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# Estimation and Comparison of EQ-5D Health States' Utility Weights for Pneumoccocal and Human Papillomavirus Diseases in Argentina, Chile, and the United Kingdom

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A B S T R A C T

**Objectives:** To estimate and compare EuroQol instrument (EQ-5D) health states' values for pneumoccocal and human papillomavirus (HPV) diseases in Argentina, Chile, and the United Kingdom. **Methods:** Twelve vignettes were designed, pilot-tested, and administered to a convenience sample in a cross-sectional design to elicit descriptive EQ-5D state data. Country-specific EQ-5D time-trade-off-based weights were used to map these descriptive health states into local country preference weights. Descriptive analysis is reported and intercountry differences for each condition were compared using repeated measures analysis of variance. **Results:** Seventy-three subjects completed the survey. Pneumococcal disease-related health states mean values ranged from −0.331 (sepsis, Chile) to 0.727 (auditive sequelae, Argentina). HPV-related conditions ranged from 0.152 (cervical cancer, United Kingdom) to 0.848 (cervical intraepithelial neoplasia 1, Argentina). Chile had consistently the lowest mean values in pneumococcal states and in one HPV state, whereas those of the United Kingdom were the lowest in most HPV states. Argentina had the highest mean values in both diseases. Differences in country-specific values for each health state were statistically ($P < 0.001$) significant except for six health states in which differences between Chilean and United Kingdom weights were nonsignificant. **Conclusions:** Utility values for most conditions differed statistically relevantly among analyzed countries, even though the same health states' descriptive set was valued for each. These results reflect the difference in social weights among different countries, which could be attributed to either different population values or valuation study methodologies. They stress the importance of using local preference weights for context-specific decision making.

*Keywords:* Great Britain, Latin America, quality-adjusted life years, questionnaires.



## Introduction

The measurement of health benefits is a critical activity associated with all aspects of the planning and delivery of health care, but the choice of unit of measure is not uniformly acknowledged. To help to guide health care-wide resource allocation decisions, it needs to be based on a generic system so that gains/losses can be compared across the widest possible range of interventions [1].

Quality-adjusted life years (QALYs) are a unit of measure which is made up of the product of quality of life and quantity of life. A QALY refers to 1 year of life in complete health. Health status, or quality of life, is measured on a scale in which full health has a value of 1.0 and dead has a value of zero [2–5]. QALYs led to much applied work based on cost-utility analysis, and approaches to prioritization based on incremental cost-per-QALY figures, both in upper- and lower-and-middle income countries [6].

QALY weights are computed either by directly eliciting subjects preferences through direct methods (standard gamble, time-trade off, visual analog scale) or through a two-step approach: The first one involves classifying the health status with a preference-based, generic health-related quality of life measurement instrument; and the second is to translate this health state to the value that the general reference population have assigned to it in a previous valuation study. The EuroQol instrument (EQ-5D) is probably the most widely used standardized instrument for use as a measure of health outcome in economic evaluations [7]. Its descriptive system classifies a health state by a three-level Likert-type scale on five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The scales range from the best level (no limitations = 1) to the worst level (severe limitations = 3) and thus describe health states in a five-digit number. In addition, it has a visual analog scale item where the health state is valued in a single 0 to 100 scale.

Conflicts of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article.

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1098-3015/$36.00 – see front matter Copyright © 2011, International Society for Pharmacoeconomics and Outcomes Research (ISPOR). Published by Elsevier Inc.

doi:10.1016/j.jval.2011.05.007

It has been shown that self-reported EQ-5D descriptive health status differ considerably between countries before weighting them through quality-of-life weighting methodologies [8]. One concern relates to the reported differences of preference weights for the same states from different countries [9–19] Preference/utilities and preference weights studies are really scarce in the Latin American region, even though they are essential for locally relevant decision making. Local utilities are not generally used in our region, and this could be due not only to the fact that these values are not widely available, but also that they may seem to be transferable from utility weights from developed countries [20].

