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Preference-Based Assessments

The European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions: Development and Investigation of General Population Utility Norms for Canada, France, Germany, Italy, Poland, and the United Kingdom

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ABSTRACT

Objectives: The European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions (EORTC QLU-C10D) is a cancer-specific preference-based measure, providing health utilities for use in economic evaluations derived from the widely used health-related quality of life measure, EORTC QLQ-C30. Several EORTC QLU-C10D country-specific value sets are available. This article aimed to provide EORTC QLU-C10D general population utility norms for Canada, France, Germany, Italy, Poland, and the United Kingdom, to aid interpretability of obtained utilities in these countries.

Methods: Data were collected in aforementioned countries via a quota-sampled, cross-sectional online survey (n = 100/age-sex group; N = approximately 1000/country). Participants were asked to complete the EORTC QLQ-C30 and provide sociodemographic data. Country-specific utility norms were calculated using the respective country tariff on the country's EORTC QLQ-C30 data after weighting to achieve population representativeness for age and sex. Norm values are provided as means (SDs) by country, age, and sex groups. Tukey's multiple comparison test investigated mean differences among countries. The impact of country, age, and sex on utility values was investigated with a multiple linear regression model.

Results: Country-specific mean utilities range from 0.724 (United Kingdom) to 0.843 (Italy). Country-, sex-, and age-specific mean utilities range from 0.664 for 30- to 39-year-old male Canadians to 0.899 for $>$ 70-year-old male Italians. Utilities were lower in females in 4 of 6 countries, and the impact of age differed among countries. Independent of the impact of age and sex, between-country differences were found ($P \leq .05$).

Conclusion: Results showed a varying impact of age and sex on EORTC QLU-C10D utilities and significant between-country differences. Using national utility norms and utility decrements is recommended.

Keywords: cancer, cost utility analysis, EORTC QLU-C10D, European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions, reference values, utility norms

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Introduction

Preference-based measures (PBMs), such as the EQ-5D[1] and the SF-6D,[2] provide health state utility values (HSUVs) that express the value a certain population (usually the general population of a country) assigns to certain health states. The calculation of HSUVs requires country-specific preference-based scoring algorithms, and HSUVs are then used to calculate quality-adjusted life-years, a metric that combines survival time and quality of life, for use in cost utility analyses. Cost utility analyses compare health interventions using incremental cost-effectiveness ratios, a ratio of the difference in treatment costs and the difference in treatment effect expressed in quality-adjusted life-years.[3]

The European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions (EORTC QLU-C10D) is a novel cancer-specific PBM.[4,5] It provides a preference-based scoring algorithm for the widely used health-related quality of life (HRQOL) profile measure EORTC QLQ-C30[6] and hence allows the calculation of HSUVs from EORTC QLQ-C30 data. In recent years EORTC QLU-C10D value sets have been provided for a range of countries in a joint endeavor of international research groups such as the EORTC Quality of Life Group and the

Multiattribute Utility in Cancer Consortium. Given that the EORTC QLQ-C30 is the most widely used HRQOL questionnaire in cancer clinical research,[7,8] the EORTC QLU-C10D can be expected to become a frequently applied research tool in oncology.

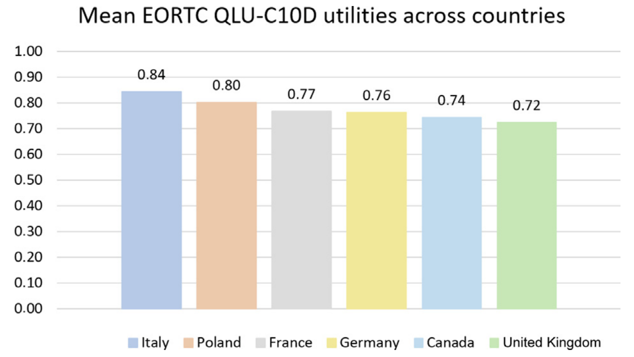
The availability of utility norms increases the applicability and interpretability of PBMs by enabling normative comparisons across specific populations or patient groups.[9] Furthermore, if normative estimates are provided by age and sex groups, these can be used in health economic evaluations to guard against confounding by these variables when comparing groups with different age and sex distributions. Utility norms can provide an adequate baseline in economic modeling and a comparator for survivorship studies. Therefore, the provision of general population utility norms of PBM is suggested.[10-12] General population utility norms allow the comparison of HSUVs between patients with cancer and a comparative group reflecting a real-world population that includes people with various (chronic) diseases, rather than a hypothetically completely healthy population. This is a valid comparator, as in a best-case treatment scenario, a cancer patient population will not return to a perfect state of health but will still include health impairments with the same prevalence as the general population. Additionally, utility norms can facilitate comparisons across countries, regions, and cultures,[13] enabling the detection of health inequities in subgroups of the population.[12] General population utility norms are currently available for commonly applied multiattribute utility instruments, such as the EQ-5D[14] and the SF-6D.[11,15]

Table 1. Sociodemographic data across 5 European countries and Canada (weighted to represent national age and sex distributions).

