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VALUE IN HEALTH

Predicting Time Trade-Off Health State Valuations of Adolescents in Four Pacific Countries Using the Assessment of Quality-of-Life (AQoL-6D) Instrument

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ABSTRACT

Objectives: Pacific Obesity Prevention in Communities (OPIC) is a community-based intervention project targeting adolescent obesity in Australia, New Zealand, Fiji, and Tonga. The Assessment of Quality of Life Mark 2 (AQoL-6D) instrument was completed by 15,481 adolescents to obtain a description of the quality of life associated with adolescent overweight and obesity, and a corresponding utility score for use in a cost–utility analysis of the interventions. This article describes the recalibration of this utility instrument for adolescents in each country.

Methods: The recalibration was based on country-specific time trade-off (TTO) data for 30 multiattribute health states constructed from the AQoL-6D descriptive system. Senior secondary students, in a classroom setting, responded to 10 health state scenarios each. These TTO interviews were conducted for 24 groups, comprising 279 students in the four countries resulting in 2790 completed TTO scores. The TTO scores were econometrically transformed by regressing the TTO scores upon predicted scores from the AQoL-6D to produce country-specific algorithms. The latter incorporated country-specific "corrections" to the Australian adult utility weights in the original AQoL.

Results: This article reports two methodological elements not previously reported. The first is the econometric modification of an extant multiattribute utility instrument to accommodate cultural and other group-specific differences in preferences. The second is the use of the TTO technique with adolescents in a classroom group setting. Significant differences in utility scores were found between the four countries.

Conclusion: Statistical results indicate that the AQoL-6D can be validly used in the economic evaluation of both the OPIC interventions and other adolescent programs.

Keywords: adolescents, ethnicity, Pacific, quality of life, utility weights.

Introduction

The Pacific Obesity Prevention in Communities (OPIC) project is a four-country project funded in Fiji and Tonga by the Wellcome Trust, New Zealand by the Health Research Council, and Australia by the National Health and Medical Research Council to expand the capacity of the Pacific region to respond to the obesity crisis. The region is faced with among the highest rates of obesity in the world. Prevalence rates for overweight and obesity are around 75% in Tonga [1] and 80% for the Pacific populations living in New Zealand [2,3]. The impact of obesity as a risk factor for diseases such as heart disease, stroke, diabetes, selected cancers, and osteoarthritis has been well documented. A World Health Report in 2002 [4] estimated that obesity, which was the 10th leading cause of avoidable burden, would be the seventh leading cause for 2010 and 2020.

The limited capacity of the Pacific Region to respond to the obesity epidemic and the poor evidence base of what works in terms of obesity prevention were the key factors underpinning the project [5]. The OPIC project set out to address these two issues through the development of comprehensive, community-based intervention programs which targeted adolescents (aged 12–18 years) in each of the four countries. A quasi-experimental design was employed with an intervention period of 3 years and a cohort follow-up, and changes in body mass index as the primary outcome variable.

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The linked economic studies included the administration of a health-related quality-of-life (QoL) measure to both facilitate description of the QoL burden of adolescent overweight and obesity, and as an outcome measure in a cost–utility analysis (CUA) of the interventions. The latter will enable a comparison of the efficiency of the obesity interventions implemented against a broader spectrum of health-care interventions.

Measuring QoL for Economic Evaluation

Before the development of CUA, economic evaluation of health services either ignored QoL or treated QoL as an "intangible" that could be noted and described, but not quantified or included as an integral part of the health outcome. CUA has attempted to overcome this deficit by adopting the quality-adjusted life-year (QALY) as the unit of output for health benefits in cost-effectiveness studies [6]. One of two approaches has been adopted.

First, in a "holistic" or scenario-based approach to measurement, the health states relevant to the evaluation of a health program are described in a series of scenarios. These are then rated using a scaling device such as the time trade-off (TTO) or standard gamble (SG) to obtain a "utility" index, an index of the strength of a person's preference for a health state [6]. The index is then used to obtain QALYs. The construction of the health scenarios and the rating exercise both require surveys. Normally, patients who have experienced the health states are consulted for scenario construction, and a random population sample is used for rating them.

The second "decomposed" approach employs multiattribute utility (MAU) theory [7] requires the preliminary construction of a generic MAU QoL instrument which is capable of describing

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numerous health states and assigning a utility score to each of these [8]. MAU instrument construction requires the creation of a descriptive system describing multiple health states. This involves the decomposition of a health state into multiple dimensions of health, which are described by one or more "items," that is, a series of questions, each with multiple responses, which describe the dimension and the intensity of the health state. Generic instruments usually purport to include all significant dimensions of health. To convert the descriptive instrument into a MAU instrument, a "scaling" system is created which is capable of assigning utility scores to every combination of the instrument's health states. This requires the calibration (scaling) of item responses and the decomposition of the dimensions into holistic health states. Literally, the MAU approach decomposes health states, assigns utility scores to the decomposed parts, and then recombines the parts using an appropriate model to determine an overall utility score. The attraction of the MAU instrument is, inter alia, that it obviates the need for the two surveys required by the holistic approach and it allows for the continuous collection of data in longitudinal studies.

