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Ada Ferrer-i-Carbonell

June 2001

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Institute for the Study
of Labor

Age-Differentiated QALY Losses

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ABSTRACT

Age-Differentiated QALY Losses

In this paper we evaluate the QALY losses, which are linked to the prevalence of specific chronic illnesses and impediments. The analysis is based on the individual self-rating health satisfaction question asked in the British Household Panel Survey data set. Our method is a refinement of the method of Cutler and Robertson (1997). First, we use more information regarding the relationship between the latent variable 'health' and its evaluation into observable QALY's. Second, we allow the QALY loss caused by a illnesses to depend on age. For instance, according to our approach a 30 years old male suffering from diabetes would experience a QALY loss of 0.135 while this would be only 0.084, if the male is 60 years old.

JEL codes: I10, I12

Keywords: Chronic diseases, health satisfaction, QALY loss, QALY weight

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1. Introduction

When we talk about health losses due to a chronic illness or a physical impediment, two questions are relevant: what is the severity of the loss per time period and how long will the loss last? The Quality Adjusted Life Year (QALY) is a well – known concept, which measures the average health during one year on a 0 to 1- scale (for surveys see Torrance, 1986, and Dolan, 2000). In this paper, we focus on an assessment of the QALY difference between being *with* or *without* an illness or impediment. For chronic diseases the duration is permanent by definition.

There is no uniformity on how health should be measured. There are four main methods to measure individual's health, viz., expert rating, individual self-rating, standard gamble, and time-trade-off (see Torrance, 1986).In the first approach the health of an individual is evaluated by asking the opinion of experts such as medical doctors. In the second approach individuals themselves are asked to rate their own health status on a discrete ladder scale. In the third approach respondents are offered a (hypothetical) choice between their present health situation and a treatment with two possible outcomes associated with two probabilities. In the fourth method patients have to make a choice between the present health status for T years or perfect health for (T-K) years.

The four methods yield different outcomes. The QALY definition depends on the method used. This paper identifies the QALY loss caused by specific illnesses and impediments on the basis of individual self-rating of own health. This choice has already been made before by, for example, Cutler and Robertson (1997) when analysing US data and by Groot (2000), who analysed British data in a similar way. These authors implicitly assume that the relationship between a latent variable *health status HS* and the corresponding evaluation of it in terms of QALY is linear over the relevant region. We refine this relation by applying an empirically estimated concave spline function. Doing so the QALY loss is no longer linearly proportional with the loss in *HS*. Furthermore, we extend their previous work by offering a method in which the evaluation of health changes due to an illness[1] are allowed to depend on age. We do that by including an interaction term between age and illness. We see that for certain illnesses the impact on

[1] In the following we shall speak of *illnesses* instead of ‘illnesses *and* impediments’.

the individuals subjective health perception depends on their age. We use the panel data set of the British Household Panel survey (BHPS) for the empirical analysis.

The paper is structured as follows. We discuss the model in section 2. We present the estimation results and the data in section 3. We discuss the results and draw some conclusions in section 4.

2 The model

We measure health by means of the following health satisfaction question

How dissatisfied or satisfied are you with your health?

This question has been posed in the BHPS since 1996. We call the answer to this question the individual's Health Satisfaction (*H*). In the BHPS individuals are asked to restrict their answers between 1 and 7, where 1 stands for 'very dissatisfied' and 7 for 'very satisfied'. Let *HS* (*Health*) be the continuous latent variable underlying health satisfaction, then we assume

$$HS_{nt} = C_t + b' X_{nt} + g' d_{nt} + V\overline{X} + e_{nt} + u_n \qquad (1)$$

