



Research Article

COMPARISON OF EQ-5D-3L AND EQ-5D-5L FOR HEALTH-RELATED QUALITY OF LIFE MEASUREMENT IN INDONESIAN POPULATION WITH SEVERAL CONDITIONS

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ABSTRACT

Cost utility analysis is the most recommended pharmacoeconomic method since it allows widely comparison of cost-effectiveness results from different interventions. The method uses outcome of quality-adjusted life year (QALY) or disability-adjusted life year (DALY). Measurement of QALY requires the data of utility and life years gained. Utility is measured with the instrument for quality of life measurement such as EQ-5D. Recently, the EQ-5D is available in two versions which are EQ-5D-3L and EQ-5D-5L. This study aimed to compare the EQ-5D-3L and EQ-5D-5L to examine the most suitable version for Indonesian population. This study was an observational study employing cross sectional approach. Data of quality of life measured with EQ-5D-3L and EQ-5D-5L were collected from several groups of population which were respondent with chronic diseases, respondent with acute diseases, and respondent from general population (without illness) in Yogyakarta Municipality and Sleman District in Yogyakarta province, Indonesia. Convenience samples of hypertension patients (141), diabetes mellitus patients (178), and osteoarthritis patients (110), acute respiratory tract infection patients (204), cephalgia patients (120), dyspepsia patients (116), and respondent from general population (700) participated in this study. Responses on the 3L and 5L versions of EQ-5D were compared by examining the psychometric properties including agreement, internal consistency, ceiling effect, discriminatory power, and convergent validity. Based on psychometric properties tests of EQ-5D-3L and EQ-5D-5L, EQ-5D-5L tended to have better psychometric properties compared to EQ-5D-3L. Future studies for health-related quality of life (HRQOL) measurements for pharmacoeconomic studies in Indonesia should consider applying EQ-5D-5L.

Keywords: Pharmacoeconomics, health utility, Indonesian population, Psychometric properties

INTRODUCTION

Pharmacoeconomic study helps the decision maker to set priority setting of healthcare program implementation. There are four methods of pharmacoeconomic studies, namely: cost minimization analysis (CMA), cost benefit analysis (CBA), cost effectiveness analysis (CEA), and cost utility analysis (CUA). The main difference of those methods is the measurement of outcome¹. CUA is the most widely used for healthcare program decision making due to the feasibility for comparison of cost-effectiveness results across interventions. CUA employed humanistic outcomes, which are quality-adjusted life year (QALY) and disability-adjusted life year (DALY). QALY is derived from utility and life year's gained¹. There are several standard instruments for measuring utility, for instance VAS (visual analogue scale), TTO (time trade off), and standard gamble, which also called as single measurements; or other multi attribute measurement instruments such as EQ 5D (Euro Quality of life), SF 6D (Short Form), QWB (Quality of Well Being index), and HUI (Health Utility Index)².

Euro-Quality of Life-Five-Dimension (EQ-5D), developed by the EuroQol Group³ is a generic instrument which widely used for measurements of health related quality of life and furthermore utility measurement in pharmacoeconomic studies⁴. The EQ-5D comprises of two parts: EQ-5D descriptive system and EQ-5D visual analog scale (EQ-5D VAS). EQ-5D descriptive system consists of 5 dimensions, namely mobility, self-care, usual

activities, pain/discomfort, and anxiety/depression. Whereas, the EQ VAS records the respondent's self-rated health on a vertical, visual analogue scale where the endpoints are labelled 'Best imaginable health state' and 'Worst imaginable health state'. EQ-5D-3L consists of 3 response levels which are no problems, some problems, extreme problems. The EQ-5D-3L has now been translated into more than 170 languages and is used worldwide. However ceiling effects have been reported in general population surveys and in some patient population settings. In order to address these criticisms, the EuroQol Group explored ways of improving the EQ-5D's measurement properties by developing the EQ-5D-5L. The EQ-5D-5L consists of 5 response levels which are no problems, slight problems, moderate problems, severe problems and extreme problems^{5,6}.

