Health related quality of life and long-term conditions: findings from a national survey in England

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Abstract

Introduction: Those responsible for planning and commissioning health services require a method of assessing the benefits and costs of interventions. Quality adjusted life years, based on health-related quality of life (HRQoL) tariffs, can be used as part of this commissioning process. The purpose of this study was to generate nationally representative HRQoL tariff estimates for demographic characteristics, lifestyle factors and chronic conditions using data from the Health Survey for England.

Methods: The EQ-5D was used to elicit mean health-related HRQoL tariffs for the participants. Mean HRQoL tariffs for socio-demographic characteristics and various health conditions were calculated. Regression modelling was used to estimate the independent impact of each socio-demographic factor and health condition on HRQoL tariffs.

Results: Minor psychiatric morbidity symptoms were strongly associated with substantially reduced HRQoL. Of the chronic conditions studied, doctor diagnosed arthritis and chronic lung disease had the greatest impact on HRQoL among the over 65s.

Discussion: The estimates calculated provide nationally representative baseline data for England. These estimates can be used for modelling the impact of various interventions on health-related quality of life.

Introduction

The National Health Service (NHS) has a responsibility to monitor the health of the UK population and to commission services and interventions that will improve health. The Department of Health and other Government departments have a similar statutory responsibility to evaluate the impact of policy interventions on health and other outcomes [1]. In the face of finite resources, it is useful to know which interventions yield the greatest benefit. One way of comparing across diverse interventions aimed at tackling different diseases and conditions is to measure their impact on length of life and in addition health-related quality of life (HRQoL). QoL measures incorporate the perspective of the user. They can also be used as an input to calculating Quality Adjusted Life Years (QALYs) for health economic evaluation [2].

The European Qualify of Life – 5 Domains (EQ-5D) incorporates physical, social and mental aspects of HRQoL [3]. It was developed by the EUROQOL group and has been used extensively in Europe, the US and worldwide [4-9]. Disease-specific HRQoL measures help evaluate and improve services for specific diseases but they cannot be used to compare across different health conditions. In contrast, HRQoL as assessed by generic measures such as the EQ-5D has been compared across a range of long-term conditions for large samples representative of the US population [6-7].

One challenge in the use of self-ratings of health is that they can be difficult to compare across individuals as they can arise out of differential expectations as well as out of true differences in health. In particular, expectations for health can change with age: Studies using anchoring vignettes suggest that younger people rate severity of impairment

as greater for a given scenario compared with older people [10]. Studies therefore need to consider age as a potential moderator of the disease-HRQoL relationship.

The aims of the current study were to generate HRQoL estimates for common long-term conditions and lifestyle factors for a representative sample of adults in England, and to investigate associations with a number of socio-demographic factors before and after appropriate adjustment.

Methods

Data source: The Health Survey for England (HSE) is an annual cross-sectional survey of a new random sample, representative of the non-institutionalised population in England. Each year the HSE focuses on different conditions and/or different population subgroups in addition to including a core set of questions. In years 2003 through to 2006, the EQ-5D was included in the HSE [11]. For the core sample, the HSE uses a multi-stage sampling procedure such that primary sampling units (postcode sectors, stratified by proportion of households headed by someone in a manual occupation) are first selected. At the next stage, a random sample of households is selected, and finally up to ten adults are selected within each household. In 2003 through 2006, all core participants were asked to complete the EQ-5D. In 2005, an additional nationally-representative boost sample of free-living participants aged 65 and over also completed the EQ-5D [12]. Trained interviewers collected information face-to-face and measured weight and height. A nurse then visited to ask further questions, take more measurements and collect biological samples. Ethical approval was obtained from an appropriate Research Ethics Committee prior to each survey.