Sociodemographic data	Characteristic	Canada (N = 1004)	Germany (N = 1006)	France (N = 1001)	Italy (N = 1036)	Poland (N = 1024)	United Kingdom (N = 1026)
Mean age (SD)		46.88 (17.1)	49.18 (17.2)	47.88 (17.0)	49.33 (16.9)	45.61 (17.1)	47.03 (17.6)
Sex	Male	495 (49.3%)	492 (48.9%)	487 (48.7%)	500 (48.2%)	489 (47.8%)	502 (48.9%)
	Female	509 (50.7%)	514 (51.1%)	514 (51.3%)	536 (51.8%)	535 (52.2%)	524 (51.1%)
Education	Less than compulsory	27 (2.7%)	1 (0.1%)	1 (0.1%)	0 (0%)	8 (0.8%)	15 (1.5%)
	Compulsory	220 (21.9%)	100 (10.0%)	51 (5.1%)	16 (1.6%)	40 (3.9%)	237 (23.1%)
	Some postcompulsory	0 (0%)	370(36.7%)	135 (13.5%)	113 (10.9%)	109 (10.6%)	188 (18.3%)
	Postcompulsory below university	230 (22.9%)	187 (18.6%)	112 (11.2%)	564 (54.4%)	359 (35.0%)	220 (21.4%)
	University degree	407 (40.5%)	131 (13.0%)	263 (26.3%)	292 (28.2%)	147 (14.4%)	282 (27.5%)
	Postgraduate degree	110 (11.0%)	211 (21.0%)	419 (41.9%)	49 (4.7%)	326 (31.9%)	72 (7.0%)
	Prefer not to answer	10 (1.0%)	7 (0.7%)	19 (1.9%)	2 (0.2%)	34 (3.3%)	13 (1.3%)
Employment	Employed full time	422 (42.1%)	400 (39.7%)	437 (43.7%)	294 (28.4%)	475 (46.4%)	361 (35.2%)
	Employed part time	82 (8.2%)	104(10.3%)	73 (7.3%)	78 (7.5%)	51 (5.0%)	105 (10.3%)
	Homemaker	57 (5.7%)	43 (4.3%)	34 (3.4%)	100 (9.6%)	30 (3.0%)	90 (8.8%)
	Student	35 (3.5%)	61 (6.1%)	50 (5.0%)	88 (8.5%)	63 (6.1%)	43 (4.2%)
	Unemployed	55 (5.5%)	34 (3.3%)	80 (8.0%)	100 (9.6%)	39 (3.8%)	89 (8.6%)
	Retired	257 (25.6%)	276 (27.4%)	283 (28.3%)	240 (23.2%)	249 (24.3%)	242 (23.6%)
	Self-employed	59 (5.9%)	53 (5.3%)	25 (2.5%)	124 (12.0%)	66 (6.4%)	64 (6.3%)
	Other	28 (2.8%)	28 (2.8%)	12 (1.2%)	10 (1.0%)	25 (2.4%)	29 (2.8%)
	Prefer not to answer/missing	8 (0.8%)	8 (0.8%)	7 (0.7%)	2 (0.2%)	27 (2.6%)	3 (0.2%)
Relationship	Single/not in a steady relationship	282 (28.1%)	230(22.9%)	208 (20.8%)	261 (25.2%)	216 (21.1%)	255 (24.8%)
	Married/in a steady relationship	585 (58.2%)	608 (60.4%)	651 (65.0%)	658 (63.5%)	609 (59.5%)	644 (62.8%)
	Separated/divorced/ widowed	129 (12.8%)	158 (15.7%)	128 (12.8%)	105 (10.1%)	165 (16.1%)	123 (12.0%)
	Prefer not to answer	8 (0.8%)	9 (0.9%)	14 (1.4%)	12 (1.1%)	34 (3.3%)	5 (0.4%)
Health	No health condition selected	396 (36.8%)	384 (38.2%)	455 (45.4%)	389 (37.5%)	367 (35.8%)	399 (38.9%)
	At least 1 health condition selected	580 (57.7%)	542 (53.9%)	498 (49.8%)	600 (57.9%)	590 (57.6%)	588 (57.3%)
	Missing as ticked “prefer not to answer”	40 (4.0%)	77 (7.7%)	39 (3.9%)	42 (4.1%)	59 (5.8%)	36 (3.5%)
	Set missing as filled out incorrectly	15 (1.5%)	2 (0.2%)	9 (0.9%)	5 (0.5%)	8 (0.8%)	3 (0.3%)