There have been many previous studies conducted to compare the psychometric properties of EQ-5D-3L and EQ-5D-5L in many population and settings, for instances study in general population in the Netherlands⁷ and in Greece⁸ study in healthy and/or young individuals in Portugal⁹, study in six European countries (Denmark, England, Italy, the Netherlands, Poland, and Scotland) involving eight patient groups with chronic conditions (cardiovascular disease, respiratory disease, depression, diabetes, liver disease, personality disorders, arthritis, and stroke)¹⁰, study in population with chronic conditions in Canada¹¹, study in osteoarthritis patients in Canada¹², study in stroke patients in Poland¹³, study in patients with Total Hip Arthroplasty in Sweden¹⁴, study in Type 2 diabetes mellitus patients in Thailand¹⁵

and in China¹⁶ and study in rheumatoid arthritis patients in UK¹⁷ Most of studies found that EQ-5D-5L had better psychometric properties compared to 3L. However, to the best of our knowledge such study has not been conducted in Indonesian population. In fact, evaluations of health related quality of life were differ among different population and countries due to difference in socio demographic and culture. Different of health utility value derived from different version of EQ-5D might lead to different QALY and hence affect Incremental Cost Effectiveness Ratio (ICER) which was the result of cost effectiveness analysis study^{18,19}. Therefore, such study is relevant for conducted in Indonesia setting and population. Results of this study aimed to gain insight for selecting the most appropriate EQ-5D questionnaire for measuring health outcome in pharmacoeconomic studies in Indonesia.

MATERIAL AND METHODS

Study design and setting

This study was a cross-sectional, observational study. In this study, measurement of health related quality of life of sample used three main questionnaire: EQ-5D-3L, EQ-VAS, and EQ-5D-5L. An additional of questionnaire consisting of respondents' characteristics was also applied. Psychometric propoerties of the EQ-5D-3L and EQ-5D-5L were compared to gain insight into the most suitable version of questionnaire for Indonesian population.

We recruited sample with acute disease, chronic disease, and general population. We selected the diseases based on the most cases of prevalence of diseases in population. The diseases were hypertension, diabetes mellitus, and osteoarthritis for chronic disease; acute upper tract infection, dyspepsia, and cephalgia for acute diseases.

Data were collected from respondents as representative of Yogyakarta Province. Convenience sampling was employed to select the study site and respondents. For acute and chronic diseases, patients visiting three primary healthcares in Yogyakarta municipality (primary health center in subdistricts of Gedong Tengen, Danurejan, and Mergangsan) and three primary health centers in Sleman District (primary health center in subdistricts of Godean, Gamping, Depok) were asked to complete the questionnaire. For general population, sample visiting subdistrict offices Gondokusuman, Danurejan, and Umbul Harjo in Yogyakarta municipality and subdistrict offices of Mlati, Ngaglik, Seyegan in Sleman District were recruited in the study. Interviews were conducted during August 2016 to February 2017. The number of sample in each disease was different based on the prevalence of the disease and number of patients who visited the study site. Overall, there were 141 hypertension patients, 178 diabetes mellitus patients, 110 osteoarthritis patients, 204 acute respiratory tract infection patients, 120 cephalgia patients, 116 dyspepsia patients, and 700 respondents from general population participated in this study.

Statistical analysis

Descriptive analysis was used to analyze sample's characteristics such as age, gender, education, occupation, income, marital status, and health insurance type. Descriptive analysis also was used to analyze EQ-5D descriptive, EQ-VAS, and EQ-5D index score. Finally, psychometric properties of EQ-5D-3L and EQ-5D-5L were tested using several attributes, such as agreement, internal consistency, ceiling effect, discriminatory power, and convergent validity²⁰⁻²³. Comparison of EQ-5D-3L and EQ-5D-5L was analyzed by assessing the psychometric properties of quality of life measured from those instruments.

Ethical consideration

This study obtained the ethical approval from Ethics and Advocacy Unit, Faculty of Dentistry, Universitas Gadjah Mada with the reference number of 00733/KKEP/FKG-UGM/EC/2016. Informed consents were obtained from all respondents.

RESULT AND DISCUSSION

Sample characteristics

Table 1 describes patients' characteristics. In general, the number of women respondents were greater than men. In chronic disease group, most of respondents aged over 55 years old; while in acute disease group, the distribution of respondents' age were equal in all age groups; lastly in resopdents of general population, most of respondents aged younger than 35 years old. Regarding the marital status, most of respondents were married. For education background, most of respondents attended junior high scholl and higher education level. Almost half of respondents were house wife and unemployment. They had various individual and family income. Most of respondents had health insurance.