EQ-5D: The EQ-5D has five domains capturing mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each domain has three possible levels indicating no problems, moderate problems or severe problems. This results in a series of 243 possible health states, with (1 1 1 1 1) representing optimal health by convention [3]. Participant's responses on these five domains are converted to the EQ-5D tariff using a time trade-off (TTO) method. QoL tariffs are sometimes determined through the direct application of preference elicitation procedures (via TTO, standard gamble, or visual analogue scales) to the participants of a specific study. Although this approach has the advantage that a health state can be evaluated directly, increasingly studies of specific interventions use the alternative approach of first translating the participant's health state into the dimensions captured by a specific health status questionnaire such as the EQ-5D and then assigning a QoL tariff corresponding to that health state based on a previous valuation study of that survey instrument. This approach is less expensive and can be more reliable because the previously calibrated weights are often based on a larger and more representative sample of the population than would be possible in the study of a specific intervention. The tariffs used in the current study have been derived for the UK in a separate sample in a study undertaken in the 1990s. Details are given elsewhere [13] but briefly, respondents were asked how long they were willing to spend in the optimal health state for it to be equivalent to 10 years in the particular health state in question. Shorter periods of time indicate a poorer health state. Responses were then transformed to create the EQ-5D tariff which ranges from 1 (optimal health) to -1 (worse than dead), with 0 being equivalent to dead. The algorithm based on this external sample was

applied to responses from HSE participants to create the EQ-5D tariff for each participant.

Long-term conditions and lifestyle factors: The following items were included in all core and boost samples. Symptoms indicating minor psychiatric morbidity were captured by the 12-item General Health Questionnaire (GHQ) [14]. Participants were coded as having 0, 1-3 or 4+ symptoms, where 4+ indicates probable psychological disturbance. Measured height and weight were used to calculate body mass index and code participants to Obese (BMI>= 30kg/m^2), Overweight (30kg/m^2>BMI>= 25kg/m^2) or Normal/underweight categories (BMI<25kg/ m^2). Smoking status was coded as Current, Ex- or Never regular cigarette smoking.

Doctor-diagnosed conditions (hypertension, angina, heart attack, diabetes and stroke) were reported by participants in the core samples in 2003 and 2006 and by those aged 65 and over (core and boost) in 2005 in response to direct questions but were not asked in HSE 2004. Self-reports have been validated against disease/event registers [15]. A participant was coded as being hypertensive if a doctor had diagnosed hypertension or their measured blood pressure was systolic >=140mmHg, diastolic >=90mmHg, or they were taking medication to lower their blood pressure. The presence or absence of an extended list of long-term conditions was asked for participants aged 65 and over (core and boost) in the HSE 2005 only. This included frequency of bladder problems (coded as At least once a week or Less frequently/not at all), whether the participant had had a fall in the last 12 months, plus a list of additional self-reported doctor-diagnosed conditions: chronic lung disease, asthma, arthritis and osteoporosis.

Socio-demographic characteristics: Sex, age, ethnicity, economic activity, occupation and educational attainment were reported by participants. For these analyses, ethnic group was coded as White, Mixed, Black/Black British, Asian/Asian British and Other ethnic group according to the 2001 Census five category classification. Economic activity was coded as In paid employment, Unemployed, Retired, Other economically inactive. The latter group was heterogeneous and included people who were in full-time education, home-makers and those unable to work because of long-term sickness or disability. Socioeconomic position based on occupation was coded according to the National Statistics Socioeconomic Classification (NSSEC) in five categories of occupation (Managerial/professional occupations, Intermediate occupations, Small employers and own account workers, Lower supervisory and technical occupations, Semi-routine occupations) plus a separate category for those who could not be classified. Highest level qualification was coded as National Vocational Qualification (NVQ) NVQ4/NVQ5/degree level, Higher education below degree/NVQ3/A level equivalent, NVQ2/O level equivalent/NVQ1/CSE equivalent, No qualification.

Statistical analysis: Means were estimated using sampling weights to correct for non-response based on known probability of sampling and allowing for the complex survey design. Unadjusted mean EQ-5D tariffs are presented initially. Tobit regression was then used to estimate EQ-5D tariffs adjusted for socio-demographic factors (sex, age, ethnicity, economic activity, socioeconomic position and educational attainment) in three models. The first modelled the independent contribution of lifestyle factors (body mass

index category and smoking status) and minor psychiatric morbidity to HRQoL. The second modelled the independent contribution of long-term conditions (hypertension, angina, heart attack, stroke and diabetes). The third modelled the contribution of an extended set of long-term conditions (bladder problems, lung disease, asthma, arthritis, osteoporosis and falls) in a subset of boost participants. Tobit regression allows the specification of floor and ceiling effects in the outcome of interest and was used here because there is a ceiling of 1 on the EQ-5D tariff [16]. It assumes there is an underlying latent HRQoL and treats those who score 1 as being censored at that point.

