EuroQol valuation instrument (version 12, 1991) translated into Japanese was used. The questionnaires were distributed and collected by public health nurses. The valid responses (rate) were 89 (74%).

Results. The mean scores (raw scores) using the visual analogue scale (VAS) for one's own health was 89.2. No statistically significant difference in VAS scores was observed for both sex and age. The contribution ratio of own health status, sex and age was 0.326 ($p < 0.0001$). The main independent variables were three dimensions of health status. Valuations for core health states varied from 96.3 (no problems in each health status) to 6.8 (dead). These VAS scores in Japan were correlated with those from other countries ($p < 0.001$). A multivariate analysis indicated that bias from own health status on preference valuations for core health states was not observed.

Conclusion. The health states and their preferences among the general public in Japan were estimated by using the EuroQol. The results show the feasibility of evaluation for health states quantitatively. Moreover, this study suggested cross-national and cross-cultural applicability of the EuroQol. *J. Med. Invest.* 45 : 123-129, 1998

Key words : *quality of life, health status measurement, EuroQol, visual analogue scale*

INTRODUCTION

There is growing interest in health-related quality of life (HRQL) among health policy makers, clinicians, and the general public (1-3). HRQL plays an important role in assessing the effectiveness of healthcare. Moreover, HRQL is also indispensable for decisions about the allocation of scarce healthcare resources (1, 4). For these purposes, a generic instrument for HRQL, which is capable of being used in many circumstances, across a wide range of patients, con-

ditions, and treatment, is most useful (1, 4).

The EuroQol is a generic multidimensional HRQL index currently being developed and standardized (2-6). It is capable of being used in a range of settings, and of generating a single index score as a measure of health status. In addition, this instrument was designed to be simple to administer and to impose little burden on respondents (4-6). Moreover, it enables the generation of cross-national comparisons of health state valuations. Recently, the EuroQol instrument has been translated into several languages, and is currently being used and tested worldwide (2-5).

Although the availability of quality of life measurements is rapidly increasing in Japan, those applicable to evaluation of healthcare or health economics are extremely limited (7, 8). Most studies used a

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disease-specific measure in clinical settings, of which the validity and reliability have not been established.

To elicit health state descriptions and their preferences among the Japanese people through a standardized cross-national method and compare them with cross-national data, a feasibility study for applying the EuroQol to the general public in Japan was carried out. In this study, to collect a common data set for reference, preference valuation for health states among the general public in a suburban area in Japan was examined.

SUBJECTS AND METHODS

The subjects were 120 people aged 40s-60s randomly selected from the general public at a typical suburban area which is adjacent to Nagoya City, the metropolitan center of Aichi Prefecture in Japan. A two way (age and sex) stratification for random sampling from the the age-sex register was used. The maximum number in each stratum was 20, and the sampling rate was about 0.01.

In assessing health states and their preference value, the EuroQol Valuation Questionnaire (version 12, 1991) (4) translated into Japanese was used. The translation process was as follows. Firstly, a forward translation by a Japanese health care researcher who has experience of studying abroad and has translated English books on health care into Japanese. Secondly, after its revision through examination and discussion by three Japanese researchers, it was backtranslated by a native English speaker who has been working for the University as a lecturer. Since there was no major difference between the backtranslation and the original English text, only minor changes were made. Moreover, this revised questionnaire was tested for acceptability and comprehension by three public health nurses and six general citizens. There was no point needed to be revised.

A self-completed questionnaire survey was carried out in 1994. The questionnaires were distributed and collected by public health nurses. In collecting responses, they checked defects among responses. The valid responses (rate) were 89 (74%). As is shown in Table 1, the proportion of men was 48%. The age distribution of 40s, 50s, and 60s was 28%, 38%, and 34%, respectively. Forty percent of subjects were current smokers. Main activities were employment (63%) and retired (26%). The proportion of subjects who received education after compulsory

Table 1. Age and sex of subjects

Age	Male	Female	Total
40 s	10 (23)	15 (33)	25 (28)
50 s	18 (42)	16 (35)	34 (38)
60 s	15 (35)	15 (33)	30 (34)
Total	43 (100)	46 (100)	89 (100)

Values show number (%)

education was 56%. The degree of difficulty in answering this questionnaire was very difficult (26%) and fairly difficult (49%). The average (standard deviation) of time for answering was 26.2 (21.8) minutes.