The final MAU instrument is a questionnaire similar in format to a number of disease-specific and psychometric instruments, however, differing in two respects. First, the "descriptive system"—the questionnaire—is generic, which purports to cover all health states (a property also claimed by a small number of psychometric instruments including the SF36). Second, the instrument's scoring system purports to measure "utility," the strength of people's preferences and in a way which gives the instrument an "interval" property. A numerical increment (e.g., 0.2) represents the same improvement in QoL anywhere on the scale. For example, an increment from 0.3 to 0.5 is the same incremental improvement according to some external criterion as a move from 0.7 to 0.9.

The strength of CUA for economic evaluation is derived from this latter property. In principle, every health state or health state improvement can be described and measured on the same scale, and, consequently, disparate health program interventions can be evaluated on a "level playing field." In particular, increments to the quality and quantity of life can be compared. The all-important interval property is obtained from the "scaling" instrument. While five such instruments (SG, TTO, person trade-off, rating scale, and magnitude estimation) have been used [9], the first two are the most widely used. The TTO is used in the present study. During a structured interview, respondents (study population or the general public) are asked what proportion of an assumed life expectancy they would be prepared to sacrifice to be in full health rather than in the health state being evaluated. With a zero rate of time preference, an answer of 50%, 20%, and 5%, respectively, therefore indicates a QoL index of 0.5, 0.8, and 0.95 on a 0 to 1 scale, where 0 and 1 represent death and full health, respectively.

In principle, an instrument should only be used in a population for which the instrument has been "validated"—successfully tested, usually by comparison with the results from another instrument which has been independently validated. The greater the difference between the population in which the instrument is to be used and the initial population from which it was created, the greater the likelihood that the instrument will not correctly measure population preferences. For this reason, instruments should not be used without independent evidence of validity.

Two Australian MAU instruments have been created, namely the Assessment of Quality of Life (AQoL) [10,11] and the Assessment of Quality of Life Mark 2 (AQoL-6D) [12]. By mid-2010, a third instrument, AQoL-8D, will be available on the Web (http://www.aqol.com.au). The AQoL-6D instrument is an adaptation of the AQoL, designed to increase sensitivity to health state variations close to normal health and to extend the coverage of AQoL-6D. Therefore, while AQoL has four dimensions, AQoL-6D has six dimensions, viz., independent living, social relationships, physical senses, psychological well-being, pain, and coping (Fig. 1). Both these instruments were scaled using a sample of the Australian population representative of the socio-economic profile of adult Australians.

In contrast with some instruments, both the AQoL-4D and AQoL-6D were conceptualized in terms of handicap: poor health is described in terms of its impact upon people's capacity to carry out normal activities rather than the effect upon a person's impairment or disability (so-called within-the-skin descriptive systems).

The use of the AQoL-6D (or any other existing MAU instrument) in the OPIC project was considered problematical, as its utility weights were calculated from the health state preferences of Australian adults. In contrast, the target population of the OPIC study was adolescents in Australia, New Zealand, Fiji, and Tonga, and it was deemed unlikely that their utility values would be the same as those of Australian adults. A review of the published literature suggests significant cultural variations in health state preferences [13–18]. Adolescents are also likely to value their health differently to adults, given their social values, support structures, lifestyles, and experience. It was therefore important to use adolescent rather than adult values, and, more specifically, country-specific adolescent values in the OPIC study. Therefore, the utility weights were recalculated and validated for each of the four countries using the adolescents' survey results from each site.

Methods

Because of the diversity of health states which were likely to be encountered, and high cost of using the scenario-based, holistic method of utility measurement, the OPIC protocol employed the decomposed MAU methodology. Because of the need for instrument sensitivity to near-normal health state and a handicap-based conceptualization of health, the AQoL-6D was adopted as the "base instrument" [12]. It consists of 20 items grouped into six dimensions, each of which is separately modeled and then combined to obtain a single AQoL-6D utility score.

The AQoL-6D was created with a three-part calibration that allows a relatively easy recalibration of the instrument. As described below, in the first two parts, multiplicative models were used to determine, respectively, algorithms for the dimension scores and for a total multidimensional—MA—score using the TTO values obtained for item responses and dimensions. In the third part, the latter score was adjusted econometrically to offset the potential effects of "structural or preference dependence," which could result in "double counting" of the disutility of some dimensions. To achieve this, multiattribute (MA) scenarios were independently constructed, evaluated using the TTO methodology, and used as the dependent variables in a regression in which total AQoL scores and country-specific demographic factors were the independent variables. Results were used as the stage 3 adjustment. In the present study, this third stage was replicated using site-specific TTO scores for MA scenarios, which were constructed to be of most relevance for obese youth.

The process of adaptation involved the six stages shown in Figure 2. These were: 1) adaptation of the AQoL descriptive system; 2) preparation of 30 MA scenarios for assessment using the TTO scores; 3) development of a protocol and proforma for the classroom-based use of the TTO; 4) administration of the TTO and "debriefing"—qualitative assessment of the under-