Participants: Modules included in the HSE change from year to year. Table 1 summarises the participant samples included for each of the above models. Items capturing lifestyle were included for the core sample in 2003-2006. The core sample is representative of the general population in England. Items capturing long-term conditions were included in the core samples for 2003, 2005 and 2006 and also for the older person's boost in 2005. To ensure representativeness when the boost sample was included, analyses of long-term conditions were stratified by age. Participants who were excluded because of missing HRQoL data (3,853 out of 45,161 core participants, yielding 41,308 for analysis) were more likely to be male (9% of men had missing data versus 8% for women), older (13% of the over 65s versus 7% for younger participants), retired (12% versus 6% for those in employment), in a lower socioeconomic group (11% in NSSEC5 versus 6% in NSSEC1), of lower educational attainment (15% of those with no qualifications versus 5% of those with the highest qualifications) and non-white (20% versus 7% of white participants).

Results

The unadjusted mean EQ-5D tariff was lower for women, older people, retired and economically inactive people, those in lower and routine socioeconomic classes and those with lower educational attainment (Table 2). Only age and socioeconomic factors were independently associated with EQ-5D tariff in the adjusted analysis.

In unadjusted analyses and adjusting for socio-demographic characteristics and other lifestyle factors, the mean EQ-5D tariff was lower for smokers and ex-smokers and those with BMI of 25kg/m^2 or more (Table 3). Those with one or more, and especially those with four or more, symptoms of minor psychiatric morbidity had substantially reduced EQ-5D tariffs. The reduction in EQ-5D tariff with minor psychiatric morbidity symptoms and overweight/obesity were a little larger for the over 65s compared with the younger subset. The association between EQ-5D tariff and smoking was greater for younger participants, possibly because of selective survival of older smokers. Unadjusted mean EQ-5D tariffs for health conditions (hypertension, angina, heart attack, stroke and diabetes) by socio-demographic factors are summarised in Appendix 1. These show how each condition impacts on quality of life differentially by age and especially by socioeconomic factors, indicating that the quality of life among those in more socially disadvantaged circumstances is lower for a given condition than those who are more advantaged.

Adjusted mean EQ-5D was lower for participants with angina, stroke or diabetes (Table 4). This finding held for those aged less than 65 and for the over 65s but the reduction in HRQoL associated with each long-term condition was greater in the younger

sample. Hypertension was associated with a reduction in HRQoL for those aged less than 65 but not for the over 65s.

Of the long-term conditions, only hypertension, diabetes and heart attack did not have an independent statistically significant association with mean EQ-5D tariff (Table 5) adjusted for socio-demographic characteristics and other long-term conditions. Four conditions were associated with a reduction in mean EQ-5D of over 0.1 points, namely arthritis (reduction of 0.239 points (standard error 0.026)), chronic lung disease (0.168 (0.036)), stroke (0.144 (0.047)) and bladder problems (0.128 (0.026)).

Discussion

Strengths and limitations

This study was based on recent data from over 40,000 adults in a sample representative of the population of England. Multiple lifestyle factors and commonly occurring long-term conditions were considered as potential contributors to HRQoL. Before discussing the findings, some limitations should be noted. Although the assumption is that disease precedes declines in HRQoL, this cannot be tested in a cross-sectional survey. A range of lifestyle factors and long-term conditions were considered but the HSE lacks details on the severity and management of most of these. Most crucially, only one measure of HRQoL, namely the EQ-5D, was considered here. This measure has been extensively used in international studies, nevertheless it is possible that alternative measures of HRQoL may accentuate different health conditions as being important [17].