Response on EQ-5D-3L and EQ-5D-5L questionnaire

Table 2 and Table 3 describe response on EQ-5D-3L and EQ-5D-5L descriptive system for each domain. In all group respondents with acute diseases, chronic diseases, and general population, the main problems reported by respondents were pain/discomfort and anxiety/depression. Responses on EQ-5D-3L descriptive system and EQ-5D-5L descriptive system were the same, in which most problems reported by respondents were domain pain/discomfort (17.3% - 90% in EQ-5D-3L and 27.9% - 93.6% in EQ-5D-5L) and anxiety/depression (20.9% - 51.7% in EQ-5D-3L and 28.3% - 32.6% in EQ-5D-5L).

Table 4 shows responses on EQ-VAS and EQ-5D index score (utility) derived from EQ-5D-3L and EQ-5D-5L. In the absence of Indonesia value set of EQ-5D at the time of study, we employed Thai value set²⁴⁻²⁵ for conversion from EQ-5D descriptive system to utility, due to rational of neighbour contry whose value set of EQ-5D-3L and EQ-5D-5L and closer population characteristics compared to other non-Asia countries. Though Malaysia might have value set most relevant to Indonesia²⁶, however at the time of study there was no EQ-5D-5L value set available. In addition, there is only available value set for EQ-5D-5L for Indonesian population²⁷ and none for EQ-5D-3L. Utility scores derived from EQ-5D-5L in all groups (0.806 - 0.971) were higher compared to utility scores derived from EQ-5D-3L (0.581 - 0.915). The findings were in line with the findings from previous studies conducted by Hernandez-Alava¹⁸ which reported that that there was a systematic difference in the 3L and 5L utility scores, with the 3L generating utilities averaging only 87% of the utility values given by the 5L, as well as Alava¹⁹ which reported that the 5L shifts mean utility scores up the utility scale toward full health. However, the findings were in contrast with findings from Pan¹⁶ which reported that the 5L score was systematically lower than the 3L score for T2DM patients with and without a condition (range -0.36 to -0.06), as well as findings from Yfantopoulos⁸ which reported that the increase in prevalence of problems was larger than the decrease in their severity, resulting in a lower mean health utility for the EQ-5D-5L. Finding from this study showed that general population had the highest utility scores compared to groups with acute and chronic diseases. Among chronic disease group, respondents with osteoarthritis had lowest utility and among acute disease group, respondents with cephalgia had lowest utility.

Table 1: Respondents' characteristics

Characteristics	HT	DM	OA	ARTI	Cephalgia	Dyspepsia	General population
	% (n = 141)	% (n = 178)	% (n = 110)	% (n = 204)	% (n = 120)	% (n = 116)	% (n = 700)
Gender							
Male	38.3	29.2	29.1	40.7	30	29.3	51.1
Female	61.7	70.8	70.9	59.3	70	70.7	48.9
Age group (years old)							
< 35	0	0	0	26.4	19.2	17.3	55.8
36-45	4.3	3.4	3.6	16.2	16.7	9.5	20.0
46-55	17	24.2	16.4	19.1	27.5	25	16.6
56-65	42.6	43.3	46.4	21.6	18.3	33.6	6.7
> 65	36.2	29.2	33.6	16.7	18.3	14.7	0.9
Marital status							
Single	3.5	4.5	.9	18.1	16.7	9.5	28.3
Married	78	71.9	80.9	71.1	75.8	90.5	67.4
Widow/doubt	18.4	23.6	18.2	10.8	7.5	0	4.3
Education							
Not attending school	11.3	6.7	13.6	2	6.7	5.2	0.4
Elementary school	8.5	21.9	30.0	15.2	20.8	23.3	2.7
Junior high school	23.4	22.5	29.1	25	30	28.4	4.7
Senior high school	24.1	31.5	21.8	40.2	35.8	31.9	43.4
University	32.6	16.9	5.5	17.6	6.7	11.2	48.7
Occupation							
Unemployed	46.8	41.6	53.6	43.2	56.7	47.4	21.7
Employee	15.6	14.6	20.9	41.2	20.8	21.6	27.6
Entrepreneur	20.6	25.3	20.9	12.7	21.7	21.6	34.6
Retired	17	18.5	4.5	2.9	0.8	4.3	4.1
Health insurance type							
Subsidized health insurance	56.7	56.7	69.1	59.3	60	63.8	22.9
Non-Subsidized health insurance	26.2	30.3	20.0	12.3	18.3	25.9	25.6
Out of pocket payment	17	12.9	10.9	28.4	21.7	10.3	13.9

