THE SLOVENIAN VAS TARIFF BASED ON VALUATIONS OF EQ-5D HEALTH STATES FROM THE GENERAL POPULATION

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INTRODUCTION

While the EuroQol instrument (EQ-5D) is gaining popularity as an analytical tool in clinical trials in Slovenia and other Central- and Eastern-European countries, the population utility weights for the instrument have never been established in the area. Early evidence suggested that the valuations for a standard set of the EuroQol health states were broadly similar across countries. Subsequent studies, however, proved that the valuations among countries differ. EQ-5D has become a widely used measure of health status. From a policy and planning standpoint, if an instrument such as the EQ-5D is to be used as a basis for resource allocation, it would be preferable to use a weighting system derived from local, and thus more representative societal preferences, especially in countries which do not fit completely into the cultural and value frame of Western Europe. Although population weights have been established in a number of Western European countries it is not known how well those weights correspond to the preferences of the populations of the Central- and Eastern-European countries such as Slovenia. The primary purpose of this investigation was therefore to derive a set of Slovenia-based population weights for the standard set of health states described in the EQ-5D questionnaire.

In 1999/2000 the EuroQol EQ-5D questionnaire was translated to the Slovenian language for the first time (see Annex 5). The questionnaire was translated and back-translated from the original English version by bilingual translators. The changes in the proposed translation were then made only after the lay testing had showed that the instructions for completing the questionnaire had been too difficult or too ambiguous to be understood properly. This is why some differences emerged between the English questionnaire and the Slovenian version. The content, however, remained the same.

The Slovenian valuations of the EQ-5D states were obtained in a household postal survey in April/May 2000 using the VAS format. A representative sample of 3.000 adults was selected and a response rate of 24,4% was obtained. The OLS model fit the observed data relatively well, achieving an adjusted R^2 of 0,69. Two coding schemes and a number of possible specifications of the model were tested. All of them proved to violate the underlying assumptions of the OLS regression procedure. The generalisability of the results of this wave of survey to the entire adult Slovenian population may be limited, therefore further research in this area is recommended, preferably with face-to-face interviews due to the observed high logical inconsistency rates in the responses.

MATERIAL AND METHODS

The aim of establishing a representative Slovenian sample was achieved by surveying 0,15% of its general population, i.e. 3.000 adult individuals. The sample was selected in collaboration with the Statistical Office of Slovenia. Only the individuals 18+ years old were included in the sample. The questionnaires were sent out in April 2000 and the respondents were granted 3 weeks time to reply. A contact telephone number was given in case the respondents had further questions. No reminder was sent out. In spite of the anonymity of the repondents, the age and gender distribution of the 3.000-sample is known from the information the Statistical Office provided the researchers with. The education distribution of the whole sample is not known. Also, there is no reliable data on the education distribution of the whole of the Slovenian population. All known distributions are shown in Table 2.

As no reminder was sent out and the participants were not contacted in any way unless they initiated the contact themselves, the response rate was low (see Table 1), but in comparison to the previous studies of the same subject this was not surprising. Regarding the logical consistency of the valuations, pairs of logically comparable health states were identified for this version of the questionnaire. A pair of health states is considered logically comparable if 1 of the 2 health states is at least as good as the other on all the five dimensions (e.g. the pair [22222, 22322] is logically comparable, while the pair [23222, 22322] is not). The health state that is at least as good on all dimensions should logically get a score at least as high as the health state to which it is compared. If both states are rated the same, they can still be considered logically consistent if the total number of levels that separate them is small. If in the response there was at least one logically inconsistent pair, we excluded the questionnaire from further analysis. Such a stringent rule was adopted as we assumed that such respondents either did not understand the questionnaire thoroughly or they prefer worse health states. In both cases they cannot represent the general population opinion about the valuation of health states.

After checking for logical inconsistencies in the returned questionnaires, we had to exclude 363 questionnaires. We could thereby perform our analysis on the remaining 370 adequately completed questionnaires. χ^2 test for independence indicated that the respondents who achieved higher logical consistency in completing the questionnaire were more likely to have higher education and were younger ($p<0,005$). We cannot claim, however, that there were any significant differences regarding logical consistency in the valuations according to gender or smoking habits.

Table 1: The response rate of the Slovenian EQ-5D general population sample, April-May 2000

	No.	%
Sample size	3.000	100,0
Total response	792	26,4
empty questionnaire	38	1,26
no health state valuations given	21	0,7
Returned questionnaires with health state valuations given	*733*	*24,4*
Returned questionnaires after logical consistency control	*370*	*12,3*

In the third part of the questionnaire fifteen different health states were evaluated directly. The valuations of all other health states that correspond to the EQ-5D questionnaire had to be predicted from the OLS regression model results. Both the median and the mean valuations for the 18 health states (i.e. the 14 different health states vectors, »unconscious« and »dead«) with their empirical scores were determined. The valuations for these health states were also compared between the respondents who did and the respondents who did not value the state »dead«. Interestingly, people who did assign a value to »dead« did not value common health states in the same way as people who did not. We performed an additional linear regression with a dummy variable »death« with the value 1 if the respondents assigned the value to »dead« and 0 otherwise, added to the EQ-5D health dimensions and sociodemographic variables. The results showed that people who did value health state »dead«, used to assign lower values to all other health states (see Annex 3). We did not put further effort into explaining the reasons for this peculiarity, especially as the proportion of the sample who did not value »dead« was very small – at only around 7%. Further research may clarify this discrepancy.

Using the valuations for the set of the health states used in the Slovenian version of the EQ-5D questionnaire, the OLS regression models were constructed according to the stepwise variable selection procedure. A number of different specifications of the set of independent variables were used. As the health states »unconscious« and »dead« were not used in the modelling, only the remaining 13 health states were used for the purpose. Interpolating the scores for health states not directly described and valued in the valuation study produces a weighting system, which can then be

applied to future respondents without having them to complete the full valuation instrument – thus reducing the respondent burden.

First, in order to be able to compare the individual respondents' VAS scores for the EQ-5D health states, their ratings were adjusted relative to the scores they attributed to the states »dead« and 11111. The states 11111 and »dead« were automatically assigned values 1 and 0, respectively. The other states were assigned adjusted scores between 0 and 1 if they were respondent-rated better than death, and between -1 and 0 if they were respondent-rated worse than death. The following formula was used to adjust the scores:

$$V_k = \frac{(S_k - S_{dead})}{(S_{11111} - S_{dead})}$$

where V_k is the VAS adjusted score for the health state k, S_k is the individual respondent's unadjusted VAS score for state k, S_{dead} is the respondent-assigned VAS score for the health state »dead«, and S_{11111} is the respondent-assigned VAS score for the state 11111.

Two different systems of coding the EQ-5D health dimensions were used. Both were used in the regression models and the obtained results were compared.