The TTO method trades length of life for HRQoL : Respondents in the TTO sample were asked what proportion of their remaining life they would forfeit in exchange for removal of the given health problem. This study used a UK-based TTO survey to elicit social preference weights in the algorithm which creates HRQoL tariffs from responses to items in the EQ-5D. Whilst this study has the advantage of being able to use domestic weights, the appropriateness of using population preferences rather than preferences reported by individuals with the condition has been questioned [18]. In particular, the tariffs reported by people with and without the condition of interest vary substantially [18]. The TTO method itself has been criticised on several levels, including its assumption that quality can be traded for quantity of life and that true preferences are revealed in a hypothetical scenario [19]. Nevertheless, the method is the most widely used approach to adjusting length of life for quality when deriving QALYs [19].

Tobit regression was used to allow for the distribution of the EQ-5D, which has a spike of observations at the ceiling of 1. This method was selected because it was available in standard software which allows for the complex survey design although recent comparisons of alternative methods for analysing the EQ-5D suggest that two-part models may be preferable for accurately representing the distributions [20, 21].

Main findings

Symptoms of minor psychiatric morbidity were the closest correlates of HRQoL, as assessed by the EQ-5D. Previous UK studies suggest that minor psychiatric morbidity has a prevalence around 16% [22] and this study found 13% of participants had four or more symptoms on the GHQ12. That minor psychiatric morbidity is so prevalent

indicates that there is great scope for improving HRQoL through interventions to improve psychological well-being. This accords with other work showing depression and other common mental disorders to be major contributors to HRQoL [7, 23-25]. However, given that the two measures, namely the GHQ12 and the EQ-5D, are self-reported concurrently it is worth re-stating that this study cannot claim to identify causal relationships. Furthermore, the anxiety/depression domain of the EQ-5D aims to directly capture symptoms of common mental disorder so the close association between the two measures may simply be explained by the fact that they are different items capturing the same underlying construct. However, closer analysis suggests this is not the case. Reporting symptoms of common mental disorder was strongly associated with more severe limitation on the mobility, self-care, usual activities and pain/discomfort domains ($p<0.001$ based on chi-squared test; data available from authors).

Of the long-term conditions considered, arthritis and chronic lung disease had the greatest independent impact on HRQoL. Stroke, bladder problems, osteoporosis, falls, angina and asthma also impacted on HRQoL, independently of all other long-term conditions and of socio-demographic characteristics. This concurs with other research showing that arthritis/joint pain and stroke are major determinants of EQ-5D scores.[6, 25-30]. It is important to note that the regression estimates presented portray the independent contribution of each condition to HRQoL so that a person who had experienced a stroke and bladder problems would be expected to have an EQ-5D of 0.272 points lower (based on estimates of -0.128 for bladder problems and -0.144 for stroke from Table 5) than one who had experienced neither of those conditions, all other factors being equal.

The impact of some of the long-term conditions on HRQoL was greater for participants aged 65 and under compared with older participants. One explanation is that younger participants have higher expectations for their health so that, for a given level of impairment they select a lower health state [10]. Alternatively, informal and statutory support may be more readily available at older ages, or the daily tasks required of younger people may highlight functional difficulties more readily. Exploration of the explanations are beyond the scope of this study but the findings highlight that initiatives aimed primarily at older people may miss opportunities to have greater impact on HRQoL.

Application of findings

There are a number of ways in which these tariffs could be used in health policy-making or service improvement, both of which may wish to compare the outcomes and utilities of alternative treatment strategies. Health policy-makers are required to produce impact assessments of costly new policies [31]. Increasingly these use QALY valuations, as do NICE technology assessments [32]. Commissioners and service providers may also wish to compare the outcomes of treatment [33]. While this may involve adjustment for sociodemographic characteristics, there is increasing interest in addressing equity and distributional issues in such comparisons. This study demonstrates that, after adjustment for other sociodemographic factors, HRQoL is strongly associated with economic status, social class and education.

The study demonstrates that minor psychiatric morbidity at all ages and arthritis among the over 65s are key contributors to suboptimalHRQoL. These estimates of

HRQoL for various long-term conditions and lifestyle factors may be useful for modelling and forecasting. In combination with prevalence or incidence data, the estimates could be used to help prioritise health and social care interventions.