where *n* stands for the individual and t for time. The dependent variable *Health* (*HS*) is not observed and therefore we can only estimate equation (1) by using the discontinuous variable *H*. We estimate (1) by ordered probit. The vector X_{nt} includes various explanatory objective variables such as income and age. The vector d_{nt} is a dummy vector, where the j^{th} component equals one if the respondent suffers from the illness j and equals zero otherwise. The error term e_{nt} is assumed to be N (0,1)-distributed as usual in ordered probit analysis. We allow for individual random effects u_n, which are constant across time but differ across individuals. We also include fix time effects, C_t. Furthermore, we incorporate some of the explanatory variables (*X*) not only as their yearly value but also as the average over the three years ($\overline{X}_n$). Mundlak (1978) proposes the same specification, where he interprets the mean of X as picking up the correlation between the observed individual characteristics (X_{nt}) and the individual unobservable random-effects (u_n). As regards content, an alternative explanation lies at hand. As explained in Van Praag et al. (2000), we may distinguish between *shock* and *level* effects. We have

$$bX_{nt} + V\overline{X}_n = b(X_{nt} - \overline{X_n}) + (b + V)\overline{X_n} \tag{2}$$

The deviation from the mean, i.e. $(X - \overline{X})$, stands for the effect of an incidental change from the mean, while the term $\overline{X}$ gives the long- term effect in the steady state. We call the first term the *shock* effect and the second the *level* effect. For income, this distinction yields the permanent and transitory income concepts introduced by Friedman (1957). The two interpretations do not exclude each other but are complimentary. We distinguish in the estimation procedure between shock and level effects in order to get better estimates of the chronic health effects.

In estimating (1) with ordered probit, we estimate the usual intercepts $\mu_1, \ldots, \mu_6$, which link the latent variable *HS* to the discrete response categories (H_i) with i =1,…,7. There holds

$$\text{if } H = i \qquad \Leftrightarrow \qquad m_{i-1} < HS \leq m_i \tag{3}$$

where $m_0 = -\infty$ and $m_7 = +\infty$. Equation (1) is similar to the equation that has been estimated by Cutler and Richardson (1997) and by Groot (2000). We want to extend on their work in two ways. First, we include in (1) some interaction terms between illnesses and age. In that way we are able to capture the interaction between specific illnesses and age. Cutler and Richardson (1997) introduced a method for calculating QALY weights for illnesses by using a health satisfaction equation such as (1). We call their approach the C-R method. Following the C-R method, the QALY loss for an illness j equals $(g_j / (m_6 - m_1))$ This procedure is tantamount to assuming a linear relationship between the latent variable *HS* on the interval (m_1 , m_6) and the corresponding QALY evaluation on the interval (0,1). The C-R method identifies the upper and lower intercept with the border line of excellent health (QALY =1) and the status of near death (QALY = 0) respectively. In other words, they equal $HS \leq m_1$ with a QALY of 0 and $HS \geq m_6$ with a QALY of 1. We suggest to refine the CR method by using more information on the relationship between *HS* and *H*. For that, we use the other intercept points (m_2, …, m_5) as well. This is the second innovation of this paper. We propose the following identification rule for our seven categories that is

$$\begin{aligned}
&\text{if} \quad HS \leq m_1 &&\Leftrightarrow \quad \text{QALY} \leq (1.5-1)/7 \\
&\text{if} \quad m_1 < HS \leq m_2 &&\Leftrightarrow \quad (1.5-1)/7 < \text{QALY} \leq (2.5-1)/7 \\
&\ldots\ldots \\
&\text{if} \quad m_6 < HS &&\Leftrightarrow \quad (6.5-1)/7 < \text{QALY}
\end{aligned} \tag{4}$$

Division by 7 and subtraction of 1 is applied to standardise the QALY values between 0 and 1 as usual in the literature. The identification rule assumes that respondents answer 1 (*H*=1) if their health quality is between 1 and 1.5. If their health quality is 1.6, then respondents round off upwards and their answer is 2 (*H*=2).

This approximation of the function QALY = QALY(*HS*) is no longer linear on the interval (m_1 , m_6), except if the *m*'s are equidistant. In our approach, the relationship between *HS* and QALY is approximated by a spline function with six nodes (see fig.1). Obviously ,the tails cannot be approximated by a straight line. An exponential curve might be a probable candidate for the approximation of the tails. For simplification, we approximate an expected value of *HS* smaller than m_1 by a QALY of 0. We do not find any expected value of *HS* larger than m_6.