The objectives of our study were to estimate and compare EQ-5D health states' preference values for pneumococcal and human papillomavirus (HPV) diseases in three different countries (Argentina, Chile, and the United Kingdom), using the same health states' descriptive mix in the three countries. This work was part of a larger project in which we needed to obtain utility values for the selected health states as inputs for two vaccination cost-effectiveness models to be applied in different countries. Although this study was a substudy of a larger project, and due to the scarce research in this area in Latin America, we think that it makes a relevant regional contribution. Moreover, the conditions reported highly contribute to the burden of disease in Latin America [21,22]. This was the rationale behind the selection of the health states.

## Methods

### *Descriptive data regarding the different disease-related EQ-5D health states*

To obtain descriptive data regarding the different health states defined in the economic models, 12 health state vignettes (eight for pneumococcal diseases and four for HPV diseases) were designed, pilot-tested, and administered to a convenience sample of subjects in Argentina. The survey was confidential and anonymous. After describing each of the health states with a half-page vignette, they proceeded to complete one EQ-5D questionnaire for each. To evaluate and control sequence or order effects, three sets of questionnaires in which the health states were ordered in different ways were used and randomly administered to each third of the sample. Both as a primer and for use as descriptive data, the first health state for which it was asked to complete the EQ-5D questionnaire was, in all cases, their health status the day of the survey. Finally, some demographic descriptive data of the respondents was gathered.

### *Analysis of questionnaire data and deriving of local preference weights*

The description of each health state consisted of an EQ-5D five-digit number, as described above. On the other hand, time trade-off-derived local weights for each of these health states for Argentinean [9], Chilean (Víctor Zárate, University of York, personal communication), and English populations [23] were available. By pairing the five-digit number of each health state with its correspondent local weight, utility values for the 12 health states could be obtained for each and all respondents.

An initial descriptive analysis of the sample is presented, as is a descriptive report of the health states values for each country. To illustrate similarities and differences in country-specific values, the relationship between the Argentine, the Chilean, and the English values was graphically shown and assessed by analysis of variance repeated measures test. We examined the statistical significance of the differences in country-specific values for each health state. Furthermore, for the cases where a significant analysis of variance result was found, showing that not all countries were similar, we run paired *t* tests with a Bonferroni-corrected alpha for multiple comparisons [24]. All statistical analyses were conducted using Stata/SE 8.0 (Stata Corp., College Station, TX).

## Results

Between July and August 2009, 73 subjects completed the survey. Study sample characteristics are shown in Table 1 (available in Supplemental Materials found at: doi:10.1016/j.jval.2011.05.007). Fifty-three percent of the respondents were women. Mean age was 31 years (range 22–58) and mean self-reported health status measured by EQ-5D's visual analog scale was 86 out of 100.

Utility values for the health states of the HPV vaccination model, obtained by pairing the five-digit number of each health state with its correspondent local weight, are shown in Table 2 and in Figure 1 (available in Supplemental Material found at: doi:10.1016/j.jval.2011.05.007); whereas utility values for the health states of the pneumococcal vaccination model, obtained in the same way, are shown in Table 3, Figure 2, and Figure 3 (available in Supplemental Material found at: doi:10.1016/j.jval.2011.05.007). Because all values had an asymmetric distribution, we present both mean/confidence interval and median/interquartile range. In addition, in Table 4 (available in Supplemental Material found at: doi:10.1016/j.jval.2011.05.007) we show the visual analog scale summary values of each of the health states. For pneumococcal disease-related health states, means utility values ranged from −0.331 (sepsis, Chile) to 0.727 (auditive sequelae, Argentina). Regarding HPV-related conditions, they ranged from 0.152 (cervical cancer, United Kingdom) to 0.848 (cervical intraepithelial neoplasia 1, Argentina). Chile had consistently the lowest coefficients in pneumococcal states and in one HPV state, whereas those of the United Kingdom were the lowest in most HPV states. Argentina had the highest coefficients in both disease groups. Mean differences between countries in pneumococcal health states were 0.256 (Argentina-Chile), 0.207 (Argentina-UK), and 0.048 (Chile-UK); and those for HPV were 0.117 (Argentina-Chile), 0.133 (Argentina-UK), and 0.017 (Chile-UK).