The author(s) declare that they have no competing interests

Authors' contributions

MSt designed the study, advised on and undertook analysis and drafted the manuscript. MSo conceived and designed the study, advised on analyses and helped to draft the manuscript. VP carried out analysis and contributed to drafting the manuscript. JM designed the study, advised on analysis and data issues and helped draft the manuscript. All authors read and approved the final manuscript.

Authors' contributions

MSt and JM are with the Department of Epidemiology and Public Health, UCL. VP was with the Department of Epidemiology and Public Health, UCL from Sept 2007-2008. MSo is with the Public Health Intelligence & Information Strategy and the Department of Primary Care and Social Medicine, Imperial College London.

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Table 1: Data availability by survey year

Survey Year	Sample type	Core participants with HRQoL and lifestyle data	Participants with HRQoL and long-term conditions data		Participants with HRQoL and extended long-term conditions data
			<65 years	65 and over	65 and over
2003	Core	13469	10943	2810	0
2004	Core	6006	0	0	0
2005	Core	8288	7134	1381	1381
	Older boost	0	0	2351	2351
2006	Core	12632	10072	2854	0
[a]Maximum total for analysis		41308	28149	9396	3732

[a]Exact number available for analysis depends on exposure of interest

Table 2. Mean EQ-5D tariff by socio-demographic characteristics (based on data from all participants from the Health Survey for England 2003-2006 core samples)

		Number of participants	Mean TTO derived HRQoL tariff using EQ-5D	95% Confidence Interval	[a]Adjusted regression coefficient (s.e.)	p-value for regression coefficient
All participants		41308	0.864	0.859, 0.870		
Year	2003	13753	0.869	0.859, 0.870	Reference	
	2004	6114	0.863	0.865, 0.873	-0.017 (0.009)	0.05
	2005	8515	0.872	0.866, 0.878	-0.004 (0.008)	0.6
	2006	12926	0.868	0.864, 0.872	0.004 (0.006)	0.6
Sex	Female	22801	0.853	0.847, 0.859	Reference	
	Male	18507	0.876	0.869, 0.883	0.005 (0.009)	0.6
Age	16-24	4549	0.940	0.932, 0.948	Reference	
	25-34	6479	0.927	0.920, 0.940	-0.102 (0.021)	<0.001
	35-44	8369	0.899	0.891, 0.908	-0.185 (0.021)	<0.001
	45-54	6810	0.852	0.838, 0.865	-0.278 (0.023)	<0.001
	55-64	6704	0.811	0.798, 0.824	-0.280 (0.023)	<0.001
	65-74	4741	0.792	0.777, 0.807	-0.246 (0.027)	<0.001
	75+	3656	0.725	0.708, 0.741	-0.333 (0.028)	<0.001
Ethnic group	White	38250	0.863	0.857, 0.868	Reference	
	Mixed	300	0.913	0.895, 0.932	-0.024 (0.052)	0.6
	Asian or Asian British	1495	0.875	0.860, 0.889	-0.021 (0.029)	0.5
	Black or Black British	865	0.901	0.880, 0.921	0.034 (0.036)	0.3
	Chinese or other ethnic group	364	0.854	0.803, 0.904	0.018 (0.051)	0.7
Economic Status	In employment	23317	0.922	0.919, 0.927	Reference	
	ILO unemployed	1836	0.923	0.911, 0.936	-0.064 (0.025)	0.01
	Retired	9068	0.762	0.751, 0.773	-0.183 (0.019)	<0.001