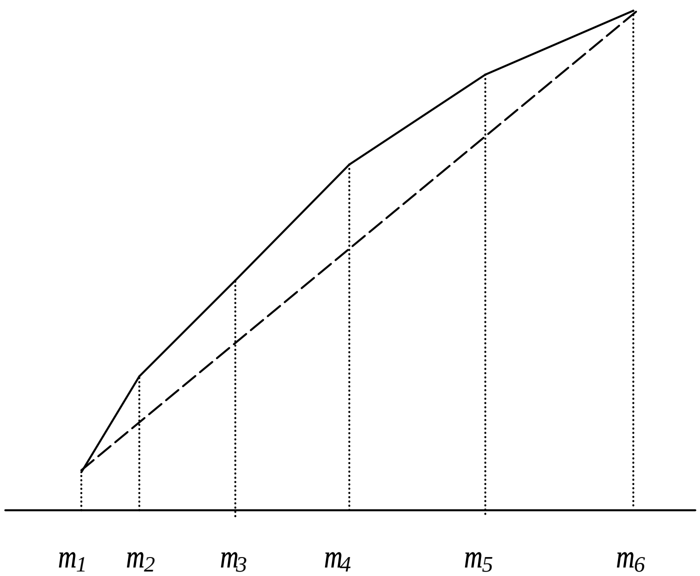

Figure 1. The relation between *HS* and QALY approximated by a spline function and by linear interpolation.

We see from figure 1 that the curve is concave in *HS*. This is caused by the increasing distances between the intercept points.

Now we like to define the analogue to the Cutler- Robertson QALY weight. In the case of a linear health function a negative change in *HS* implies a QALY loss in health, which does not depend on the point of departure. If the QALY evaluation was 1.0 to begin with, a QALY loss of 0.2 assigned to a specific illness would imply a decline to 0.8 and if the starting position was 0.7 it would imply a fall to 0.5. However, in our case the loss in health depends on the change in *HS and* on the point of departure. We make a difference between absolute and relative QALY losses. We define the *absolute* QALY loss caused by a specific illness j, which can be compared to the QALY weights in the CR approach, as

$$QALY(H\hat{S}(X)) - QALY(H\hat{S}(X + d_j(X))) \qquad (5)$$

where $\hat{HS}$ stands for the expected health status without illness, which is calculated for different values of X, and where $d_j(X)$ stands for the effect of the illness j on a person of type X. Hence we define the QALY of a healthy individual with personal characteristics X as $\hat{HS}(X)$, where the illness dummies are all set equal to zero. We use eq.(5) in order to calculate the QALY loss, where the function is the spline function, depicted in fig.1. The *relative* QALY loss , is then defined as,

$$\frac{QALY(\hat{HS}(X)) - QALY(\hat{HS}(X + d_j(X)))}{QALY(\hat{HS}(X))} \tag{6}$$

3. Data and estimation results.

3.1. The data.

For the empirical analysis, we make use of the British Household Panel Survey (BHPS). The BHPS is a comprehensive household survey covering about 10,000 individuals belonging to more than 5000 British households. The BHPS is described in Taylor et al. (1999). We consider waves six to eight corresponding to 1996, 1997, and 1998 respectively. The reason for this restriction is that the health satisfaction question is only asked after wave 5. The survey includes a catalogue of various illnesses and impediments, where the respondents have to answer whether they suffer from it or not. There is also a host of socio-economic and demographic variables referring to the individual and the household, e.g. age, children, education, and household income.

3.2 Estimation

Table 1 presents the estimation results for different specifications of equation (1). First, we estimate health satisfaction (*H*) by various socio-economic and demographic variables such as age, income, education, family size, and employment status. Second, we also include dummies for illnesses . Third, we add interaction terms between the illnesses and age in order to make the illness effects age - dependent. The last specification is, to our best knowledge, estimated for the first time.