Note. Data are presented as n (%) unless mentioned otherwise.

Figure 1. Countries' mean EORTC QLU-C10D values, adjusted for age and sex.



EORTC QLU-C10D indicates European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions.

To support the interpretability of HSUVs obtained by the EORTC QLU-C10D, this article aimed to provide general population utility norms for Canada, France, Germany, Italy, Poland and the United Kingdom, for which EORTC QLU-C10D value sets have recently become available.[16-20] Additionally, we investigate HSUV age and sex differences within and among countries.

Methods

Instruments

EORTC QLQ-C30 and EORTC QLU-C10D

The EORTC QLU-C10D is a PBM designed for use in health economic evaluations. It constitutes a scoring algorithm that is applied to a health state description system based on the widely used HRQOL profile measure EORTC QLQ-C30. The EORTC QLQ-C30 shows robust psychometric properties.[6] Additionally, its reliability and validity for the cancer patient population have been extensively investigated and are well established.[6,21] In the development of the EORTC QLU-C10D, the EORTC QLQ-C30's content and construction were subjected to thorough investigation to build a health state classification system suitable and relevant for a cancer-specific PBM.[4] The dimensions included are physical functioning, role functioning, social functioning, emotional functioning, pain, fatigue, sleep disturbance, appetite, nausea, and bowel problems.[4] Each dimension can take on 4 levels, so the EORTC QLU-C10D describes more than a million possible health states (4^{10} = 1 048 576).[4] There is a standard protocol in place for the elicitation of preferences that includes a web-based discrete choice experiment.[5] So far value sets have been developed for Australia,[22] Austria,[16] Canada,[18] France,[19] Germany,[17] Italy,[16] The Netherlands,[23] Poland,[16] Spain,[24] the United Kingdom,[20] and the United States.[25] Further valuation studies are currently conducted in China, Denmark, Hong Kong, Japan, and Singapore.

Utility Norm Data Collection

For our analyses, we drew on data collected in March/April 2017 within an EORTC project to develop multinational norm data for both the EORTC computerized adaptive test, the EORTC Computerized Adaptive Test Core[26] and the EORTC QLQ-C30.[27] In the respective project, general population norm data were obtained for 13 European countries, Canada, and the United States. Data were collected via the panel research company GfK SE (www.gfk.com) that specializes in international online surveys.[27] These online panels are representative for a range of variables, such as age, sex, education, region, size of the city, and household size. To ensure sufficiently large samples for age and sex subgroups, samples were stratified by sex and a total of 5 age groups in each country, with n = 100 per stratum, resulting in a total sample of N = 1000 per country. Given that the quota-sampling procedure assured a balanced distribution of age and sex groups, the calculation of the population norms data was weighted according to population distribution statistics of age and sex to achieve representativeness for these variables for the respective countries. Additionally, information on employment status, education, marital status, and comorbidities were collected.[27]

Statistical Analyses

Given that the EORTC QLU-C10D consists of items taken from the EORTC QLQ-C30, EORTC QLU-C10D utility norms can be constructed based on the recently published general population norm data for the EORTC QLQ-C30 described earlier.[22] EORTC QLU-C10D utility norms were calculated from QLQ-C30 data using the respective national utility decrements for Canada,[18] France,[19] Germany,[17] Italy,[16] Poland,[16] and the United Kingdom,[20] because these were already available at the time. Sample characteristics are presented as frequencies, means, and SDs. General population utility norms are presented as means and SD separately for countries, age, and sex groups. Analyses of variance were used to investigate the significance of mean differences across countries with Tukey's method.