The EuroQol valuation questionnaire is made up of two main sections (4, 6). The first section (EQ-5D) records self-rated health status in terms of the five dimensioned classification with level of problems on a 3-point scale (1=none, 2=some, 3=extreme). Self-rated health status is also recorded on a visual analogue scale (VAS). The second section is to elicit valuations for a series of hypothetical core health states defined in terms of the EuroQol five dimensioned descriptive system. For example, the health state (12123) means : no problem in walking around [1], some problems with self-care [2], no problem in usual activities [1], moderate pain or discomfort [2], and extreme anxiety or depression [3].

In analyzing data, firstly, preference (self-rated VAS score) of own health status of the subjects and selected health states were estimated according to sex and age. To evaluate cultural differences in preference measurement, a correlation of these VAS scores with those obtained in other countries between 1993-1996 (9-11) was undertaken. In addition, a two-way analysis of variance (12) was performed to assess the effect of health status and countries on VAS scores (SPSS 7.5.1 J for Windows).

Three methods were available for calculation of VAS scores as follows : The first was a raw score (worst imaginable health state=0, best imaginable health state=100) which has been used for description of all health states (10, 13, 14). The second was a general score (dead=0, best imaginable health state=100). As in the usual utility value, dead and best imaginable health state were anchored. The third was an adjusted score (dead=0, healthy=100). In this score, healthy was restrictively defined as a health state (i.e.,11111) where there were no problems in self-rated five dimensioned health state.

Second, to evaluate the contribution of the self-reported

health status (five dimension) to VAS score of own health status, a multiple regression analysis (15) was performed (SPSS 7.5.1J for Windows). VAS score of their own health status among the subjects was used as a dependent variable, while scores of self-reported health status, sex and age were used as independent variables. Scores of self-reported health status were used as dummy variables.

Third, to evaluate bias of own health status on VAS scores for a series of health states in the EuroQol, a multiple regression analysis was performed (15). VAS score for hypothetical health states was used as a dependent variable, while scores of self-reported health status, age and sex were used as independent variables.

RESULTS

Table 2 shows the prevalence rate of problems in self-reported health status. The proportion of some problems on each dimension ranged from 1.1% (self-care) to 25.8% (pain/discomfort). No one reported extreme problems in any dimension.

The VAS scores for subjects' own health status are shown in Table 3. The mean for raw, general and adjusted VAS scores among total subjects were 89.2, 87.4, and 91.7, respectively. Although these scores among women were higher than those among men, statistical significance was not observed. As is shown in Table 4, the general VAS score for own health status was higher with increasing age among men. In contrast, that among women was

higher with decreasing age. However, there was no statistically significant difference in both cases. In comparison of this score between men and women classified by age, a statistical significance was observed only at the age of 40s ($p < 0.05$).

Table 5 shows the results of multiple regression analysis for VAS score of own health status. The multiple regression coefficient of seven factors (age, sex, five dimensions of health status) was 0.571 ($p < 0.0001$). Contribution ratio was 0.326. Three factors, such as usual activity (standardized multiple coefficient = -0.399, $p = 0.001$), self-care (0.295, $p = 0.01$),

Table 3. Valuations of own health classified by sex

VAS score	Total (n=89)	Male (n=43)	Female (n=46)
A : Raw score	89.2 (9.3)	87.6 (10.0)	90.8 (8.4)
B : General score	87.4 (13.9)	85.7 (12.1)	89.0 (15.3)
C : Adjusted score	91.7 (15.5)	90.1 (13.7)	93.1 (17.1)

Values show mean (SD)

VAS : visual analogue scale

A (Best imaginable=100, Worst imaginable=0),

B (Best imaginable=100, dead=0)