Let us start with the simplest explanation where no information about the prevalence of diseases is used. The first two columns of table 1 show the results. As expected, health falls monotonically with age (see also Deaton and Paxson, 1998). Health satisfaction is positively and significantly correlated with the mean of income, i.e., with permanent income. The positive correlation between income and health has been extensively discussed in the literature (see, e.g., Smith, 1994; Deaton and Paxson, 1998). Incidental fluctuations in income, i.e. the *shock* effects, do not seem to affect health. Males are slightly more satisfied with their health than females. The coefficient for education is negative and non-significant. The negative correlation between education and health satisfaction has also been found by Groot (2000) and Kerkhofs and Lindeboom (1995). We also notice that, health-wise, having children seems to be a mixed blessing. There seems to be an optimum number between one and two.

The results for the second specification are shown in the third and fourth columns of table 1. The quadratic specification of age shows that age has now a positive effect on health from the age of 29.5 years old onward. Thus, the inclusion of the dummy for illnesses changes the age coefficient from negative to positive. This may be explained by the fact that most illnesses are correlated with age ,where the variable *age* in the first specification is picking up the effect of the illnesses. Gender effects are now non-significant. Education becomes significant and is still negative. The children effect persists but becomes non-significant at the 5% level. The other coefficients do not change with the introduction of dummy diseases. The disease coefficients are all significant and negative. The values found are roughly comparable with Groot's estimates on only one wave of the same data set. Using this, we can derive a hierarchy of diseases according to the magnitude of their effects on individual health satisfaction.

The results of the third specification are presented in the fifth and six columns of table 1. By including interaction terms between diseases and age, we can analyse whether the impact of the illness on health satisfaction is age-dependent. This may have several reasons. One, the objective degree of severity of an illness may vary with age. This is the case for `chest and breath problems`. Two ,even if the illness is becoming objectively more severe with age, the individual may subjectively perceive it differently. The reasons can be diverse: people may adapt to an illness, it may be that individuals require less from their body than when they were young ,e.g. in sports, and it may be that when growing older they get other ailments as well, such that their original illness becomes one of several complaints. These reasons could be the explanation for the positive age - coefficients found for ‘difficulty in hearing’, ‘heart and blood problems’, ‘problems with the stomach, liver, and kidneys’, ‘diabetes’, and ‘anxiety, depression or bad nerves’. For some impediments and illnesses, we did not find a marked age-dependency and thus we did not include an interaction term with age. Similarly, the dummy coefficient found for ‘chest and breath problems’ becomes non-significant when we include an interaction term with age. Figure 2 displays the age pattern for various illnesses, i.e. $d_j + d_j \ln age$. We see that QALY losses diminish with age except for the ‘chest and breath problems’. Finally, we notice that the variances of the individual random effects are fairly large and represent about 50% of the total unobservable effects.