HT = Hypertension; DM = Diabetes Mellitus; OA = Osteo Arthritis; ARTI = Acure Respiratory Track Infection

Table 2: Response on EQ-5D-3L descriptive system

Domain	HT	DM	OA	ARTI	Cephalgia	Dyspepsia	General population
	% (n = 141)	% (n = 178)	% (n = 110)	% (n = 204)	% (n = 120)	% (n = 116)	% (n = 700)
Mobility							
Level 1	84.4	76.4	53.6	84.8	70.8	87.9	98.9
Level 2	14.2	22.5	46.4	15.2	29.2	12.1	1.1
Level 3	1.4	1.1	0	0	0	0	0
Self Care							
Level 1	92.9	91.0	94.5	91.2	88.3	97.4	100.0
Level 2	6.4	8.4	5.5	8.3	11.7	2.6	0
Level 3	0.7	0.6	0.0	0.5	0	0	0
Usual Activity							
Level 1	85.1	83.7	84.5	71.1	71.7	84.5	98.7
Level 2	14.2	14.6	14.5	24.0	26.7	15.5	1.3
Level 3	0.7	1.7	0.9	4.9	1.7	0	0
Pain/discomfort							
Level 1	40.4	42.7	10.0	35.3	18.3	19	82.7
Level 2	49.6	47.2	65.5	56.9	66.7	66.4	17.0
Level 3	9.9	10.1	24.5	7.8	15.0	14.7	0.3
Anxiety/depression							
Level 1	67.4	66.3	62.7	69.6	60.8	48.3	79.1
Level 2	27	29.8	28.2	26.5	35.8	46.6	20.9
Level 3	5.7	3.9	9.1	3.9	3.3	5.2	0

Table 3: Response on EQ-5D-5L descriptive system

Domain	HT	DM	OA	ARTI	Cephalgia	Dyspepsia	General population
	% (n = 141)	% (n = 178)	% (n = 110)	% (n = 204)	% (n = 120)	% (n = 116)	% (n = 700)
Mobility							
Level 1	80.1	69.7	48.2	81.9	65	86.2	98.1
Level 2	12.8	16.9	34.5	10.8	22.5	12.1	1.6
Level 3	2.8	8.4	11.8	5.8	10.8	0.9	0.1
Level 4	3.5	5.1	5.5	1.5	1.7	0.9	0.1
Level 5	0.7	0	0	0	0	0	0
Self Care							
Level 1	92.9	92.7	91.8	90.6	87.5	97.4	99.6
Level 2	3.5	4.5	7.3	6.9	11.7	1.7	0.4
Level 3	2.1	2.2	0.9	2.0	0.8	0.9	0.0
Level 4	1.4	0.6	0.0	0.5	0	0	0
Level 5	0	0	0	0	0	0	0
Usual Activity							
Level 1	83.7	81.5	80.9	67.2	69.2	86.2	96.3
Level 2	8.5	10.7	13.6	14.7	17.5	8.6	3.1
Level 3	4.3	5.1	4.5	12.7	10	4.3	0.3
Level 4	4.3	2.2	0.0	2.5	1.7	0.9	0.1
Level 5	0.7	0.6	0.9	2.9	1.7	0	0.1
Pain/discomfort							
Level 1	30.5	32.6	6.4	26.5	11.7	10.3	72.1
Level 2	34.8	36.0	31.8	40.2	39.2	46.6	24.6
Level 3	23.4	18.5	32.7	23.5	29.2	29.3	2.9
Level 4	8.5	12.4	23.6	9.3	20	11.2	0.4
Level 5	2.8	0.6	5.5	0.5	0	2.6	0
Anxiety/depression							
Level 1	67.4	61.8	60.9	67.2	60	44.8	71.7
Level 2	19.9	21.3	23.6	16.2	25	35.3	22.4
Level 3	7.1	12.4	8.2	13.2	11.7	12.9	5.6
Level 4	4.3	3.9	5.5	2.9	2.5	5.2	0.3
Level 5	1.4	0.6	1.8	0.5	0.8	1.7	0