We found that the differences in country-specific values for each health state were statistically significant, and many of them of an important magnitude, except for six health states (cervical intraepithelial neoplasia 1, cervical intraepithelial neoplasia 2 and 3, cured cancer, meningitis, acute otitis media, and acute otitis media with myringotomy) in which differences between Chilean and English weights were nonsignificant. Argentinean weights resulted significantly different and higher for all the conditions.

## Discussion

Although it is not uncommon to assume that utility values to be used in economic evaluations are usually transferable from place to place, and many studies use for QALY calculations weights from other settings, there is growing evidence that utilities can be significantly and sometimes meaningfully different between settings [9–19]. In our study we found that utility coefficients for each condition differed significantly between the three analyzed countries even considering that the same health states' mix was valued in all three countries. This is why, even though our sample was a convenience sample, the fact that a health state can be descriptively different between countries (i.e., a typical pneumonia could be more severe), this could not account for the differences among countries' utility values. Our study is a practical exercise that shows that in a real-life scenario and using the same set of health states for each disease state, the difference in country valuations introduce significant differences in results. This stress the importance of using local and not international weights in context-spe-

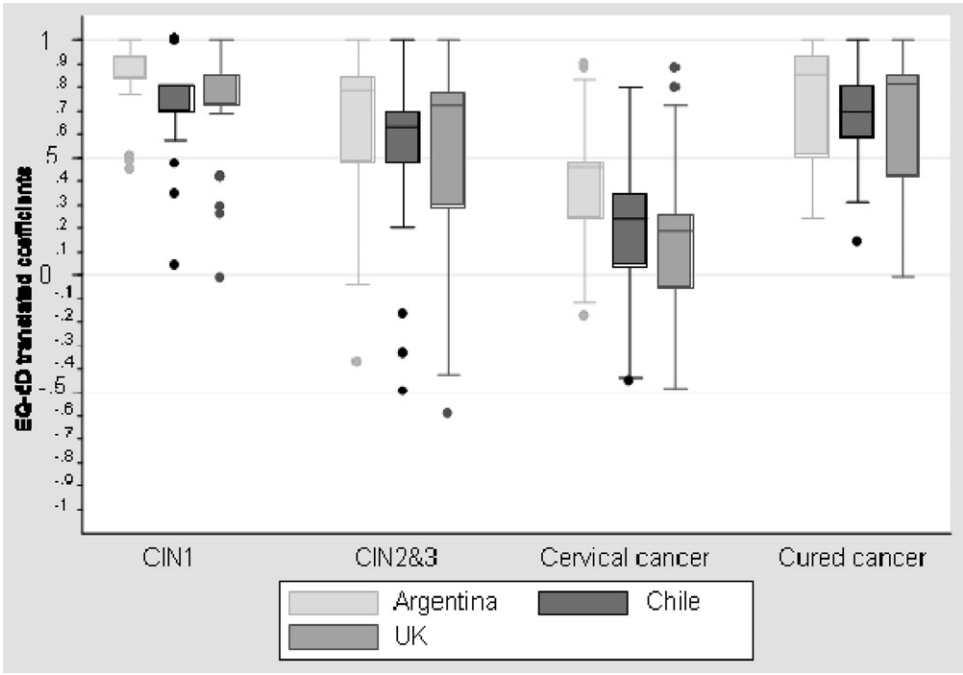


**Fig. 1 – Box plots representing EQ-5D translated coefficients for health states included in the human papillomavirus vaccination model. Central horizontal line of each box: median; upper hinge: 75th percentile; lowerhinge: 25th percentile; whiskers: upper (third quartile plus 1.5* interquartile range) and lower (first quartile minus 1.5* interquartile range) adjacent values; outside dots: outliers.**

cific decision-making processes such as cost-effectiveness analyses and economic evaluations.