The first coding system was as follows:

EQ-5D dimensions	Level 1	Level 2	Level 3
Mobility	MO1=0 MO2=0	MO1=1 MO2=0	MO1=0 MO2=1
Self-care	SC1=0 SC2=0	SC1=1 SC2=0	SC1=0 SC2=1
Usual activities	UA1=0 UA2=0	UA1=1 UA2=0	UA1=0 UA2=1
Pain/discomfort	PD1=0 PD2=0	PD1=1 PD2=0	PD1=0 PD2=1
Anxiety/depression	AD1=0 AD2=0	AD1=1 AD2=0	AD1=0 AD2=1

In the first coding system we introduced 10 dummy variables, two for each dimension, indicating what severity level of the health dimension is inherent to a given health state.

In the second coding system we coded the severity levels of the five dimensions as 1, 2, or 3, where 1 represented no problem and 3 represented the worst severity level in the particular health dimension. The second coding therefore was:

EQ-5D dimensions	Level 1	Level 2	Level 3
Mobility	MO=1	MO=2	MO=3
Self-care	SC=1	SC=2	SC=3
Usual activities	UA=1	UA=2	UA=3
Pain/discomfort	PD=1	PD=2	PD=3
Anxiety/depression	AD=1	AD=2	AD=3

In addition, we introduced into the models a dichotomous variable N_3 which indicated whether any of the dimensions of a given health state was at level 3. The N_3 term represents the disutility associated with extreme problems. Besides, we incorporated into the model an additional variable N_2 to be able

to explore the effects of different levels of severity and to therefore overcome the linear equi-distance effects introduced by the original set of independent variables.

Some previous studies (Dolan, 1997) included additional variables whose purpose was to specify in how many dimensions the levels of severity 2 or 3 occur. As it was shown in those studies, this added little to the explanation of the model variance. We therefore decided not to include them in our models.

Given the independent variables described above, the following models were specified:

VAS1 =	f (MO1, SC1, US1, PD1, AD1, MO2, SC2, US2, PD2, AD2)
VAS2 =	f (MO1, SC1, US1, PD1, AD1, MO2, SC2, US2, PD2, AD2, N3)
VAS3 =	f (MO1, SC1, US1, PD1, AD1, MO2, SC2, US2, PD2, AD2, N3, N2)
VAS4 =	f (AD-1, SC-1, PD-1, UA-1, M-1)
VAS5 =	f (AD-1, SC-1, PD-1, UA-1, M-1, N3)
VAS6 =	f (AD-1, SC-1, PD-1, UA-1, M-1, N2, N3)
VAS7=	f (MO, SC, UA, PD, AD)
VAS8 =	f (MO, SC, UA, PD, AD, N3)
VAS9 =	f (MO, SC, UA, PD, AD, N3, N2)
VAS10 =	f (AD, SC, PD, UA, MO, N3, SAH100, GENDER, AGE, SMOKING, SECONDARY, UNIVERSITY)
VAS11 =	f (AD-1, SC-1, PD-1, UA-1, MO-1, N3, SAH100, GENDER, AGE, SMOKING, SECONDARY, UNIVERSITY)
VAS12 =	f (N3, M, SC, UA, PD, AD, SAH100, GENDER, SMOKING, SECONDARY, UNIVERSITY, YOUNGER, OLDER)
VAS13 =	f (MO1, SC1, US1, PD1, AD1, MO2, SC2, US2, PD2, AD2, N13, SAH100, GENDER, SMOKING, SECONDARY, UNIVERSITY, YOUNGER, OLDER, DEATH),

where the variables were defined as follows:

SAH100	the self-assessed health state valuation on the VAS,
GENDER	the individual respondent's gender (0=males, 1=females),
AGE	the individual respondent's age in years,
YOUNGER	a dummy variable representing all the individual respondents younger than 41 years,
OLDER	a dummy variable representing all the individual respondents aged 66 or more,
SECONDARY	a dummy variable representing the individual respondents who continued with their education on the secondary level,
UNIVERSITY	a dummy variable representing the individual respondents with completed at least the undergraduate level of education,
SMOKING	a dummy variable representing the individual respondent's smoking habits (1 if currently smoking and 0 otherwise),
DEATH	a dummy variable indicating whether the individual respondents assigned a VAS value to the state »dead« or not.

Models VAS1 – VAS3 use the independent variables from the first coding system, whereas the rest of the models employ the second coding system. In the models VAS4 – VAS6 and VAS11 a linear transformation of the health-dimension related independent variables was used, i.e. one point was substracted from each severity level in the dimension in order to facilitate the interpretation of the estimated regression constant. Such a transformation does not bring about a change in the goodness of fit of the models (R^2 as well as the beta coefficients remained the same as in the models VAS7 – VAS10). In the models VAS10 and VAS11 the sociodemographic variables are added. The model VAS12 is an attempt to further analyze the possible nonlinearity in the impact of the variable age on

the health valuations. The age variable, in other models measured in years on a quasi-continuous scale, was classified into three age groups similar to the Erikson's human development throughout the life cycle theory (Kaplan, Sadock, 1991). Due to the low share of respondents aged less than 20, the first age group comprised of the respondents aged between 18 and 40, the second of those aged 41 to 65, and the third of those aged 66 or more.

RESULTS

The sociodemographic characteristics of the Slovenian general population sample and a comparison with the general Slovenian population are given in Table 2.

The mean age of the used respondent sample was 40,2 years (SD=16,5). The sample was predominantly female (59,4%), non-smoking (57,3%), in full employment (55,7%) and with secondary level of education (63,0%). Most of the respondents had had some experience with illness (76,5%), from which they experienced serious illness either themselves (33,6%), in their family (77,4%) or in caring for others (37,8%). There were only 23,5% of all respondents who had not had any previous experience with serious illness. There are no significant differences in valuing health states among respondents who up to the moment of the survey had and had not had any experience with serious illness.

The sample population reported a high number of health problems. It was only 39,4% of the respondents who reported no problems with their health at all. 36,4% indicated moderate or serious problems with depression or anxiety, 46,8% of the respondents felt some or extreme pain, 32,2% indicated some or serious problems with performing usual activities, 13,6% are partly or totally unable to take care of themselves and 29,2% of the respondents have some degree of mobility problems.

Respondents reporting any kind of problems with mobility valued their health on average as 58,0 on the VAS. Those having problems with self-care valued their health on average as 50,6 on the VAS, the ones having problems with performing usual activities as 58,8 on average, the ones reporting pain or discomfort as 64,4 and the depressed/anxious ones as 66,0. The standard deviations in these valuations on the VAS were high.