To investigate the joint impact of country, age, and sex on EORTC QLU-C10D utility values, we fitted a multiple linear regression model including all variables as fixed effects including interaction terms of country × sex and country × age. Age was set so that constant reflects 18 years given that the normative samples do not comprise younger respondents. This means that in the regression formula the age of the respondent at hand needs to be subtracted by 18. Based on the regression model, we provide a formula to calculate country-, sex-, and age-specific general population utility norms. For all analyses, we used IBM SPSS Statistics, version 25.[28]

Table 2. EORTC QLU-C10D utility norms across countries.

EORTC QLU-C10D utility norm	Canada	Germany	France	Italy	Poland	United Kingdom
Mean (SD)	0.743* (0.24)	0.763† (0.23)	0.769‡ (0.25)	0.843§ (0.18)	0.803‖ (0.17)	0.724¶ (0.26)

EORTC QLU-C10D indicates European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions.
*Significant difference in comparison with all countries except Germany (P = .45), France (P = .06), and the United Kingdom (P = .31).
†Significant difference in comparison with all countries except Canada (P = .45) and France (P = .94).
‡Significant difference in comparison with all countries except Canada (P = .06) and Germany (P = .94).
§Significant difference in comparison with all other countries.
‖Significant difference in comparison with all other countries.
¶Significant difference in comparison with all countries except Canada (P = .31).

Table 3. EORTC QLU-C10D utility norms across countries, age, and sex.

Country	Mean utility (SD)											
	18-29 years		30-39 years		40-49 years		50-59 years		60-69 years		70+ years	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Canada	0.779 (0.230)	0.726 (0.208)	0.664 (0.308)	0.766 (0.234)	0.767 (0.242)	0.737 (0.254)	0.736 (0.256)	0.727 (0.246)	0.731 (0.253)	0.754 (0.213)	0.779 (0.197)	0.761 (0.186)
Germany	0.755 (0.283)	0.830 (0.121)	0.811 (0.227)	0.791 (0.255)	0.808 (0.195)	0.793 (0.225)	0.799 (0.202)	0.702 (0.238)	0.748 (0.203)	0.730 (0.260)	0.720 (0.235)	0.684 (0.238)
France	0.780 (0.279)	0.733 (0.281)	0.790 (0.277)	0.742 (0.253)	0.781 (0.259)	0.738 (0.266)	0.783 (0.271)	0.752 (0.222)	0.811 (0.221)	0.781 (0.216)	0.804 (0.208)	0.751 (0.210)
Italy	0.857 (0.206)	0.839 (0.195)	0.796 (0.231)	0.819 (0.188)	0.832 (0.205)	0.807 (0.187)	0.887 (0.163)	0.845 (0.159)	0.877 (0.148)	0.833 (0.166)	0.899 (0.128)	0.834 (0.174)
Poland	0.837 (0.175)	0.779 (0.205)	0.787 (0.186)	0.792 (0.169)	0.837 (0.134)	0.802 (0.187)	0.816 (0.166)	0.808 (0.158)	0.815 (0.147)	0.794 (0.174)	0.814 (0.125)	0.759 (0.198)
United Kingdom	0.674 (0.308)	0.758 (0.193)	0.747 (0.281)	0.673 (0.258)	0.745 (0.295)	0.697 (0.276)	0.695 (0.289)	0.692 (0.279)	0.755 (0.237)	0.752 (0.225)	0.787 (0.183)	0.746 (0.185)

EORTC QLU-C10D indicates European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions.

Results

Sociodemographic Analysis

The data sets of the 6 countries comprised between 1001 (France) and 1036 (Italy) respondents. In the Canadian sample, 2.7% reported to have less than compulsory education whereas only 11.0% possessed a postgraduate degree. In contrast, in the French sample, only 0.1% had less than compulsory education and 41.9% held a postgraduate degree. Unemployment ranged from 3.3% in Germany to 9.6% in Italy. The highest proportions of singles were found in Canada with 28.1%, whereas France, with 65.0%, had the highest percentage of respondents married or in a steady relationship. The surveyed population in France showed the lowest burden of pre-existing ailments (49.8% of its respondents), whereas in Italy 57.9% of the sample indicated that they had at least 1 pre-existing health condition (Table 1).

EORTC QLU-C10D Utility Norm Data Table for Countries

Mean utility norms and SD are presented separately for each country in Figure 1 and Table 2. Overall, the highest utility norm across countries was observed in Italy (u = 0.843; SD = 0.182) and the lowest in the United Kingdom (u = 0.724; SD = 0.257). Significant differences in country-specific EORTC QLU-C10D utility values were observed among most countries (Tukey's $P \leq .05$), independent of the impact of age and sex. Further details are presented in Appendix Table 1 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2022.12.009.