C (Healthy=100, dead=0), Healthy : there are no problems in the self-rated five dimensioned health status

Table 4. Valuations of own health classified by age (VAS score : general score)

Sex	Age		
	40 s	50 s	60 s
Male	84.0 (11.8)	84.6 (14.6)	88.2 (8.9)
Female	93.7 (5.3)*	89.8 (6.9)	83.5 (24.8)

Values show mean (SD)

* $p < 0.05$ (compared with male by Welch's t-test)

Table 2. Self-reported health status

Health status	Number (%) (n=89)
Mobility	
no problem	82 (92.1)
some problems	7 (7.9)
Self care	
no problem	88 (98.9)
some problems	1 (1.1)
Usual activity	
no problem	85 (95.5)
some problem	4 (4.5)
Pain/discomfort	
none	66 (74.2)
moderate	23 (25.8)
Anxiety/depression	
none	82 (92.1)
moderate	7 (7.9)

Table 5. Results of multiple regression analysis for VAS score of own health (general score)

Items	β	T	p value
Sex	-.131	-1.38	.1706
Age	-.070	-0.76	.4494
Mobility	-.244	-2.26	.0264
Self care	.295	2.61	.0109
Usual activity	-.399	-3.40	.0010
Pain/discomfort	-.090	-0.83	.4069
Anxiety/depression	-.100	-0.91	.3639
Multiple regression coefficient	.571		
Contribution ratio	.326		
F value (df=5)		5.597 (p=.000)	

and mobility (-0.244 , $p=0.026$) were estimated as main independent variables.

Table 6 shows VAS scores for core health states in the EuroQol. Healthy condition, the state (11111) where no problems in the five dimensions of health status existed, was valued as near 100 (best imaginable health state). In contrast, death which was used as an anchor point for preferences was valued as near 0 (worst imaginable health state). Unconsciousness was also valued at low level. According to the increase of degree and number of problems in a health state, its VAS score decreased. Three states, which were repeatedly valued, were marked (a) and (b) (e.g., 11111ab, 33333ab, and dead ab). The pairs of their scores were very close.

A comparison of valuations for core health states in the EuroQol among the general population in other countries is shown in Table 7. While VAS scores for a series of health states in Japan were relatively high, those in Spain and Thailand were relatively low. However, VAS scores for the majority of health states are closely related, both in terms of their absolute values and in terms of their

Table 6. Valuations for core health states in EuroQol (VAS score : raw score)

Health state MSUPA*	Mean (SD)	Median Quartile Range
11111 a	96.3 (6.3)	100 (95–100)
11111 b	95.8 (7.0)	100 (95–100)
11211	87.4 (12.5)	90 (80– 95)
21111	84.7 (12.8)	90 (80– 95)
11112	78.8 (14.4)	80 (70– 90)
11121	83.3 (12.9)	85 (75– 94)
12111	72.6 (20.0)	74 (65– 90)
11122	60.5 (17.7)	60 (50– 70)
21232	49.0 (20.9)	50 (33– 60)
32211	42.9 (26.5)	36 (20– 60)
22233	38.4 (24.7)	30 (20– 57)
22323	29.4 (25.5)	20 (10– 48)
33321	26.9 (27.5)	15 (6– 38)
Unconc	11.2 (23.7)	1 (0– 10)
Dead a	7.0 (16.4)	0 (0– 5)
Dead b	6.8 (16.4)	0 (0– 5)
33333 a	18.3 (24.9)	10 (2– 22)
33333 b	19.4 (26.2)	10 (1– 20)

*M : Mobility, S : Self-care, U : Usual activity, P : Pain/discomfort, A : Anxiety/depression