Table 2: Distribution of the socio-demographic variables of the Slovenian general population sample and the Slovenian population, April-May 2000

	Slovenian population		Total sample		Used questionnaires	
	Number	Proportion	Number	Proportion	Number	Proportion
Gender						
All	1.565.435	100,0	3.000	100,0	370	100,0
Male	751.448	48,0	1.457	48,6	149	40,3
Female	813.987	52,0	1.543	51,4	221	59,7
Age (in years)						
All	1.565.435	100,0	3.000	100,0	370	100,0
18-25	238.009	15,2	427	14,2	85	23,0
26-35	295.718	18,9	560	18,7	88	23,8
36-45	313.726	20,0	593	19,8	72	19,5
46-55	257.600	16,5	532	17,7	49	13,2
56-65	211.627	13,5	420	14,0	40	10,8
65+	248.755	15,9	468	15,6	36	9,7
Education						
All		100,0			370	100,0
up to 8 years of schooling		45,3			31	8,1
9-12 years of scholling		44,8			233	63,0
13 + years of schooling		9,9			106	28,6
Status						
All	1.565.435	100,0			370	100,0
Employed	745.169	47,6			206	55,7
Unemployed	126.625	8,1			20	5,4
Student	74.642	4,8			63	17,0
Housewife	n.a.	3,1			7	1,9
Retired	461.910	29,5			74	20,0
Smoking						
All	1.036	100,0			370	100,0
Yes	274	26,4			78	21,1
Former smoker	191	18,4			79	21,3
No	571	55,1			213	57,6
Experience with illness						
All					370	100,0
Yes					283	76,4
No					87	23,5

Methodological issues: Slovenian population according to: gender and age on December 31st 1998, number of enrolled students in 1998/1999, number of employed persons in 1998, number of pensioners in 1998, education in 1996.
For the general population, the category education is comprised of population older than 15 years, while the EQ-5D sample included the population 18+ years of age. All other data refers to population 18+ years old.
The data on smoking habits of the Slovenian population and the share of housewives in the general population originate from the 1996/2 Slovenian Public Opinion Poll Survey.
Sources: Statistical Office of Slovenia (the EQ-5Dsample description); Statistical Office of Slovenia, 1999; Drofenik, Kraigher, Berlogar (1999); Toš et al., 1996; authors' computations.

Male, older, those who were not in some employment, the less educated, non-smoking respondents who have not had any experience with serious illness valued their health lower on the VAS.

Table 3: Summary statistics for the VAS data for the 18 health states with empirical scores

Health state	Mean	SD	Min	Max	Median	95% CI	
11211	86,02	11,07	30	100	90	84,89	87,14
11111(a)	97,64	4,96	70	100	100	97,14	98,15
21232	34,90	17,08	0	85	35	33,16	36,64
11122	57,28	17,28	9	90	60	55,52	59,04
11121	76,19	14,63	25	100	80	74,70	77,68
22233	21,43	14,68	0	65	20	19,93	22,92
33333(a)	2,88	6,20	0	40	0	2,25	3,51
33321	13,30	10,98	0	50	10	9,67	12,75
21111	81,71	12,67	35	100	85	80,42	83,00
11111(b)	97,89	4,48	70	100	100	97,43	98,35
12111	73,93	16,81	10	100	80	72,22	75,65
11112	73,72	15,52	30	100	77	72,14	75,30
32211	27,75	17,23	0	75	30	25,99	29,50
33333(b)	3,44	6,86	0	40	0	2,74	4,14
22323	22,99	14,95	0	80	20	21,47	24,52
Unconscious	12,74	18,58	0	100	5	10,84	14,63
Dead(a)	11,21	15,10	0	80	5	12,18	14,42
Dead(b)	11,30	15,38	0	80	5	9,73	12,87

The goodness of fit and the statistical significance of the models VAS1 – VAS13 as a whole are presented in Table 4. The R^2 adj. obtained from these models varied between 0,648 to 0,692.

Table 4: Statistical significance of estimated regression models

Models	*R^2 adj.*	*Se*	*F-test*	*p*
Model VAS1	0,689	0,268	1227,51	0,000
Model VAS2	0,689	0,268	1115,96	0,000
Model VAS3	0,689	0,268	1024,30	0,000
Model VAS4	0,648	0,286	2034,99	0,000
Model VAS5	0,660	0,281	1791,94	0,000
Model VAS6	0,677	0,274	1656,40	0,000
Model VAS7	0,648	0,286	2034,99	0,000
Model VAS8	0,660	0,281	1791,94	0,000
Model VAS9	0,677	0,274	1656,40	0,000
Model VAS10	0,668	0,276	913,41	0,000
Model VAS11	0,668	0,276	913,41	0,000
Model VAS12	0,657	0,280	881,37	0,000
Model VAS13	0,692	0,267	1037,97	0,000

In further analysis the models VAS1 and VAS7 became our models of choice.

The estimated unstandardized regression coefficients together with their respective statistic significances for models VAS1, VAS2 (with the N_3 included) and VAS7 are presented in Tables 5 and 6. The final model of choice to base the calculation of the VAS-based tariff for all the 243 EQ-5D health states on, was the model VAS1. In model VAS1 except for the term UA2, all the individual coefficients were significant at the 0,05 level and were, as expected, negative. The overall model was significant (F= 1227,51, p<0,00); the adjusted R^2 was 0,689.

Table 5: Estimated unstandardized regression coefficients and significances for models VAS1 and VAS2

Model VAS1			Model VAS2		
Predictor	*Unstandardized coefficient β*	*Sig.*	*Predictor*	*Unstandardized coefficient β*	*Sig.*
Constant	0,986	0,00	Constant	0,991	0,00
MO1	-0,177	0,00	MO1	-0,186	0,00
MO2	-0,438	0,00	MO2	-0,463	0,00
SC1	-0,271	0,00	SC1	-0,280	0,00
SC2	-0,291	0,00	SC2	-0,267	0,00
UA1	-0,122	0,00	UA1	-0,131	0,00
UA2	-0,053	0,09	UA2	-0,084	0,07
PD1	-0,220	0,00	PD1	-0,226	0,00
PD2	-0,178	0,00	PD2	-0,202	0,00
AD1	-0,263	0,00	AD1	-0,265	0,00
AD2	-0,157	0,00	AD2	-0,146	0,00
			N3	0,039	0,36

Table 6: Estimated unstandardized regression coefficients and significances for model VAS7

Model VAS7		
Predictor	*Unstandardized coefficient b*	*Sig.*
Constant	1,429	0,00
MO	-0,206	0,00
SC	-0,093	0,00
UA	-0,054	0,00
PD	-0,111	0,00
AD	-0,093	0,00

As can be seen from Table 5, in model VAS1 the variable UA2 is significant only at the 0,10 level. Because of the soft nature of the data we find this significance level still acceptable. The reason for the variable usual activities being the least significant of all cannot result from inadequate understanding of the category, especially as it was additionaly explained in the brackets. The reason for this may be found in other variables such as mobility and self-care containing some information about the ability to perform usual activities, e.g. work cannot normally be performed when one is not capable of caring for oneself or is confined to bed.

In model VAS1 all the independent variables were significant at the 0,10 level. From the model VAS2 we eliminated the term N_3 as it was highly non-significant.

The regression model used to derive the weighting system for the EQ-5D score based on the general Slovenian population can therefore be specified as follows:

$$\text{VAS score (transf.)} = b_0 + b_1MO1 + b_2MO2 + b_3SC1 + b_4SC2 + b_5UA1 + b_6UA2 + +b_7PD1+b_8PD2 + b_9AD1 + b_{10}AD2$$

where the coefficient b_0 represents the mean transformed VAS score for the logically best health state (vector 11111) and the coefficients b_i represent the decrement from b_0 associated with each dimension and level for the EQ-5D descriptive system. In calculating the Slovenian EQ-5D VAS tariff we also used the model VAS7 and detected quite high differences in the valuation of different health states (see Annex 2).