EORTC QLU-C10D Utility Norm Data Table for Countries, Age, and Sex Groups

To provide comprehensive utility norms across all countries, age, and sex groups, all subgroup mean utility norms that serve as population norm reference values for the EORTC QLU-C10D are presented in Table 3. The pattern of mean utility norms by age and sex differed somewhat across countries (Fig. 2). For Canada the subgroup with the lowest mean utility norm is 30- to 39-year-old males (u = 0.664, SD = 0.308) whereas 18- to 29-year-old men and men older than 70 years have the highest mean utility norm with 0.779 (SD = 0.197). In Germany, females older than 70 years possess on average the lowest utility norm (u = 0.684; SD = 0.238). In contrast, 18- to 29-year-old female Germans have on average 0.830 (SD = 0.121), the highest utility norm. A more balanced picture is displayed in France, where 18- to 29-year-old females (u = 0.733, SD = 0.281) have the lowest utility norm, and 60- to 69-year-old males (u = 0.804; SD = 0.208) display the highest health utility norm. Overall, the Italian population shows the highest utility norms, where the range starts at 0.796 (SD = 0.231) for 30- to 39-year-old male Italians and reaches 0.899 (SD = 0.128) for male Italians older than 70 years. In Poland, the female population older than 70 years shows, with 0.759 (SD = 0.198) mean utility, the lowest norm. In contrast, males aged 18 to 29 years (u = 0.837, SD = 0.175) possess the highest utility norms. In the United Kingdom, the country with the overall lowest utility norms, this subgroup analysis shows that 18- to 29-year-old males (u = 0.674; SD = 0.308) have the poorest health state utility norms, whereas males older than 70 years have the highest utility norms with 0.787 (SD = 0.183).

Regression Models

To allow ad hoc calculation of country-, sex-, and age-specific utility norms for the EORTC QLU-C10D, a linear regression model is provided Table 4. The regression table shows a significant effect of sex on the EORTC QLU-C10D utility norms for Germany, France, Italy, and Poland, where the female population consistently shows lower utility values than the male population. In contrast, for Canada and the United Kingdom, there is no significant effect of sex. In most countries with significant influence of age, utility values increase with age. It is only in Germany where an increase in age is significantly linked to decreasing utility values. The regression estimation in Poland does not show any relevant age effect. An exemplary calculation is included in the Appendix in Supplemental Materials found at https://doi.org/10.1016/j.jval.2022.12.009.

$$U_{ref} = C \pm \beta_1 * (age - 18) \pm \beta_2 * sex\ code$$

Discussion

The EORTC QLU-C10D is a cancer-specific preference-based utility instrument[4] that is backward compatible with the EORTC QLQ-C30. This allows the retrospective calculation of utility values from already collected EORTC QLQ-C30 data.

In this article, we have provided the first EORTC QLU-C10D country-specific utility norms. We believe that these will be a practical tool for the interpretation of utility values derived from this fairly new, yet in future presumably frequently used, PBM. They may be of special importance in economic evaluations when no other control groups are available (eg, owing to low prevalence rates of a disease) or when the investigated population is expected to return to a "normal," rather than to a perfect, state of health.[29] This approach of interpreting disease-specific HRQOL data is commonly suggested by norm data publications for non-PBMs such as the EORTC QLQ-C30.[27,30-43]

When using these utility norms for health economic evaluations, the composition of the patient with cancer samples with regard to age and sex should be considered.