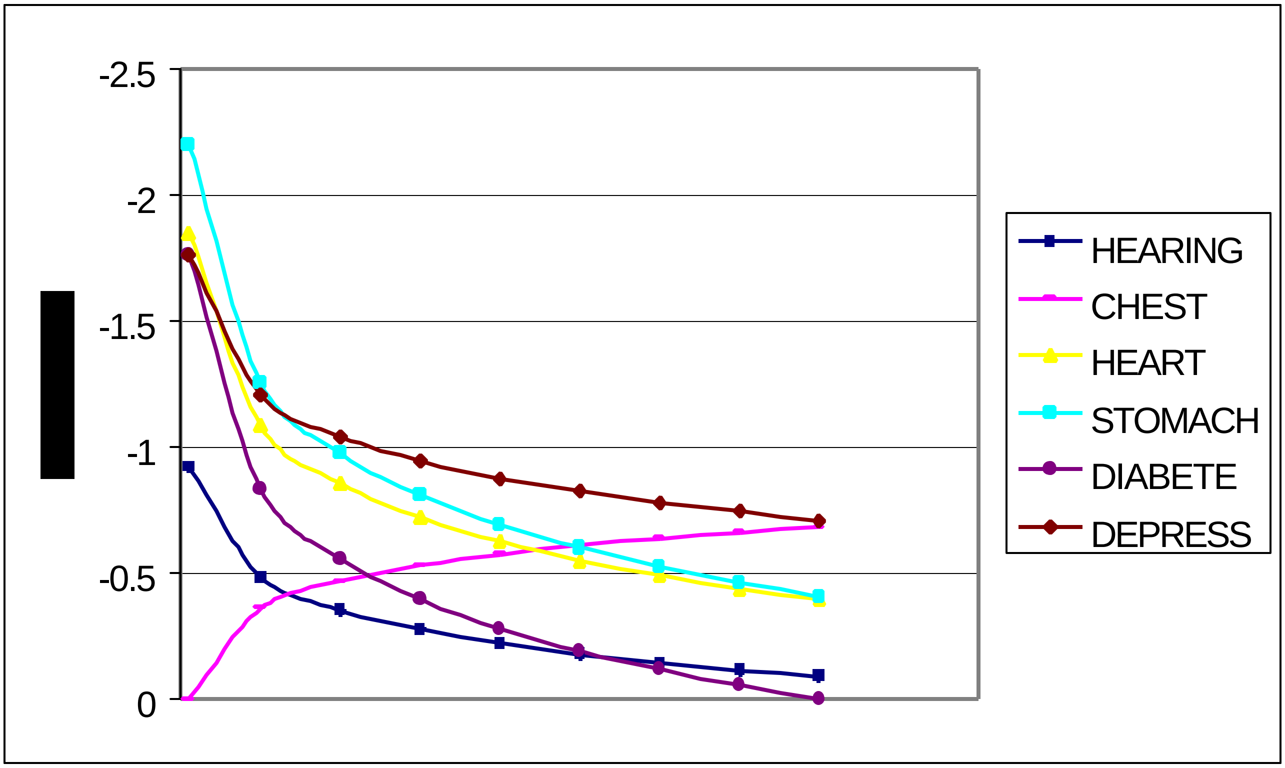

Figure 2: Age pattern of QALY weights for various illnesses and impediments

Table 1: Health Satisfaction Probit Equations

	Coeff.	*Std.Err.*	Coeff.	*Std.Err.*	Coeff.	*Std.Err.*
Intercept term	4.308	*4.671*	7.039	*9.022*	5.700	*7.149*
Time Fix Effect 1996, wave 6	-0.096	*-5.944*	-0.138	*-8.550*	-0.139	*-8.646*
Time Fix Effect 1997, wave 7	-0.038	*-2.403*	-0.057	*-3.654*	-0.057	*-3.659*
X						
Ln (age)	-1.289	*-2.472*	-2.419	*-5.436*	-1.598	*-3.500*
Ln2 (age)	0.131	*1.829*	0.357	*5.807*	0.235	*3.714*
Minimum	*137.362*		*29.642*		*29.879*	
Ln (income last month)	-0.010	*-0.654*	-0.019	*-1.213*	-0.020	*-1.294*
Ln (children +1)	0.176	*2.005*	0.097	*1.163*	0.092	*1.101*
Ln2 (children +1)	-0.162	*-2.671*	-0.102	*-1.901*	-0.101	*-1.866*
Maximum	*1.726*		*1.605*		*1.578*	
Male	0.103	*3.812*	-0.011	*-0.463*	-0.012	*-0.522*
Ln (years Education)	-0.034	*-1.065*	-0.064	*-2.268*	-0.067	*-2.366*
Missing Education	-0.158	*-1.871*	-0.197	*-2.396*	-0.209	*-2.532*
Living together?	0.016	*0.565*	-0.015	*-0.586*	-0.013	*-0.537*
Illness Dummy						
Arms, legs, hands, feet, back, or neck			-0.649	*-31.950*	-0.649	*-31.935*
Difficulty in Seeing			-0.252	*-6.669*	-0.262	*-6.888*
Difficulty in Hearing			-0.156	*-4.569*	-0.923	*-2.484*
Skin conditions/allergies			-0.138	*-4.704*	-0.142	*-4.809*
Chest/breathing problems			-0.583	*-21.987*		
Heart/blood problems			-0.511	*-19.100*	-1.853	*-5.314*
Stomach/liver/kidneys			-0.608	*-19.227*	-2.199	*-6.671*
Diabetes			-0.673	*-10.475*	-2.293	*-2.847*
Anxiety, depression or bad nerves			-0.852	*-28.138*	-1.760	*-5.906*
Alcohol or drug related problems			-0.948	*-6.754*	-0.889	*-6.327*
Epilepsy			-0.649	*-6.118*	-0.654	*-6.179*
Migraine or frequent headaches			-0.270	*-8.898*	-0.263	*-8.623*
Other health problems			-0.787	*-23.594*	-1.436	*-4.548*
*Illness Dummy*Age*						
Difficulty in Hearing * ln(age)					0.190	*2.093*
Chest/breathing problems * ln(age)					-0.156	*-22.730*
Heart/blood problems * ln(age)					0.333	*3.908*
Stomach/liver/kidneys * ln(age)					0.409	*4.924*
Diabetes * ln(age)					0.401	*2.048*
Anxiety, depression or nerves * ln(age)					0.239	*3.104*
Others * ln(age)					0.167	*2.079*