In Table 7 we present the results of the regression model in which the sociodemographic variables such as self-assessed health state using the VAS scale, attained education level, smoking status, gender and two dummy variables for age were included. Because the objective of the analysis was to estimate a single preference-based EuroQol tariff for the general population, the model which contains respondents' demographic characteristics cannot be used for calculating the VAS tariff (Dolan, 1997). Nevertheless, the results of this regression model are presented for giving additional insights into the valuation of health by the general Slovenian population.

Table 7: Estimated unstandardized regression coefficients and significances for model VAS12

Model VAS12		
Predictor	*Unstandardized coefficient b*	*Sig.*
Constant	1,310	0,00
MO	-0,205	0,00
SC	-0,093	0,00
UA	-0,054	0,00
PD	-0,110	0,00
AD	-0,093	0,00
SAH100	0,002	0,00
GENDER	0,016	0,05
SMOKING	0,039	0,00
UNIVERSITY	0,017	0,04
SECONDARY	-0,041	0,01
YOUNGER	-0,017	0,05
OLDER	-0,012	0,40

All variables except »older« are significant. On average, mobility, in this regression model with a beta-coefficient of 0,36, has the highest impact on the individual's VAS valuation of health states. It is followed by pain and discomfort, depression and anxiety, self-care and usual activities. A similar relationship can be observed in previous models, as well. The respondents who estimate their own health state on the VAS higher, on average attach higher values to all health states. On average, women and smokers value health states higher. The respondents with university level education value health states higher than the respondents with secondary level of education but lower than the respondents with primary education only. The respondents with secondary education value health states lower than the respondents with primary level of education only. Younger respondents attach lower values to all health states than in both other age groups but there seems to be no significant difference between the valuations by the age group between 41 and 65 years and the age group of 66 and older.

Various assumptions underlying the OLS regression models were tested. The normality of the residuals was assessed using a probability plot of the residuals. It showed an approximately normal

distribution but with some outliers to the left side of the graph that caused distoriton (Annex 4). The Jarque-Bera test indicated an overall violation of the normality assumption.

The homoscedasticity assumption was tested using the Breusch-Pagan test. As expected and seen in previous studies (Johnson et al., 1998; Badia et al., 1998), heteroscedasticity was present in the model.

Variance-inflation factors (VIF) were used to detect multicollinearity. Each of the regressors of our basic regression model was successively taken as a dependent variable. Very high values of adjusted R^2 (especially for MO2, SC2, UA2, PD2 and AD2 – where the R^2 adj. values went up to 0,97) indicated the presence of multicollinearity. However, as individual regression coefficients were not very sensitive to changes in our sample when running regression on subgroups of observations, we assume that multicollinearity is not a major problem in our model.

The departures from the underlying assumptions of the OLS regression models were expected as they appeared in almost all of the similar models run across different countries. According to the authors, »given the nature of the data, it is not possible to control for such problems« (Johnson et al., 1998).

DISCUSSION

As the EQ-5D questionnaire was only translated into the Slovenian language in 2000, this is the first study which attempted to derive the EQ-5D utility weights in Slovenia. However, as there are many methodological questions and questions regarding the logical consistency of the respondents' answers still unresolved, it is highly unlikely that the health-state preferences derived from this sample would be representative of the general Slovenian population. Our results can serve well as an introduction into the research of whether the Central- and Eastern European countries' health states valuations differ from those in the Western Europe and if therefore the use of a local-based utility weighting system is preferable to the use of a common tariff.

It could be deducted from the model results that it is more favourable to use two dummy variables representing different severity levels of each EQ-5D health dimension than to use one ordinal variable for every dimension. No logical explanation could be confirmed to account for the strange behaviour of the N_3 variable which was used to measure disutility in connection with extreme problems. It was later omitted from the model.

In the model VAS1, the dimension with the greatest empirical influence on the values of the hypothetical health states is mobility, followed by self-care, pain/disability, anxiety/depression and usual activities. In some models usual activities did not have a significant impact on the health valuations. We presume that some of the information about this variable is already contained in the categories mobility and self-care. Interestingly, depression/anxiety and pain/disability categories have approximately the same impact on the health valuations. In model VAS7, mobility again had the highest impact of all the independent variables in the model. However, self-care, pain/disability and anxiety/depression had approximately the same impact on the VAS valuation. Usual activities explained the least model variance share of all variables.

We suggest further analysis not necessary using a bigger sample, but preferably using face-to-face interviews to see what parts of the questionnaire the respondents find difficult and to help them on the spot with additional explanations. The majority of the reported problems were connected with valuing the health state 32211, as it is difficult to understand that an individual who is confined to bed only has moderate problems with self-care and usual activities. Moreover, it was very difficult for a large part of the respondents to value the health state »dead«, as many claimed that it was unnatural to pronounce death as a health state and found it uncomparable with other health states.

An important consideration stemming from this survey is therefore the idea that it would be more appropriate for such a research to be conducted on a face-to-face interview instead of on a postal survey basis. The results of the research may only be used to enhance health policy decisions when it can be reliably assumed that the respondents were able to understand the task of health valuation thoroughly. Although postal surveys are simpler and easier to administer, we should be cautious when using the results they provide us with. Further consideration should also be given to the connection and generalizability of the categories, especially in the case of the category usual activities, which was reported already in the previous studies (Johnson et al., 1998; Murti et al., 1998) to have an insignificant impact on health states valuations.

The problems of heteroscedasticity and non-normality were present in the model. Both could be solved by adapting alternative model specifications. Finally, the weights presented in this paper should be further compared to the weights derived in previous studies and if shown that they differ significantly, local-based preferences for health states should have advantage over foreign-based ones.

REFERENCES

Badia X, Roset M, Monserrat S, Herdman M (1998): The Spanish VAS tariff based on valuations of EQ-5D health states from the general population. In: Rabin RE, Busschbach JJV, de Charro FT, Essink-Bot ML, Bonsel GJ (eds.): EuroQol Plenary Meeting Rotterdam 1997, Discussion Papers; 93-114.

Dolan P (1997): Modelling Valuations for EuroQol Health States. Medical Care; 35; 1094-1108.

Johnson JA, Coons JS, Ergo A, Szava-Kovats G (1998): Valuation of EuroQol (EQ-5D) Health States in an Adult US Sample. Pharmacoeconomics; 13; 421-433.

Kaplan HI, Sadock BJ (1991): Synopsis of Psychiatry. London: Williams&Wilkins; 903.

Drofenik O, Kraigher T, Berlogar J (1999): Izobraženost in vključenost odraslih v izobraževanje. In: Velikonja, M. (Ed.), Nacionalni program izobraževanja odraslih: strokovne podlage. Zvezek 2: cilji, dejavnosti, utemeljitve. Andragoški center Slovenije. Ljubljana; 108-120.

Murti B, Johnson JA; Ohinmaa A, Sintonen H, Coons JS (1998): Comparison of Finnish- and US-based VAS valuations of the EQ-5D. In: Rabin RE, Busschbach JJV, de Charro FT, Essink-Bot ML, Bonsel GJ (eds.): EuroQol Plenary Meeting Rotterdam 1997, Discussion Papers; 115-138.