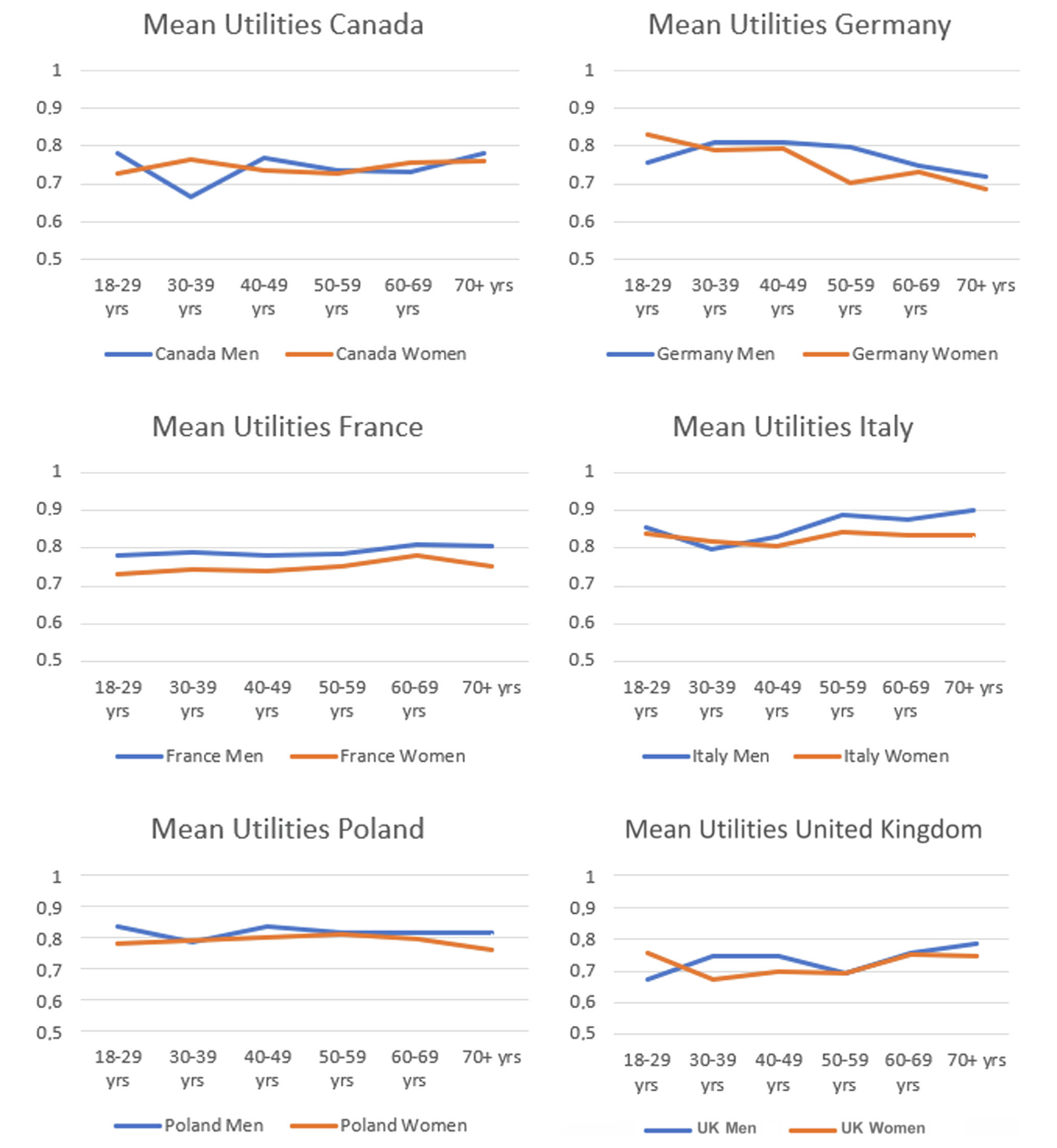


Figure 2. Mean utility values across countries, age, and sex.

The general population utility norms were found to significantly differ among countries. Various factors may be driving these differences: different sociodemographic structures (eg, employment ratios, levels of education), differing cultural attitudes toward health and, or the willingness to trade-off lifetime, and different cultural interpretations of the wording of health descriptions. Nevertheless, the extent of the contribution of each of these factors to between-country differences is mostly unknown. This highlights the potential impact of applying QLU-C10D value sets from one country to QLQ-C30 data from another country.[14] Nevertheless, the standard procedure when using international data sets in economic evaluations is to apply the utility weights of the decision maker's country given that these represent the respective societal values for those decision makers.[44-46] Nevertheless, there are still many unknown factors and lack of evidence, and therefore, the working hypothesis must be that, if available, country-specific preferences and data from that same country are the best match; that is, they provide the "truest"

Table 4. EORTC QLU-C10D regression model.