	Other economically inactive	7024	0.759	0.742, 0.776	-0.279 (0.016)	<0.001
Social Class (NS-SEC)	Managerial and professional	16895	0.904	0.899, 0.910	Reference	
	Intermediate occupations	3587	0.868	0.855, 0.881	-0.039 (0.016)	0.02
	Small employers and own account workers	4472	0.864	0.850, 0.878	-0.041 (0.017)	0.02
	Lower supervisory and technical occupations	4677	0.856	0.842, 0.871	-0.030 (0.016)	0.06
	Semi-routine occupations	10806	0.807	0.795, 0.819	-0.100 (0.013)	<0.001
Highest Educational Qualification	NVQ4/NVQ5/Degree	7594	0.925	0.918, 0.931	Reference	
	Higher ed/NVQ3/A Level	9953	0.895	0.888, 0.903	-0.057 (0.014)	<0.001
	NVQ2/NVQ1	11952	0.887	0.880, 0.894	-0.039 (0.015)	0.007
	No qualification	10654	0.767	0.755, 0.778	-0.118 (0.016)	<0.001

s.e. standard error

[a]Adjusted for all other lifestyle factors and sex, age group, ethnicity, educational attainment, economic activity status and social class of household reference person

Table 3. Health-related quality of life weights for lifestyle factors and minor psychiatric morbidity: core participants

		Number of participants	Mean TTO derived HRQoL tariff using EQ-5D	95% Confidence Interval	[a]Adjusted regression coefficient (s.e.)	p-value for regression coefficient
Age<65						
Cigarette Smoking Status	Never regular smoker	20973	0.888	0.882, 0.893	Reference	
	Ex-regular smoker	10539	0.834	0.825, 0.843	-0.022 (0.012)	0.08
	Current smoker	9735	0.846	0.834, 0.857	-0.071 (0.012)	<0.001
GHQ12 Score	0	25994	0.925	0.921, 0.929	Reference	
	1-3	9254	0.828	0.818, 0.838	-0.218 (0.012)	<0.001
	4+	5445	0.645	0.625, 0.665	-0.456 (0.014)	<0.001
Body mass index	Under 25	13934	0.906	0.900, 0.912	Reference	
	25-30	13934	0.875	0.868, 0.882	-0.032 (0.011)	0.004
	Over 30	8742	0.828	0.817, 0.839	-0.084 (0.014)	<0.001
Age 65 and over						
Cigarette Smoking Status	Never regular smoker	20973	0.888	0.882, 0.893	Reference	
	Ex-regular smoker	10539	0.834	0.825, 0.843	-0.014 (0.017)	0.4
	Current smoker	9735	0.846	0.834, 0.857	-0.029 (0.025)	0.2
GHQ12 Score	0	25994	0.925	0.921, 0.929	Reference	
	1-3	9254	0.828	0.818, 0.838	-0.240 (0.018)	<0.001
	4+	5445	0.645	0.625, 0.665	-0.501 (0.029)	<0.001
Body mass index	Under 25	13934	0.906	0.900, 0.912	Reference	
	25-30	13934	0.875	0.868, 0.882	-0.023 (0.019)	0.2
	Over 30	8742	0.828	0.817, 0.839	-0.100 (0.021)	<0.001

s.e. standard error [a]Adjusted for sex, age group, ethnicity, educational attainment, economic activity status, social class of household reference person, smoking, minor psychiatric morbidity and body mass index

Table 4. Health-related quality of life tariffs for long-term conditions by age: core and boost participants

		Number of participants	Mean TTO derived HRQoL tariff using EQ-5D	95% Confidence Interval	[a]Adjusted regression coefficient (s.e.)	p-value for regression coefficient
Age <65						
Hypertension	Not hypertensive	2133	0.903	0.895, 0.906	Reference	
	Hypertensive	15208	0.819	0.807, 0.831	-0.046 (0.011)	<0.001
Doctor diagnosed angina	No	27795	0.895	0.892, 0.897	Reference	
	Yes	352	0.629	0.591, 0.666	-0.212 (0.031)	<0.001
Doctor diagnosed heart attack	No	27894	0.893	0.891, 0.896	Reference	
	Yes	255	0.652	0.612, 0.693	-0.062 (0.036)	0.09
Doctor diagnosed stroke	No	27958	0.893	0.891, 0.896	Reference	
	Yes	191	0.625	0.574, 0.675	-0.159 (0.040)	<0.001
Doctor diagnosed diabetes	No	27564	0.895	0.892, 0.897	Reference	
	Yes	584	0.741	0.713, 0.768	-0.111 (0.023)	<0.001
Age 65 and over						
Hypertension	Not hypertensive	3384	0.783	0.773, 0.794	Reference	
	Hypertensive	3015	0.771	0.760, 0.781	-0.003 (0.013)	0.8
Doctor diagnosed angina	No	6863	0.786	0.778, 0.794	Reference	
	Yes	1139	0.661	0.639, 0.683	-0.126 (0.020)	<0.001
Doctor diagnosed heart attack	No	7234	0.780	0.772, 0.788	Reference	
	Yes	766	0.661	0.634, 0.689	-0.047 (0.023)	0.04
Doctor diagnosed	No	7408	0.779	0.771, 0.787	Reference	