Statistical Office of Slovenia: Statistični letopis Slovenije. 1999.

Toš N et al. (1996): Slovensko javno mnenje 1996/2. Ljubljana: FDV, CJMMK, [production] 1996. Ljubljana: Arhiv družboslovnih podatkov pri FDV [distribution], 1999.

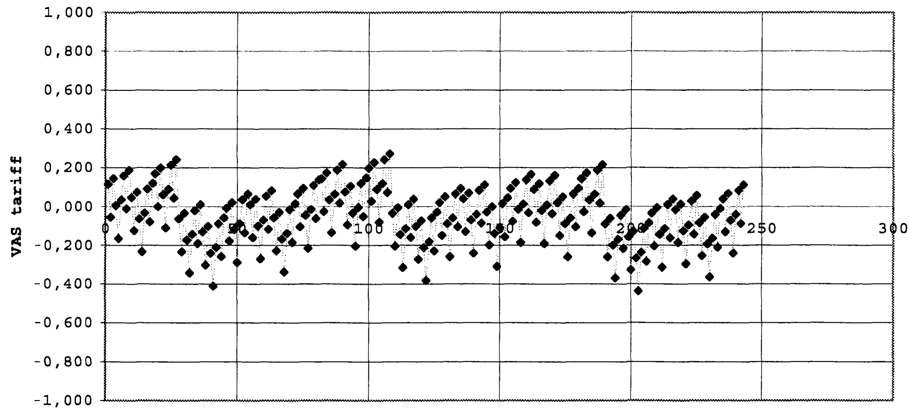
Annex 1: Slovenian VAS based tariff for 243 EQ-5D health states

State	VAS tariff (model VAS7)	VAS tariff (model VAS1)	State	VAS tariff (model VAS7)	VAS tariff (model VAS1)	State	VAS tariff (model VAS7)	VAS tariff (model VAS1)
11111	1,000*	1,000*	12331	0,449	0,484	21321	0,447	0,536
11112	0,779	0,723	12332	0,355	0,221	21322	0,354	0,273
11113	0,685	0,829	12333	0,262	0,327	21323	0,260	0,379
11121	0,761	0,766	13111	0,685	0,695	21331	0,336	0,578
11122	0,668	0,503	13112	0,592	0,432	21332	0,243	0,315
11123	0,574	0,609	13113	0,499	0,538	21333	0,149	0,421
11131	0,650	0,808	13121	0,574	0,475	22111	0,573	0,538
11132	0,557	0,545	13122	0,481	0,212	22112	0,479	0,275
11133	0,463	0,651	13123	0,388	0,318	22113	0,386	0,381
11211	0,818	0,864	13131	0,463	0,517	22121	0,462	0,318
11212	0,725	0,601	13132	0,370	0,254	22122	0,368	0,055
11213	0,631	0,707	13133	0,277	0,360	22123	0,275	0,161
11221	0,707	0,644	13211	0,631	0,573	22131	0,351	0,360
11222	0,614	0,381	13212	0,538	0,310	22132	0,257	0,097
11223	0,520	0,487	13213	0,445	0,416	22133	0,164	0,203
11231	0,596	0,686	13221	0,520	0,353	22211	0,519	0,416
11232	0,503	0,423	13222	0,427	0,090	22212	0,425	0,153
11233	0,409	0,529	13223	0,334	0,196	22213	0,332	0,259
11311	0,764	0,933	13231	0,409	0,395	22221	0,408	0,196
11312	0,671	0,670	13232	0,316	0,132	22222	0,314	-0,067
11313	0,577	0,776	13233	0,223	0,238	22223	0,221	0,039
11321	0,653	0,713	13311	0,577	0,642	22231	0,297	0,238
11322	0,560	0,450	13312	0,484	0,379	22232	0,203	-0,025
11323	0,466	0,556	13313	0,391	0,485	22233	0,110	0,081
11331	0,542	0,755	13321	0,466	0,422	22311	0,465	0,485
11332	0,449	0,492	13322	0,373	0,159	22312	0,371	0,222
11333	0,355	0,598	13323	0,280	0,265	22313	0,278	0,328
12111	0,779	0,715	13331	0,355	0,464	22321	0,354	0,265
12112	0,685	0,452	13332	0,262	0,201	22322	0,260	0,002
12113	0,592	0,558	13333	0,169	0,307	22323	0,167	0,108
12121	0,668	0,495	21111	0,666	0,809	22331	0,243	0,307
12122	0,574	0,232	21112	0,573	0,546	22332	0,149	0,044
12123	0,481	0,338	21113	0,479	0,652	22333	0,056	0,150
12131	0,557	0,537	21121	0,555	0,589	23111	0,479	0,518
12132	0,463	0,274	21122	0,462	0,326	23112	0,386	0,255
12133	0,370	0,380	21123	0,368	0,432	23113	0,293	0,361
12211	0,725	0,593	21131	0,444	0,631	23121	0,368	0,298
12212	0,631	0,330	21132	0,351	0,368	23122	0,275	0,035
12213	0,538	0,436	21133	0,257	0,474	23123	0,182	0,141
12221	0,614	0,373	21211	0,612	0,687	23131	0,257	0,340
12222	0,520	0,110	21212	0,519	0,424	23132	0,164	0,077
12223	0,427	0,216	21213	0,425	0,530	23133	0,071	0,183
12231	0,503	0,415	21221	0,501	0,467	23211	0,425	0,396
12232	0,409	0,152	21222	0,408	0,204	23212	0,332	0,133
12233	0,316	0,258	21223	0,314	0,310	23213	0,239	0,239
12311	0,671	0,662	21231	0,390	0,509	23221	0,314	0,176
12312	0,577	0,399	21232	0,297	0,246	23222	0,221	-0,087
12313	0,484	0,505	21233	0,203	0,352	23223	0,128	0,019
12321	0,560	0,442	21311	0,558	0,756	23231	0,203	0,218
12322	0,466	0,179	21312	0,465	0,493	23232	0,110	-0,045
12323	0,373	0,285	21313	0,371	0,599	23233	0,017	0,061