$\overline{X}$						
Mean (Ln(income last month))	0.194	*7.928*	0.081	*3.579*	0.082	*3.620*
Mean (Ln(children +1))	0.128	*1.948*	0.090	*1.411*	0.091	*1.425*
μ*						
m_2	0.523	*38.851*	0.543	*39.379*	0.543	*39.335*
m_3	1.210	*72.900*	1.253	*74.478*	1.254	*74.518*
m_4	1.923	*106.559*	1.981	*108.520*	1.984	*108.596*
m_5	2.794	*145.391*	2.855	*147.111*	2.859	*147.273*
m_6	4.050	*193.934*	4.085	*192.157*	4.090	*192.282*
σ (υ_I)(individual random effect)	1.264	*97.002*	0.994	*83.229*	0.992	*83.026*
Log Likelihood	-48702		-46719		-46685	
Numb Individuals	12033		12033		12033	
Numb Observations	29979		29979		29979	
Chi-Squared	7863.657		4510.775		4484.208	

* μ_I is standardised at 0.

Next, we present in table 2 the absolute and relative QALY losses and weights for all illnesses included in the BHPS for a male of 30 years old and for a male of 60. For these calculations, we use the third specification of table (1) and equations (4), (5), and (6). As a reference group we take males in 1996, living in partnership, with an income of U.K. £1900 per month, two children, and 10 years of education[2]. Table 2 also presents the QALY weights when we apply the C-R approach to the second specification of table 1. Using the third specification and taking age at the sample average gives rise to similar results, which we do not present in table 2. Table 2 shows, for example, that an individual of 30 years old who suffers from diabetes has a QALY loss of 0.135 in a (0,1) scale, while a man of 60 would have a loss of only 0.084. Table 2 shows that for all diseases except for 'chest and breath problems', the absolute and relative QALY losses are equal or bigger for a 30 years old man than for a 60 years old man.

Table 2: QALY losses due to various diseases

Disease / Age	Absolute QALY Loss		Relative QALY Loss		QALY Weight
	30	60	30	60	CR approach
Average QALY level for healthy people	0,684	0,698			
Arms, legs, hands, feet, back, or neck	0,089	0,084	0,130	0,120	0,159
Difficulty in Seeing	0,173	0,173	0,253	0,248	0,062
Difficulty in Hearing	0,175	0,16	0,256	0,229	0,038
Skin conditions/allergies	0,159	0,159	0,232	0,228	0,034
Chest/breathing problems, asthma, bronchitis	0,07	0,082	0,102	0,117	0,143
Heart/blood problems or blood circulation problems	0,101	0,058	0,148	0,083	0,125
Stomach/liver/kidneys	0,115	0,063	0,168	0,090	0,149
Diabetes	0,135	0,084	0,197	0,120	0,165
Anxiety, depression or bad nerves	0,137	0,105	0,200	0,150	0,209
Alcohol or drug related problems	0,128	0,123	0,187	0,176	0,232
Epilepsy	0,09	0,085	0,132	0,122	0,159
Migraine or frequent headaches	0,173	0,173	0,253	0,248	0,066
Other health problems	0,125	0,1	0,183	0,143	0,193

[2] The sample mean in 1996 for income is U.K. £1834 per month and approximately 10 years of education.