Table 4: Description of EQ-VAS and utility

Group of respondent	EQ-5D-3L index score		EQ-5D-5L index score		EQ-VAS	
	Mean	SD	Mean	SD	Mean	SD
Hypertension	0.73	0.247	0.885	0.145	0.802	0.142
DM	0.724	0.256	0.870	0.165	0.724	0.163
Osteoarthritis	0.581	0.199	0.806	0.162	0.719	0.147
ARTI	0.707	0.214	0.882	0.130	0.727	0.138
Cephalgia	0.644	0.215	0.843	0.132	0.706	0.143
Dyspepsia	0.67	0.18	0.87	0.12	0.69	0.13
General population	0.915	0.129	0.971	0.971	0.852	0.107

Table 5: Intra class coefficient correlation between EQ-5D-3L and EQ-5D-5L versus EQ-5D VAS

Group of respondent	EQ-5D-3L vs EQ-5D-5L	EQ-5D-3L vs EQ-5D-VAS	EQ-5D-5L vs EQ-5D-VAS
Hypertension	0.374	0.248	0.816
DM	0.77	0.422	0.478
Osteoarthritis	0.8	0.375	0.404
ARTI	0.806	0.381	0.38
Cephalgia	0.676	0.377	0.487
Dyspepsia	0.75	0.258	0.347
General population	0.463	0.426	0.355

Table 6: Cronbach alpha of EQ-5D-3L and EQ-5D-5L

Domain	HT	DM	OA	ARTI	Cephalgia	Dyspepsia	General population
EQ-5D-3L							
Mobility	0.617	0.688	0.263	0.454	0.574	0.27	0.311
Self Care	0.664	0.727	0.419	0.509	0.579	0.424	0.346
Usual Activity	0.639	0.687	0.413	0.519	0.527	0.39	0.347
Pain/discomfort	0.672	0.768	0.248	0.504	0.597	0.36	0.082
Anxiety/depression	0.66	0.731	0.452	0.588	0.660	0.511	0.080
EQ-5D-5L							
Mobility	0.608	0.695	0.284	0.558	0.515	0.328	0.368
Self Care	0.697	0.735	0.573	0.615	0.554	0.451	0.393
Usual Activity	0.626	0.684	0.527	0.584	0.452	0.434	0.391
Pain/discomfort	0.699	0.726	0.414	0.556	0.537	0.287	0.177
Anxiety/depression	0.692	0.757	0.519	0.663	0.636	0.518	0.166

Table 7: Proportion of responses to highest value of each domain and health state in EQ-5D-3L and EQ-5D-5L

Domain	HT	DM	OA	ARTI	Cephalgia	Dyspepsia	General population
EQ-5D-3L							
Mobility	84.4	76.4	53.6	84.8	70.8	87.9	98.9
Self Care	92.9	91	94.5	91.2	88.3	97.4	100.0
Usual Activity	85.1	83.7	84.5	71.1	71.7	84.5	98.7
Pain/discomfort	40.4	42.7	10	35.3	18.3	19	82.7
Anxiety/depression	67.4	66.3	62.7	69.6	60.8	48.3	79.1
Health state 11111	31.9	32.6	5.5	24	15.0	11.2	68.9
EQ-5D-5L							
Mobility	80.1	69.7	48.2	81.9	65.0	86.2	98.1
Self Care	92.9	92.7	91.8	90.7	87.5	97.4	99.6
Usual Activity	83.7	81.5	80.9	67.2	69.2	86.2	96.3
Pain/discomfort	30.5	32.6	6.4	26.5	11.7	10.3	72.1
Anxiety/depression	67.4	61.8	60.9	67.2	60.0	44.8	71.7
Health state 11111	25.5	23	2.7	17.6	9.2	7.8	57.3