These differences we found reflect how systematic differences in social preference weights between countries can lead to different results in difference settings, and eventually to potentially different conclusions about effectiveness and cost-effectiveness of different alternative strategies. The reasons for the differences in the social value weightings in each country might be explained

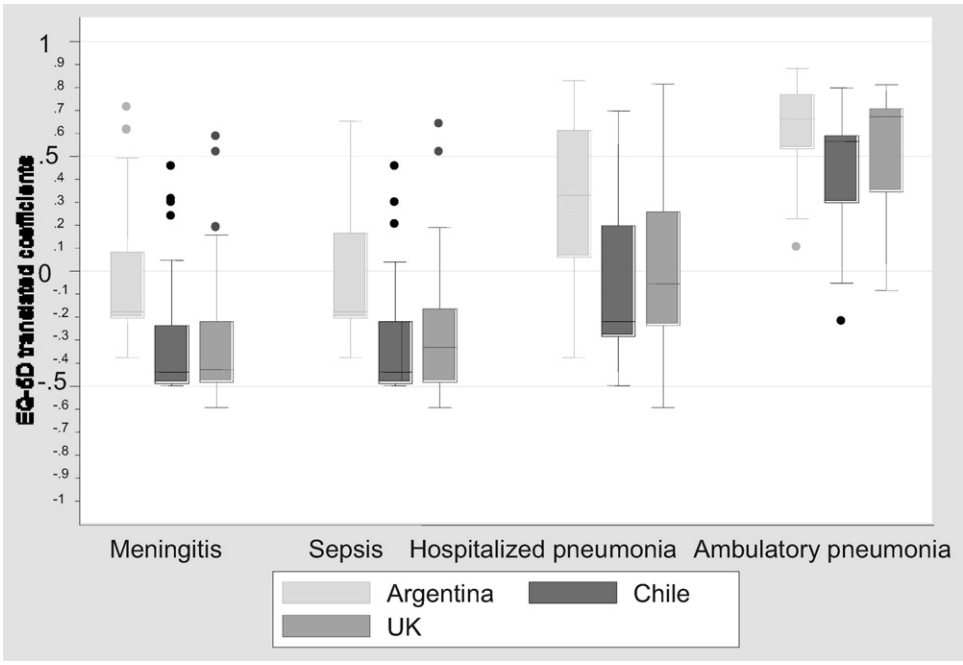


**Fig. 2 – Box plots representing EQ-5D translated coefficients for four health states included in the pneumococcal vaccination model. Central horizontal line of each box: median; upper hinge: 75th percentile; lower hinge: 25th percentile; whiskers: upper (third quartile plus 1.5 · interquartile range) and lower (first quartile minus 1.5 · interquartile range) adjacent values; outside dots: outliers.**