The relative QALY loss for diabetes is 0,197 for a male of 30 years old, and 0.120 for one of 60 years old. The QALY weight for diabetes derived by CR approach is 0.165.

Let us now look what are the averages for the British population, as represented by the waves 1996-8 in the BHPS. Here, we calculate for all respondents their expected *HS* value and the corresponding QALY. Next, we compute the QALY for all the respondents under the hypothetical situation that none of the individuals suffer from any illness, i.e. if all the individuals were cured from these drawbacks. We call the first measure the *actual* QALY level and the second the *cured* QALY level. Then, we can define the QALY *loss* as the difference between the actual and the cured QALY. In table 3, we present the averages of the actual QALY levels and QALY losses for the total sample, over the sub - samples of males and females, and for three age brackets. The actual QALY level is for the whole population about 0,75. The level falls with increasing age from 0,79 to 0.70. Females have a lower QALY than males. The average QALY loss, caused by the illnesses, including multiple prevalence, is about 0,08. Hence, the QALY level is reduced by more than 10 %.

In the rest of the table we look at the QALY loss caused by having *one* illness. For each illness, we present 3 rows. The first row shows the actual QALY, the second the QALY loss, and the third the corresponding sample frequencies. We see that the most frequently found illnesses is problems with ‘arms, legs, hands, feet, back, or neck’, viz. for 27 % of the sample, followed by ‘chest and breathing problems’, and ‘heart problems’ and ‘skin probelms’. The surprisingly large percentage of respondents with ‘arms, legs, hands, feet, back, or neck problems’ may be caused by the fact that it is a broad impediment definition that includes very different degrees of severity, which can not be distinguished in the BHPS. The overall QALY loss due to arms problems is 0.023. However, if we restrict the loss to the actual sufferers it implies that the loss has to be multiplied for the sufferers by 1/0.27. It follows that the loss for sufferers is about 0.11. Similar calculations can be made for the other illnesses.

We can see in table 3 that the lower QALY for female respondents is especially due to the ‘arms, legs, hands, feet, back, or neck problems’, ‘Anxiety, depression or bad nerves’, and ‘migraine or frequent headaches’. This result is a combination of different weights and different prevalence of the illness among the sub-samples.

Table 3. QALY averages and losses in the population.