		Number of participants	Mean TTO derived HRQoL tariff using EQ-5D	95% Confidence Interval	[a]Adjusted regression coefficient (s.e.)	p-value for regression coefficient
stroke	Yes	593	0.632	0.602, 0.663	-0.132 (0.024)	<0.001
Doctor diagnosed diabetes	No	7173	0.774	0.765, 0.782	Reference	
	Yes	830	0.721	0.697, 0.745	-0.057 (0.021)	0.008

s.e. standard error

[a]Adjusted for and sex, age group, ethnicity, educational attainment, economic activity status, social class of household reference person, hypertension and doctor diagnosed conditions (angina, heart attack, stroke and diabetes)

Table 5. Health-related quality of life tariffs for extended list of long-term conditions: participants over 65 in HSE 2005

		Number of participants	Mean TTO derived HRQoL tariff using EQ-5D	95% Confidence Interval	[a]Adjusted regression coefficient (s.e.)	p-value for regression coefficient
Bladder problems	No	2941	0.798	0.782, 0.814	Reference	
	Yes	675	0.639	0.604, 0.674	-0.128 (0.026)	<0.001
Doctor diagnosed chronic lung disease	No	3446	0.772	0.756, 0.789	Reference	
	Yes	286	0.667	0.610, 0.723	-0.168 (0.036)	<0.001
Doctor diagnosed asthma	No	3315	0.775	0.759, 0.791	Reference	
	Yes	417	0.676	0.624, 0.727	-0.090 (0.036)	0.01
Doctor diagnosed arthritis	No	2252	0.842	0.825, 0.859	Reference	
	Yes	1480	0.654	0.629, 0.679	-0.239 (0.026)	<0.001
Doctor diagnosed osteoporosis	No	3450	0.777	0.892, 0.897	Reference	
	Yes	282	0.613	0.558, 0.667	-0.090 (0.042)	0.03
Fall in last 12 months	No	2787	0.791	0.776, 0.808	Reference	
	Yes	945	0.679	0.646, 0.713	-0.095 (0.028)	0.001
Hypertension	Not hypertensive	1334	0.784	0.760, 0.809		
	Hypertensive	1145	0.771	0.745, 0.796	-0.037 (0.024)	0.13
Doctor diagnosed angina	No	3202	0.788	0.772, 0.805	Reference	
	Yes	528	0.627	0.584, 0.670	-0.086 (0.039)	0.03
Doctor diagnosed	No	3363	0.777	0.761, 0.794	Reference	

		Number of participants	Mean TTO derived HRQoL tariff using EQ-5D	95% Confidence Interval	[a]Adjusted regression coefficient (s.e.)	p-value for regression coefficient
heart attack	Yes	369	0.659	0.612, 0.706	-0.070 (0.040)	0.08
Doctor diagnosed stroke	No	3468	0.775	0.759, 0.791	Reference	
	Yes	262	0.617	0.549, 0.685	-0.144 (0.047)	0.003
Doctor diagnosed diabetes	No	3334	0.769	0.752, 0.785	Reference	
	Yes	398	0.729	0.679, 0.778	-0.051 (0.042)	0.2

s.e. standard error

[a]Adjusted for sex, age group, ethnicity, educational attainment, economic activity status, social class of household reference person, bladder problems, falls, hypertension and doctor diagnosed conditions (angina, heart attack, stroke, diabetes, lung disease, asthma, arthritis and osteoporosis)

Appendix 1. Health-related quality of life tariffs for long-term conditions by sociodemographic characteristics: core and boost participants