State	VAS tariff (model VAS7)	VAS tariff (model VAS1)	State	VAS tariff (model VAS7)	VAS tariff (model VAS1)
23311	0,371	0,465	32232	-0,003	-0,286
23312	0,278	0,202	32233	-0,096	-0,180
23313	0,185	0,308	32311	0,259	0,224
23321	0,260	0,245	32312	0,165	-0,039
23322	0,167	-0,018	32313	0,072	0,067
23323	0,074	0,088	32321	0,148	0,004
23331	0,149	0,287	32322	0,054	-0,259
23332	0,056	0,024	32323	-0,039	-0,153
23333	-0,037	0,130	32331	0,037	0,046
31111	0,460	0,548	32332	-0,057	-0,217
31112	0,367	0,285	32333	-0,150	-0,111
31113	0,273	0,391	33111	0,273	0,257
31121	0,349	0,328	33112	0,180	-0,006
31122	0,256	0,065	33113	0,087	0,100
31123	0,162	0,171	33121	0,162	0,037
31131	0,238	0,370	33122	0,069	-0,226
31132	0,145	0,107	33123	-0,024	-0,120
31133	0,051	0,213	33131	0,051	0,079
31211	0,406	0,426	33132	-0,042	-0,184
31212	0,313	0,163	33133	-0,135	-0,078
31213	0,219	0,269	33211	0,219	0,135
31221	0,295	0,206	33212	0,126	-0,128
31222	0,202	-0,057	33213	0,033	-0,022
31223	0,108	0,049	33221	0,108	-0,085
31231	0,184	0,248	33222	0,015	-0,348
31232	0,091	-0,015	33223	-0,078	-0,242
31233	-0,003	0,091	33231	-0,003	-0,043
31311	0,352	0,495	33232	-0,096	-0,306
31312	0,259	0,232	33233	-0,189	-0,200
31313	0,165	0,338	33311	0,165	0,204
31321	0,241	0,275	33312	0,072	-0,059
31322	0,148	0,012	33313	-0,021	0,047
31323	0,054	0,118	33321	0,054	-0,016
31331	0,130	0,317	33322	-0,039	-0,279
31332	0,037	0,054	33323	-0,132	-0,173
31333	-0,057	0,160	33331	-0,057	0,026
32111	0,367	0,277	33332	-0,150	-0,237
32112	0,273	0,014	33333	-0,243	-0,131
32113	0,180	0,120			
32121	0,256	0,057			
32122	0,162	-0,206			
32123	0,069	-0,100			
32131	0,145	0,099			
32132	0,051	-0,164			
32133	-0,042	-0,058			
32211	0,313	0,155			
32212	0,219	-0,108			
32213	0,126	-0,002			
32221	0,202	-0,065			
32222	0,108	-0,328			
32223	0,015	-0,222			
32231	0,091	-0,023			

*The actual value derived from the regression models were 0,986 for model VAS1 and 0,872 for model VAS7. We automatically assigned value of 1 to the state 11111.

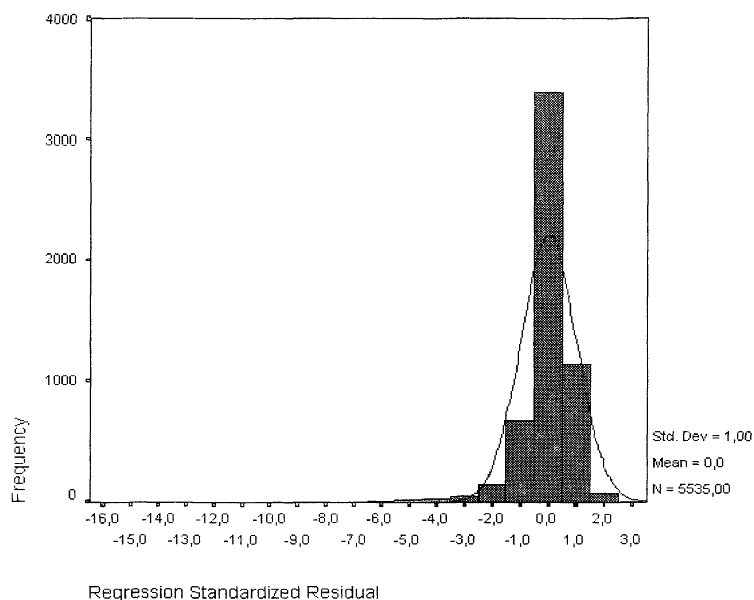
Annex 2: Difference in the VAS valuations when using models 1 and when using model 7



Annex 3: Regression model results including dummy for valuing health state »dead« (1= valuation of death exists, 0= valuation of death is omitted)

Predictor	*Unstandardized coefficient β*	*Sig.*
Constant	0,958	0,00
MO1	-0,185	0,00
SC1	-0,278	0,00
UA1	-0,129	0,00
PD1	-0,225	0,00
AD1	-0,263	0,00
MO2	-0,461	0,00
SC2	-0,264	0,00
UA2	-0,086	0,57
PD2	-0,202	0,00
AD2	-0,145	0,00
N3	0,037	0,38
DEATH	-0,096	0,00
SAH100	0,002	0,00
GENDER	0,017	0,02
SMOKING	0,036	0,00
SECONDARY	-0,040	0,00
UNIVERSITY	0,024	0,00
YOUNGER	-0,011	0,18
OLDER	-0,006	0,64

Annex 4: Distribution of standardized residuals



Annex 5: EQ-5D Health Questionnaire (Slovenian version)

EQ VPRAŠALNIK O VREDNOTENJU ZDRAVSTVENIH STANJ

S tem vprašalnikom želimo ugotoviti, kaj ljudje mislijo o zdravju. Opisali bomo nekaj možnih zdravstvenih stanj. Prosimo, da označite, kako dobra ali slaba bi bila ta stanja za osebo, podobno Vam. Zanima nas le *Vaše osebno mnenje*, pravilnih ali napačnih odgovorov zato ni.

Najprej Vas prosimo, da na naslednji strani označite, kakšno je Vaše zdravstveno stanje danes.

V vsaki od spodnjih skupin treh trditev označite tisti odgovor ☑, ki najbolj ustrezno opiše Vaše počutje na današnji dan.

POKRETNOST
Pri hoji nimam nobenih težav. ?
Pri hoji imam nekaj težav. ?
Priklenjen-a sem na posteljo. ?
SKRB ZASE
Zase poskrbim brez težav. ?
Pri umivanju ali oblačenju imam nekaj težav. ?
Ne morem se sam-a umivati ali oblačiti. ?

VSAKDANJE AKTIVNOSTI *(npr. delo, študij, gospodinjska dela, družina, prosti ¸as)*
Vsakdanje aktivnosti mi ne povzročajo težav. ?
Vsakdanje aktivnosti opravljam z nekaj težavami. ?
Vsakdanjih aktivnosti nisem zmožen-na opravljati. ?

BOLEČINA/NEUGODJE
Ne čutim bolečin oz. nimam občutka neugodja. ?
Pestijo me zmerne bolečine ali občutki neugodja. ?
Čutim nevzdržne bolečine ali skrajno neugodje. ?

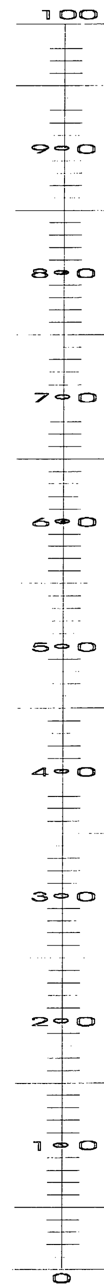
TESNOBA/DEPRESIJA
Nisem tesnoben-na ali depresiven-na. ?
Sem zmerno tesnoben-na ali depresiven-na. ?
Sem skrajno tesnoben-na ali depresiven-na. ?

V primerjavi z mojim splošnim zdravstvenim stanjem v zadnjih 12 mesecih se danes počutim:

boljše ?
približno enako ?
slabše ?

Prosimo, označite le eno izmed trditev.