Country	Constant (C)	*P* value	Age* (β_1)	*P* value	Sex† (β_2)	*P* value
Canada	0.708‡	< .001	0.001	.071	0.003	.821
Germany	0.875‡	< .001	−0.002‡	< .001	−0.039‡	.015
France	0.835‡	< .001	0.001	.073	−0.039‡	.002
Italy	0.811‡	< .001	0.001‡	.002	−0.048‡	< .001
Poland	0.782‡	< .001	<0.000	.884	−0.040‡	.002
United Kingdom	0.688‡	< .001	0.002‡	.004	−0.024	.153

EORTC QLU-C10D indicates European Organisation for Research and Treatment of Cancer Quality of Life Utility-Core 10 Dimensions.
*Age set so that constant reflects 18 years (ie, calculate actual age – 18 years).
†Sex code: male = 0, female = 1.
‡Statistically significant influence (*P* value assumed .05).

values that can be obtained, challenging the aforementioned practice. Little is known about the impact of language and cultural reporting behaviors in combination with providing health preferences in the valuation of a PBM. In the specific case of the EORTC QLU-C10D, the standardized procedure when translating the EORTC QLQ-C30 into various languages[47] and the standardized methodology used for valuation studies in different countries[5] is likely to avoid a range of issues when it comes to translation and can minimize variability of results across countries as a result of valuation methodology. There are now numerous country-specific value sets available or in development for the EORTC QLU-C10D, but still many more countries that do not yet have value sets, in which case the choice of most appropriate value set must be faced.

In addition to between-country differences, some significant age and sex effects were found, supporting the notion that it is important to carefully choose an adequate reference group when interpreting health economic data. Where significant, the female sex showed a negative impact on EORTC QLU-C10D utility norms reflecting the sex effect in the source QLQ-C30 data. Notably, the effect of age on the EORTC QLU-C10D utility norms differed across the inspected countries. For example, the German utility norms decreased with age, whereas the Italian utility norms increased with age. The exceptionally high utility norms for older Italians might raise concerns about the representativeness of online panels for older age groups, but it is unclear why such a selection bias would occur in one country and not others. The survey company GfK SE only guarantees representativeness for the general population with internet access. Liu et al[48] showed that the Patient-Reported Outcomes Measurement Information System internet panel data were representative of the US general population in terms of health status provided that they were weighted appropriately; we weighted our data to represent national age and sex distributions. Furthermore, the primary study behind this publication extensively discussed the congruence between the sociodemographic characteristics of the study sample and the European general population,[27] whereby the unemployment data,[49] the marital statistics,[50] and the prevalence self-reported comorbidities were largely in line with external sources.[51-53] The age patterns observed in our results partly align with the EQ-5D general population utility norms, assessed by personal computer-based home interviews. For example, the age pattern for Germany was similar for both EQ-5D and QLU-C10D; in contrast, for France and Italy, the EQ-5D general population utility norms showed lower utility values with increasing age, which is deviating from our analysis of the EORTC QLU-C10D utility norms.[14] A different sampling procedure (address registries and hospital visitor face-to-face interviews) was shown by Golicki et al[54-56] to establish Polish general population norms for the EQ-5D. They reported a decrease in utility values of the Polish EQ-5D population norms, which is in contrast with our findings. Future research is necessary to explore whether these differences can be explained by the different sampling procedures, different approaches to establish scoring algorithms, or the differing content of the PBMs.

A limitation of this study is the potential selection bias toward computer-literate and higher educated respondents as a result of web-based recruitment and data collection. In each of the EORTC QLU-C10D valuations studies, samples obtained via online panels have consistently over-represented educated people and in some countries also married people, people in poor mental health, and people in good overall health.[16-20,22-25] We were unable to assess this in the current analysis because such sociodemographic variables were not assessed in a way comparable with country-specific sociodemographic normative data as they were in the valuation studies. This selection bias may especially be an issue for the elderly population where those who are able to operate a computer and are familiar with online surveys may be disproportionately in better health states[57]; this was found in the Australian EORTC QLQ-C30 population norm study.[34]

A strength of the utility norms presented here is that standardized procedures of recruitment and data collection have been in place across all included countries, not only for the data sets used for the calculation of the utility norms but also in the valuation studies of the EORTC QLU-C10D in these countries. Therefore, not only was statistical power excellent, but we can also rule out that methodological variability affected our results.

Conclusion

These utility norms are a solid basis for interpretation and comparison of cancer-specific HSUVs obtained from the EORTC QLU-C10D for 6 countries. When using these utility norms for that purpose, the composition of the patient with cancer samples with regard to age and sex should be considered and respective utility norms calculated by using either the table or, for a more accurate comparison of diversified samples, the regression formula we have provided.

Supplemental Material

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.jval.2022.12.009.

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