		Hypertension	Doctor diagnosed angina	Doctor diagnosed heart attack	Doctor diagnosed stroke	Doctor diagnosed diabetes
Sex	Male	0.819 (0.809,0.829)	0.684 (0.666,0.703)	0.696 (0.676,0.715)	0.633 (0.611,0.656)	0.758 (0.741,0.775)
	Female	0.763 (0.754,0.773)	0.626 (0.608,0.664)	0.614 (0.593,0.635)	0.635 (0.614,0.657)	0.690 (0.671,0.709)
Age	<50	0.849 (0.831,0.867)	[a]	0.654 (0.567,0.740) [a]	0.677 (0.634,0.720) [a]	0.780 (0.747,0.812)
	<65	0.803 (0.789,0.817)	0.631 (0.607,0.655)[a]	0.652 (0.628,0.676)	0.599 (0.572,0.637)	0.716 (0.695,0.737)
	<75	0.798 (0.786,0.809)	0.682 (0.660,0.704)	0.711 (0.684,0.738)	0.661 (0.634,0.688)	0.738 (0.720,0.756)
	75+	0.747 (0.735,0.759)	0.657 (0.639,0.676)	0.639 (0.617,0.662)	0.620 (0.600,0.657)	0.685 (0.664,0.707)
Economic Status	In employment	0.898 (0.889,0.906)	0.817 (0.805,0.829)	0.847 (0.836,0.857)	0.791 (0.750,0.833)[a]	0.880 (0.870,0.889)[a]
	ILO unemployed	[a]	[a]	[a]	[a]	[a]
	Retired	0.773 (0.764,0.782)	0.667 (0.652,0.683)	0.669 (0.650,0.688)	0.633 (0.614,0.652)	0.708 (0.692,0.725)
	Other economically inactive	0.640 (0.619,0.661)	0.505 (0.477,0.533)	0.519 (0.491,0.547)	0.531 (0.505,0.557)	0.515 (0.486,0.543)
Social Class (NS-SEC)	Managerial and professional	0.841 (0.831,0.850)	0.722 (0.701,0.742)	0.715 (0.696,0.735)	0.695 (0.673,0.716)	0.787 (0.770,0.803)
	Intermediate occupations	0.790 (0.774,0.806)	0.683 (0.667,0.698)	0.670 (0.635,0.705)	0.594 (0.552,0.636)[a]	0.708 (0.687,0.729)[a]

		Hypertension	Doctor diagnosed angina	Doctor diagnosed heart attack	Doctor diagnosed stroke	Doctor diagnosed diabetes
	Small employers and own account workers	0.816 (0.802,0.830)	0.653 (0.638,0.668)	0.641 (0.629,0.652)	0.637 (0.589,0.685)[a]	0.753 (0.727,0.778)[a]
	Lower supervisory and technical occupations	0.763 (0.745,0.781)	0.631 (0.608,0.654)	0.643 (0.620,0.666)	0.615 (0.593,0.636)	0.706 (0.681,0.731)
	Semi-routine occupations	0.735 (0.720,0.749)	0.620 (0.599,0.641)	0.649 (0.624,0.674)	0.612 (0.586,0.638)	0.681 (0.657,0.706)
Highest Educational Qualification	NVQ4/NVQ5/Degree	0.879 (0.866,0.892)	0.755 (0.744,0.766)	0.734 (0.709,0.760)	0.740 (0.705,0.776)	0.835 (0.819,0.851)
	Higher ed/NVQ3/A Level	0.839 (0.826,0.857)	0.736 (0.711,0.761)	0.744 (0.722,0.766)	0.724 (0.698,0.749)[a]	0.777 (0.755,0.798)
	NVQ2/NVQ1	0.806 (0.792,0.820)	0.674 (0.656,0.692)	0.706 (0.687,0.726)	0.637 (0.619,0.655)	0.736 (0.711,0.761)
	No qualification	0.743 (0.732,0.754)	0.627 (0.609,0.646)	0.632 (0.609,0.654)	0.601 (0.578,0.623)	0.682 (0.664,0.701)

[a]estimates based on fewer than 100 participants