Najboljše zdravstveno stanje, ki si ga lahko zamislite



Najslabše zdravstveno stanje, ki si ga lahko zamislite

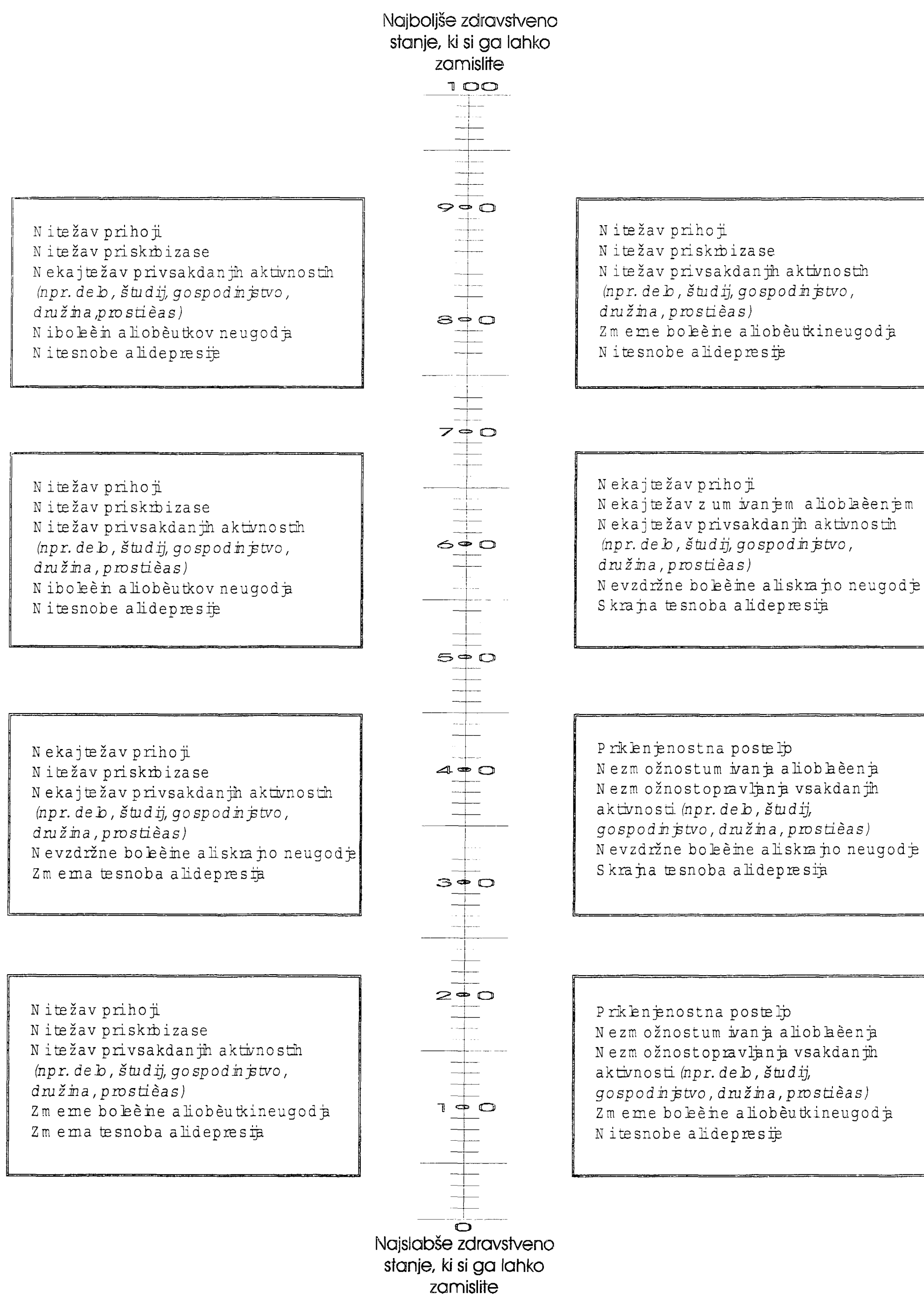
Da bi Vam pomagali označiti, kako dobra ali slaba so določena zdravstvena stanja, smo izrisali lestvico, podobno termometru. Na njej smo s 100 označili najboljše zdravstveno stanje, ki si ga lahko zamislite, z 0 pa najslabše zdravstveno stanje, ki si ga lahko zamislite.

Prosimo, da na tej lestvici označite, kako dobro ali slabo je po Vašem mnenju Vaše zdravstveno stanje danes. To naredite tako, da od črnega pravokotnika spodaj povlečete črto do tiste točke na lestvici, ki najbolje označuje, kako dobro ali slabo je Vaše zdravstveno stanje na današnji dan.

Vaše zdravstveno stanje

- Zdaj Vas prosimo, da razmislite še o osmih zdravstvenih stanjih, ki so opisana na naslednji strani. V vsakem okvirčku je opisano eno zdravstveno stanje.
- Prosimo, da označite, kako slaba ali kako dobra bi bila ta zdravstvena stanja za osebo, kot ste Vi.
- Zamislite si, da bi vsako opisano zdravstveno stanje doživljali eno leto. Kar se zgodi po enem letu, ni poznano in tega ne upoštevajte.

Iz vsakega okvirčka povlecite eno črto do tiste točke na lestvici od 0 do 100, ki po Vašem mnenju najbolje predstavlja, kako dobro ali slabo je zdravstveno stanje, opisano v tem okvirčku. Črte se med seboj lahko križajo.



Najboljše zdravstveno stanje, ki si ga lahko zamislite

100

90

80

70

60

50

40

30

20

10

0

Najslabše zdravstveno stanje, ki si ga lahko zamislite

N itežav prihoji
N itežav priskrbizase
N ekajtežav privsakdanjih aktivnostih
(npr. delo, študij, gospodinjstvo, družina, prostièas)
N ibolèèin aliobèutkov neugodja
N itesnobe alidepresije

N itežav prihoji
N itežav priskrbizase
N itežav privsakdanjih aktivnostih
(npr. delo, študij, gospodinjstvo, družina, prostièas)
Zm erne bolèèine aliobèutkineugodja
N itesnobe alidepresije

N itežav prihoji
N itežav priskrbizase
N itežav privsakdanjih aktivnostih
(npr. delo, študij, gospodinjstvo, družina, prostièas)
N ibolèèin aliobèutkov neugodja
N itesnobe alidepresije

N ekajtežav prihoji
N ekajtežav z umivanjem alioblaèenjem
N ekajtežav privsakdanjih aktivnostih
(npr. delo, študij, gospodinjstvo, družina, prostièas)
N evzdržne bolèèine aliskrajno neugodje
S krajna tesnoba alidepresija

N ekajtežav prihoji
N itežav priskrbizase
N ekajtežav privsakdanjih aktivnostih
(npr. delo, študij, gospodinjstvo, družina, prostièas)
N evzdržne bolèèine aliskrajno neugodje
Zm erna tesnoba alidepresija