		Total	Male	Female	<30	30-65	>65
Actual QALY		0.7514	0.7633	0.7412	0.7879	0.7543	0.7040
QALY loss		0.0847	0.0719	0.0956	0.0456	0.0799	0.1393
One Illness							
Arms	QALYUN	0.8130	0.8145	0.8116	0.8250	0.8130	0.7995
	QALYWIN	0.0231	0.0207	0.0252	0.0084	0.0213	0.0437
	%Prevalence	27.32%	24.33%	29.87%	9.63%	24.71%	52.99%
Sight	QALYUN	0.8346	0.8340	0.8352	0.8328	0.8333	0.8397
	QALYWIN	0.0015	0.0013	0.0016	0.0006	0.0009	0.0035
	%Prevalence	4.78%	4.17%	5.30%	2.13%	3.07%	11.59%
Hearing	QALYUN	0.8347	0.8336	0.8356	0.8326	0.8331	0.8406
	QALYWIN	0.0014	0.0016	0.0012	0.0009	0.0012	0.0026
	%Prevalence	8.13%	9.26%	7.17%	2.26%	5.24%	21.22%
Chest	QALYUN	0.8260	0.8255	0.8265	0.8255	0.8258	0.8271
	QALYWIN	0.0101	0.0097	0.0104	0.0079	0.0085	0.0161
	%Prevalence	13.44%	12.91%	13.89%	13.12%	11.20%	18.85%
Skin	QALYUN	0.8341	0.8336	0.8344	0.8309	0.8323	0.8417
	QALYWIN	0.0020	0.0016	0.0024	0.0025	0.0020	0.0015
	%Prevalence	12.32%	9.78%	14.48%	15.25%	12.17%	9.38%
Heart	QALYUN	0.8275	0.8274	0.8276	0.8309	0.8273	0.8243
	QALYWIN	0.0086	0.0078	0.0092	0.0025	0.0070	0.0190
	%Prevalence	14.18%	12.93%	15.24%	2.27%	9.72%	37.53%
Stomach	QALYUN	0.8304	0.8301	0.8306	0.8297	0.8280	0.8364
	QALYWIN	0.0057	0.0051	0.0063	0.0038	0.0062	0.0068
	%Prevalence	7.34%	6.46%	8.09%	2.93%	7.14%	12.73%
Diabetes	QALYUN	0.8339	0.8330	0.8347	0.8322	0.8325	0.8388
	QALYWIN	0.0022	0.0023	0.0022	0.0012	0.0017	0.0044
	%Prevalence	2.47%	2.52%	2.43%	0.78%	1.68%	6.12%
Depress	QALYUN	0.8272	0.8294	0.8253	0.8271	0.8239	0.8349
	QALYWIN	0.0089	0.0058	0.0115	0.0063	0.0104	0.0083
	%Prevalence	7.50%	4.85%	9.75%	4.39%	8.59%	8.49%
Alcohol&Drugs	QALYUN	0.8355	0.8344	0.8365	0.8327	0.8336	0.8430
	QALYWIN	0.0006	0.0009	0.0003	0.0007	0.0007	0.0002
	%Prevalence	0.45%	0.67%	0.27%	0.56%	0.52%	0.17%
Epilepsi	QALYUN	0.8354	0.8346	0.8361	0.8326	0.8335	0.8428
	QALYWIN	0.0007	0.0006	0.0007	0.0008	0.0007	0.0004
	%Prevalence	0.76%	0.72%	0.80%	0.91%	0.82%	0.47%
Migraine	QALYUN	0.8332	0.8337	0.8328	0.8306	0.8309	0.8412
	QALYWIN	0.0029	0.0015	0.0040	0.0028	0.0033	0.0020
	%Prevalence	9.41%	5.03%	13.14%	9.20%	10.83%	6.46%
Other	QALYUN	0.8308	0.8316	0.8301	0.8304	0.8288	0.8358
	QALYWIN	0.0053	0.0037	0.0067	0.0030	0.0055	0.0074
	%Prevalence	4.95%	3.47%	6.20%	2.35%	4.94%	7.87%
Number of Observations		29979	13779	16200	7670	16669	5640

4. Conclusions.

In this paper we considered how we assign QALY losses to various impediments and illnesses. For that, we use individual self-ratings of health. The method we use is a refinement of the method originally devised by Cutler and Richardson (1997). The novelties of the paper are two. First, we exhaust all available information to transform the individual estimated responses (*H*) into QALY values. Thus, we get a better insight into the non- linear relation between the cardinal QALY and the observed variable Health (*H*), where Cutler and Robertson assume a linear relationship on the relevant range. It is obvious that the relationship becomes more accurate, the more response categories are distinguished in the Health Satisfaction question. Second, in our approach, the QALY weights depend on age. We introduce in the estimation interaction terms between illnesses and age. It is obvious that this can be extended to other characteristics such as gender and job situation

The QALY weights differentiated by age have a clear implication for the cost-effectiveness analysis of therapies. In practice it implies that therapies on chronic diseases are more cost-effective for the demographic group with the higher QALY losses per year. This has an obvious ethical dimension.

The results of this paper show in our opinion that the method is operational to evaluate the health situations of populations and population subgroups. Other more problem oriented surveys are needed to trace the effect of illnesses and possible therapies in more detail.

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