Table 8: Discriminatory power of EQ-5D-3L and EQ-5D-5L

Domain	Shannon Index		Shannon Evenness Index	
	EQ-5D-3L	EQ-5D-5L	EQ-5D-3L	EQ-5D-5L
General Population				
Mobility	0.09	0.16	0.06	0.07
Self Care	0.00	0.04	0.00	0.02
Usual Activity	0.10	0.25	0.06	0.11
Pain/discomfort	0.69	1.02	0.44	0.44
Anxiety/depression	0.80	0.97	0.51	0.42
ARTI				
Mobility	0.61	0.91	0.39	0.39
Self Care	0.42	0.54	0.27	0.23
Usual Activity	1.06	1.45	0.67	0.63
Pain/discomfort	1.28	1.88	0.81	0.81
Anxiety/depression	1.05	1.38	0.67	0.60
OA				
Mobility	1.00	1.63	0.63	0.70
Self Care	0.31	0.45	0.19	0.19
Usual Activity	0.67	0.90	0.42	0.39
Pain/discomfort	1.23	2.03	0.78	0.87
Anxiety/depression	1.25	1.56	0.79	0.67
Cephalgia				
Mobility	0.87	1.33	0.55	0.57
Self Care	0.52	0.59	0.33	0.25
Usual Activity	0.95	1.34	0.60	0.58
Pain/discomfort	1.25	1.87	0.79	0.81
Anxiety/depression	1.13	1.49	0.71	0.64
HT				
Mobility	0.69	1.00	0.44	0.43
Self Care	0.40	0.47	0.25	0.20
Usual Activity	0.65	0.91	0.41	0.39
Pain/discomfort	1.36	1.99	0.86	0.86
Anxiety/depression	1.13	1.40	0.71	0.60
Dyspepsia				
Mobility	0.53	0.67	0.34	0.29
Self Care	0.17	0.20	0.11	0.08
Usual Activity	0.62	0.74	0.39	0.32
Pain/discomfort	1.25	1.86	0.79	0.80
Anxiety/depression	1.24	1.75	0.78	0.75
DM				
Mobility	0.85	1.31	0.54	0.57
Self Care	0.47	0.47	0.29	0.20
Usual Activity	0.72	0.97	0.45	0.42
Pain/discomfort	1.37	1.92	0.86	0.83
Anxiety/depression	1.10	1.50	0.69	0.65

Table 9: Correlation between EQ-5D-3L and EQ-5D-5L versus EQ-5D VAS

Group of respondent	EQ-5D-3L vs EQ-5D-VAS	EQ-5D-5L vs EQ-5D-VAS
Hypertension	0.289**	0.643**
DM	0.388	0.396
Osteoarthritis	0.318**	0.327**
ARTI	0.275**	0.280**
Cephalgia	0.390**	0.409**
Dyspepsia	0.267**	0.284**
General population	0.427**	0.466**

Psychometric properties of EQ-5D-3L and EQ-5D-5L

Agreement

Agreement is one of attribute of psychometric properties that represents reliability of an instrument. Agreement test using intraclass coefficient correlation is shown in Table 5. EQ-5D-3L and EQ-5D-5L had strong correlation, indicated from coefficient of correlation > 0.5 in most of groups of respondents (0.676 - 0.806), except for Hypertension (0.374) and general population (0.463). Previous study conducted by Yfantopoulos⁸ reported that the agreement between the EQ-5D-3L and EQ-5D-5L was high (ICC = 0.85). Study by Ferreira⁹ showed an ICC of 0.759 for the correlation of EQ-5D-3L and EQ-5D-5L. Finding of our study showed utility derived from EQ-5D-5L had better correlation with EQ-VAS in all groups (0.347 - 0.816) compared to correlation of EQ-5D-3L and EQ-VAS (0.248 - 0.426).

Internal consistency

Psychometric property attribute of reliability of an instrument also can be indicated by internal consistency. Table 6 shows internal consistency of EQ-5D-3L and EQ-5D-5L. Internal consistency indicators were indicated by Cronbach alpha of each domain of the questionnaires. In general, internal consistency of EQ-5D-5L were better than EQ-5D-3L, indicated by greater Cronbach alpha of EQ-5D-5L.

Ceiling effects

Table 7 describes ceiling effects of EQ-5D-3L and EQ-5D-5L questionnaires. Ceiling effects in EQ-5D-5L reduced compare to ceiling effects in EQ-5D-3L, indicated by the reduction of proportion of responses in each domain with highest score and health state 11111 which were 5.5 %– 68.9% in all population groups for EQ-5D-3L compared to 2.7% - 57.3% in all population groups for EQ-5D-5L.