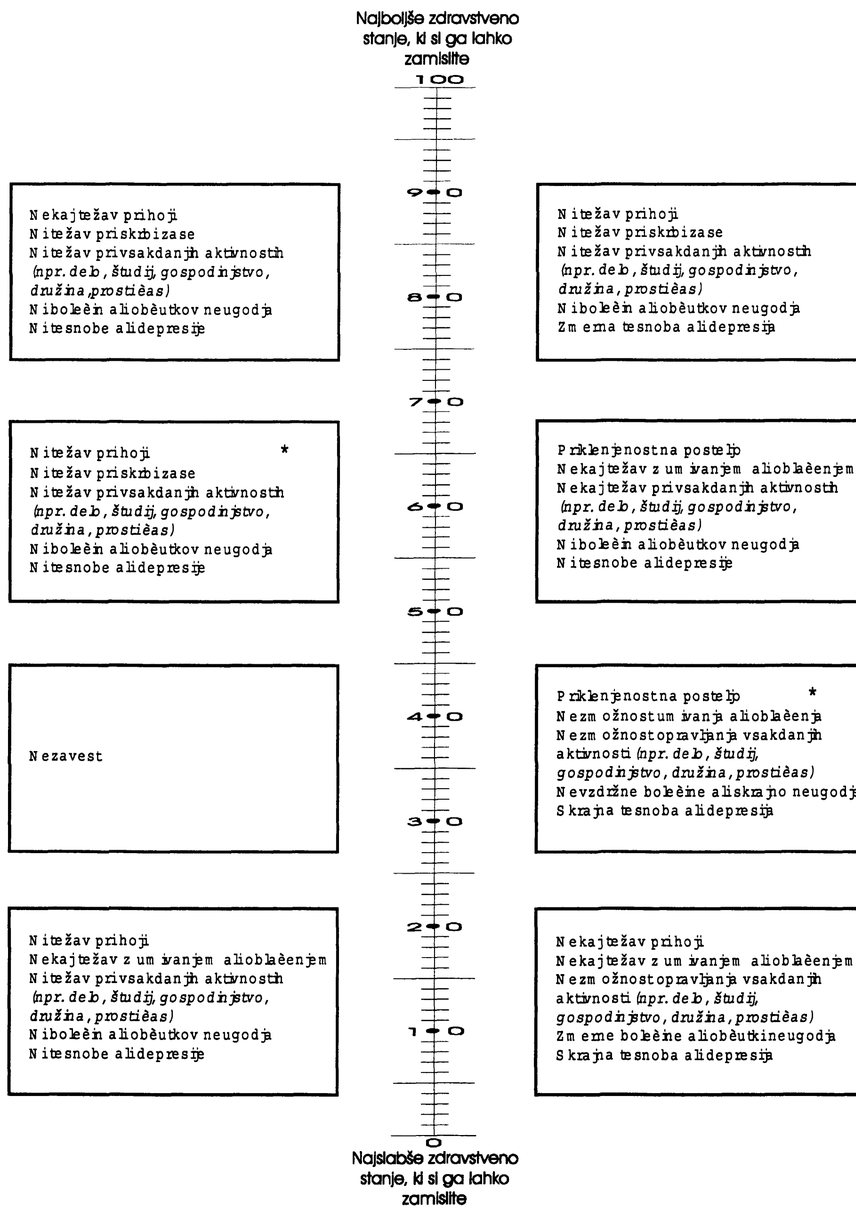
P riklenjenostna postelјo
N ezm ožnostum ivanja alioblaèenja
N ezm ožnostopravljanja vsakdanjih aktivnosti *(npr. delo, študij, gospodinjstvo, družina, prostièas)*
N evzdržne bolèèine aliskrajno neugodje
S krajna tesnoba alidepresija

N itežav prihoji
N itežav priskrbizase
N itežav privsakdanjih aktivnostih
(npr. delo, študij, gospodinjstvo, družina, prostièas)
Zm erne bolèèine aliobèutkineugodja
Zm erna tesnoba alidepresija

P rikljenjenostna postelјo
N ezm ožnostum ivanja alioblaèenja
N ezm ožnostopravljanja vsakdanjih aktivnosti *(npr. delo, študij, gospodinjstvo, družina, prostièas)*
Zm erne bolèèine aliobèutkineugodja
N itesnobe alidepresije

P rosim o, preverite, èe ste vsak okvirèek povezaliz eno izm ed toèk na lestvici
(skupno osem èrt)

Prosim o, da na enak naèin kot na prejšnji strani tudi na tej strani oznaèite, kako dobra ali slaba se Vam zdijo navedena zdravstvena stanja. Zdravstveni stanji, oznaèeni z znakom *, sta enaki dvema stanjema na prejšnji strani.



Prosimo, preverite, èe ste vsak okvirèek povezali z eno izmed toèk na lestvici (skupno osem èrt)

- Na prejšnjih dveh straneh smo Vas prosili, da po lastni presoji ocenite, kako dobra ali slaba se Vam zdijo navedena zdravstvena stanja.
- Zdaj bi želeli, da nam poveste, kako dobro ali slabo se Vam zdi stanje "mrtev" v primerjavi s prej opisanimi zdravstvenimi stanji, če si zamislite, da bi ta stanja doživljali eno leto.
- Prosimo, da na straneh 5 in 6 potegnete vodoravno črto čez lestvico v točki, kamor bi Vi uvrstili stanje "mrtev".
- Ne pozabite stanja "mrtev" uvrstiti na straneh 5 in 6.

Ker so Vaši odgovori anonimni, Vas prosimo, da nam za njihovo lažje razumevanje zaupate nekaj podatkov. Za kakršnekoli dodatne komentarje in pripombe smo Vam na koncu ankete pustili nekaj praznega prostora.

PROSIMO, ODKLJUKAJTE!

1. Ste kdaj doživeli resno bolezen? Da Ne
    - Vi sami ? ?
    - v Vaši družini ? ?
    - pri skrbi za druge ? ?

2. Vaša starost v letih [ ]

3. Vaš spol M Ž
   ? ?

4. Ali ste:
    - kadilec-ka ?
    - bivši kadilec-ka ?
    - nikoli nisem kadil-a ?

6. Ali ste kdaj delali na področju zdravstva ali socialnega skrbstva?
   Da Ne
   ? ?

Če da, kakšen je bil Vaš položaj? [ ]

6. Kakšna je Vaša delovna aktivnost?
- zaposlen-a ali samozaposlen-a ?
- upokojen-a ?
- gospodinja ?
- študent-ka ?
- iščem službo ?
- drugo (prosimo, navedite) ? [ ]

7. Ali ste nadaljevali s šolanjem po osnovni šoli?

   Da Ne
   ? ?

8. Ali imate univerzitetno izobrazbo?

   Da Ne
   ? ?

9. Prosimo, da tukaj vpišete karkoli, kar bi pripomoglo k boljšemu razumevanju Vaših odgovorov:

____
____
____
____
____
____
____
____
____
____
____

10. Ali se Vam je zdelo izpolnjevanje ankete:

- zelo zahtevno ?
- precej zahtevno ?
- zahtevno ?
- precej lahko ?
- zelo lahko ?

12. Prosimo, navedite, koliko časa Vam je vzelo izpolnjevanje vprašalnika (v minutah): [ ]

12. Vpišite Vašo poštno številko: [ ]

Najlepša hvala za Vaše sodelovanje in pomoč!