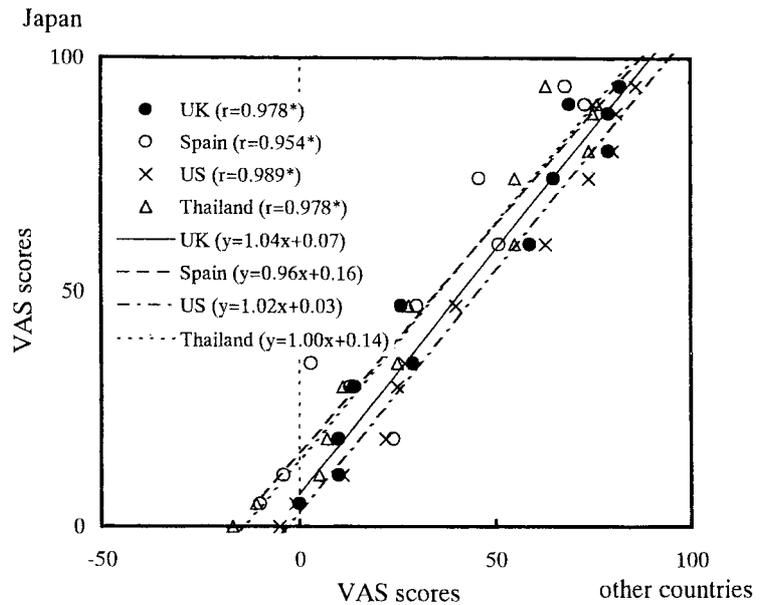


Fig.1. Correlation of VAS scores between Japan and other countries * $p<0.001$

relative position. Figure 1 shows the correlation of VAS scores for core health states between Japan and other countries (UK, Spain, US, and Thailand). Each correlation coefficient was high (from 0.95 to 0.98) ($p<0.001$). The results of a two-way analysis of variance indicated a statistically significant difference among both the health status ($F_{12}=167$, $p<0.0001$) and the countries ($F_4=16$, $p<0.0001$).

Table 8 shows results of multiple regression analysis for examining effects of self-health status on VAS score for own health, age and sex. No multiple regression coefficient of five dimensioned health status in each health state was statistically significant.

DISCUSSION

The EuroQol has been evaluated among the general public in Europe (the UK, Sweden, Norway, the Netherlands, and Spain) (4-6, 9, 10, 14, 16-19) and the US (9). The findings of this study are consistent with those in these earlier studies. The prevalence rates of problems in self-reported health status in this study were similar to those in the UK population with a similar composition of age (Table 2) (4, 6). Also, VAS scores (raw score) of own health among the general public in Japan were similar to those in European countries (Table 3) (4-6, 9, 10, 14, 16-19).

For a measure of preference, data in the EuroQol are usually presented according to raw score (worst imaginable=0, best imaginable=100). This has the advantage in presenting the preferences without

Table 7. Comparison of valuations for core health states in EuroQol among different countries (VAS score : adjusted score)

Health state	Japan (n=89)	UK (n=82)	Spain (n=600)	US (n=478)	Thailand (n=354)
Age	55	52	44	52	46
MSUPA*	Median				
11111	100 (standard)				
11211	94	82	68	86	63
21111	90	69	73	75	76
11112	80	79	79	80	74
11121	88	79	70	81	75
12111	74	65	46	74	55
11122	60	59	51	63	55
21232	47	26	30	40	28
32211	35	29	3	27	25
22233	30	14	13	25	11
22323	19	10	24	22	7
33321	11	10	-4	11	5
Unconc	0	0	-10	-5	-17
33333	5	0	-10	-1	-11
Dead	0 (standard)				

MSUPA* same as in Table 5

mentioning dead which has some difficulty in evaluation (4, 20). However, in general, the preference value is estimated by a score (dead=0, best imaginable =100) (1). Therefore, in interpreting data, this point must be taken into consideration. According to our analysis, there is no statistical difference between general and raw scores. Moreover, several studies show that the VAS raw score of dead is near 0 (5-6, 9, 10, 17, 18).