Previous studies also reported the reduction of ceiling effect from EQ-5D-3L to EQ-5D-5L, for instances in study by Janssen¹⁰ which reported that the ceiling was reduced from 20.2 % (3L) to 16.0 % (5L), study by Agborsangaya¹¹ reported that compared to 3L, 5L showed lower ceiling effect (32.3% versus 42.1%), study by Greene¹⁴ reported that the five-level diminished ceiling effects by up to 30%, study by Ferreira⁹ reported a ceiling effect reduction of 25.3 % from EQ-5D-3L to EQ-5D-5L, study by Pan¹⁶ reported that the overall ceiling effects decreased from 56.7 % (3L) to 36.7 % (5L), study by Pattanaphesaj¹⁵ reported that the 5L trended towards a slightly lower ceiling compared with the 3L (33% versus 29%), and study by Yfantopoulos⁸ reported that ceiling effects decreased significantly in the EQ-5D-5L in all domains.

Discriminatory power

Table 8 shows discriminatory power of EQ-5D-3L and EQ-5D-5L measured in term of Shannon Index and Shannon Evenness Index to reflect the absolute and relative informativity. Discriminatory power of EQ-5D-5L tended to be more optimal compared to EQ-5D-3L which was indicated by the highest indexes of Shannon and Shannon Evenness Index in almost all domains of EQ-5D-5L compared to those of EQ-5D-3L in all

groups. In some groups, the Shannon Evenness Indexes were lower for EQ-5D-5L in the domain of usual activity and anxiety/depression.

Janssen¹⁰ reported absolute discriminatory power (Shannon index) improved considerably with 5L (mean 1.87 for 5L versus 1.24 for 3L), meanwhile relative discriminatory power (Shannon Evenness index) improved slightly (mean 0.81 for 5L versus 0.78 for 3L). Agborsangaya¹¹ reported higher absolute discriminatory power (Shannon index, mean 0.79 versus 0.52) and higher relative discriminatory power (Shannon Evenness index, mean 0.09 versus 0.06 for 3L). Conner-Spady¹² reported Absolute informativity (Shannon's index) showed higher results for all dimensions of the 5L compared with the 3L (average difference 0.74), mean while relative informativity (Shannon's evenness index) showed an increase from the 3L to the 5L in mobility, usual activities, and pain/discomfort. Yfantopoulos⁸ reported that overall absolute and relative informativity improved by 70.5 % and 16.4 %, respectively, in the EQ-5D-5L. Pattanaphesaj¹⁵ reported the Shannon index improved with the 5L while the Shannon's Evenness index reduced slightly.

Convergent validity

In this study, convergent validity was measured using correlation between utility derived from EQ-5D-3L and EQ-5D-5L versus VAS. The correlation was examined using Spearman's rho correlation. Table 9 describes correlation between utility scores derived from EQ-5D-3L and 5L versus EQ-VAS. Compared to EQ-5D-3L, EQ-5D-5L had better correlation with EQ-VAS, indicated from greater coefficient of correlation.

Janssen¹⁰ reported that convergent validity with WHO-5 was demonstrated and improved slightly with 5L. Conner-Spady¹² reported that all convergent validity coefficients were stronger with the 5L (Spearman coefficients 0.51–0.75).

Limitations of the study

The results of this study has limitations and hence interpretation of study results should be made with some cautions. The limitations were such as the study sample was recruited from only one province of 34 provinces in Indonesia, therefore this sample could not represent the whole population of Indonesia. The sample was also only represent some patients of 7 health conditions, hence further study should also be conducted in other health conditions.

CONCLUSION

Based on psychometric properties of EQ-5D-3L and EQ-5D-5L indicated by attributes of agreement, internal consistency, ceiling effects, and convergent validity, EQ-5D-5L tended to have better psychometric properties compare to EQ-5D-3L in Indonesian sample with several conditions of acute diseases, chronic diseases, and general population. Therefore, future study of HRQOL measurements for pharmacoeconomic analysis should consider to use the EQ-5D-5L version instead of EQ-5D-3L.

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