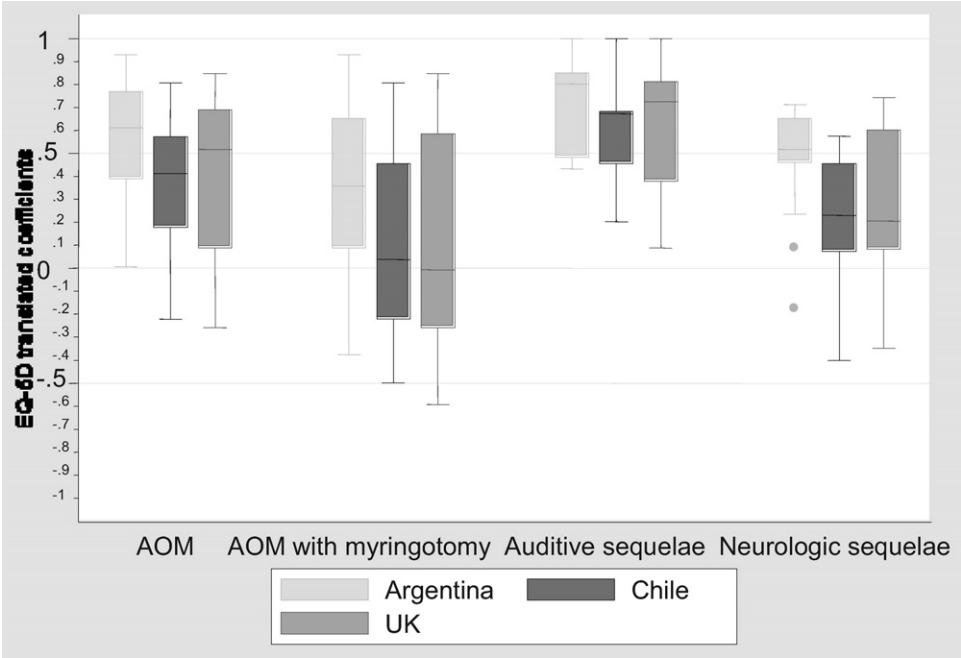


**Fig. 3 – Box plots representing EQ-5D translated coefficients for four health states included in the pneumococcal vaccination model. Central horizontal line of each box: median; upper hinge: 75th percentile; lower hinge: 25th percentile; whiskers: upper (third quartile plus 1.5 · interquartile range) and lower (first quartile minus 1.5 · interquartile range) adjacent values; outside dots: outliers.**

not only by the fact that they have different population characteristics and values, but they can also be at least partially explained by variations in the valuation protocol and method used for each country. Although all of the local valuation studies were done with the time-trade-off method, slightly different analysis procedures and different sampling methods were used to allow the valuations of all EQ-5D states to be interpolated from direct valuations, given that it is virtually impossible to generate direct valuations for all of the 243 possible EQ-5D health states. Chile and United Kingdom valuation studies used probabilistic sampling, whereas the Argentinean one used quota sampling. Secular trends in social preferences might also have some relevance. The United Kingdom valuation study was undertaken in 1993 [23], and the Chilean one 15 years later (Víctor Zárate, University of York, personal communication).

Although studies exist that compared different valuation methods for similar health states and populations [25,26], there are fewer studies that attempted to compare potential differences in local utilities in a given set of identical mix of health states in different jurisdictions. As an example in our region, Augustovski et al. [9] published a study in 2009 where they developed a set of EQ-5D health states' values for the Argentine general population and compared it with published values for the United States, finding meaningful and significant differences between them. Nevertheless, this study was based on all EQ-5D set of states and it was not related to any particular disease [9]. König et al. [8] published in 2009 a brief report where they compared general population health status measured by the EQ-5D in six European countries [8]. Even after adjusting for sociodemographic variables and with representative samples, self-reported EQ-5D health status differed considerably between countries, calling for caution when making international comparisons of disease burden and health care effectiveness and potential cost-effectiveness of different interventions. Jürges [27] decomposed in 2007 cross-national differences in self-reported general health into parts explained by differences in 'true' health, measured by diagnosed conditions and measurements, and parts explained by cross-cultural differences in response styles, and concluded that failing to account for differences in reporting styles may yield misleading results. There are studies that reported that the use of anchoring vignettes successfully improved the comparability of self reported measures [28]. Newer studies also underline the problems of using value sets to weight profile data as EQ-5D derived health states and that caution should be taken when choosing a summary measure [29,30].

It would have been interesting to recruit different samples of subjects in Argentina, Chile, and the United Kingdom to evaluate if the same vignettes produced different responses regarding to which EQ-5D states they correspond, or even to make locally specific vignettes to reflect potential differences between disease states (i.e., ambulatory pneumonia) in three countries. Nevertheless, this was out of the scope and resources of our work and is an issue that could be addressed in the future.

## Acknowledgement

The authors thank Jorge A. Gomez, from GlaxoSmithKline Biologicals, for helpful comments on a previous version.

## Supplemental Materials

Supplemental material accompanying this article can be found in the online version as a hyperlink at doi:10.1016/j.jval.2011.05.007, or if hard copy of article, at www.valueinhealthjournal.com/issues (select volume, issue, and article).

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