The present study shows that there was no statistical difference in the VAS score of own health status between sex and age, except a sex difference in the 40s age group (Tables 3 and 4). The studies in other countries also showed no difference in sex, but an age difference was observed (4, 6, 10, 13, 17). The results of comparison of the VAS score in our large cohort study in Japan (21), where the sample size was 14, 940, showed that an age difference was only observed at the age of 70s and more. It is consistent with this study, since age in this study ranged only from 40s to 60s. Moreover, a sex difference was also observed only in the 40 s age group of both the large cohort study mentioned above and this study. It was suggested that this difference was due to the influence of working conditions among men. However, this relationship should be examined by a further study.

Table 8. Effects of self-health status on valuations for core health states in EuroQol (general score)

Health state MSUPA*	Multiple regression coefficient
11111 a	.196
11111 b	.139
11211	.230
21111	.211
11112	.333
11121	.218
12111	.220
11122	.206
21232	.292
32211	.159
22233	.343
22323	.241
33321	.275
Unconscious	.187
33333 a	.330
33333 b	.292

MSUPA* same as in Table 5

The effect of the five dimensioned self health status on the VAS score for own health status was observed with a statistical significance (Table 5). However, the contribution of health status to the VAS score was only 33%. Since problems in health status among the subjects in this study were very limited, they were not enough to explain variations in VAS scores. However, it is also thought that the five dimensions of health status are not necessarily enough to evaluate preferences of health states. However, as examined when designing the EuroQol, a trade-off between burden for respondents and comprehensive description of health states must be taken into consideration (4, 5).

The results of preference valuations by VAS for core health states in this study are consistent with those in the earlier studies in European countries and the US (Tables 6 and 7, and Figure 1) (4, 6, 9-11, 14). Although a statistically significant difference in VAS scores was observed between countries by a two-way analysis of variance, absolute values and positions of VAS score for most health states are closely related. Therefore, it is suggested that preferences based on a VAS is feasible in different sociocultural settings (from European to Asian countries).

For health policy decision making, since a societal

viewpoint should be considered, valuations of health states by the general population who understand health states are indispensable (22). Therefore, biases due to the evaluators' health state are important problems. In this study, the results of a multivariate analysis indicates that five dimensioned health states did not have any effects on the VAS scores of core health states in the EuroQol. This supports these findings of earlier studies. For example, Essink-Bot *et al.* (13) indicated, by a multivariate analysis of variance, that age and its interaction with health states influenced valuations of health states. Badia *et al.* (10) showed that self-rated health states had significant differences in only two of 16 core health state values. These results indicate that there is not a significant bias from evaluators' health status in preference valuation for core health states.

Regarding the acceptance of this valuation questionnaire from respondents, the proportion (25%) of respondents who found the questionnaire easy to complete in this study was relatively low compared with those (30% to 60%) in the earlier studies in the UK, Norway and Spain (4, 10, 16). This is partly because Japanese people are not familiar with this type of a questionnaire. But, as pointed out by Badia *et al.* (10), this will be explained by response bias: the questionnaires were mainly returned by the individuals who could easily answer. In Japan, the questionnaires were collected by public health nurses. Therefore, while the valid response rate in Japan was 74%, those in the UK and Norway were less than 40% (4, 16). In this study, even though, understandably, some respondents found this method of eliciting valuations difficult to answer, the valid response rate was high. It is considered an instrument acceptable for a field survey among the general population.

Summarizing these findings and discussions, it is suggested that elicitation of health description and preference through the EuroQol is applicable to the general public in Japan. It is pointed out that the global use of the EuroQol appears in the following ways: 1) the description and rating of own health state, 2) valuation of health state by preference elicited from the general population, 3) the descriptive information and/or the assigned valuations analyzed by background variables, such as age, sex, or education (23). Therefore the EuroQol would play an important role in healthcare decision making in Japan if it was utilized by taking its characteristics and limitations into consideration.

However, the results of this study are preliminary,

and must be cautiously evaluated. Firstly, the sample size was relatively small, and the survey area was very limited. Therefore, a further survey with a larger sample in several different areas in Japan will be needed to confirm these findings. Second, cross-cultural comparison in the present study is based on limited data and rather qualitative evaluation. In the future, more detailed quantitative comparison will be needed according to the accumulation of more extensive international field surveys.

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