SURVEY ON ESTIMATING QALYS IN THE WESTERN REGION OF ROMANIA – THE CASE WITHOUT INTERVENTION

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ABSTRACT
Currently, assessing a population's quality of life is considered one of the most important aspects in health interventions' evaluation across most of the European countries. However, in Romania its utility is unfortunately overlooked. In this context, the paper aims at providing an accurate estimate of QALYs for healthcare investment projects, determining through a questionnaire survey the utilities associated to quality of life for five critical medical conditions and thus calculating the related QALYs. The targeted population consisted of 100 patients and 50 medical personnel from the most important hospitals in the Western Region of Romania. The study's outcome – a list of QALYs / medical condition – represent the foundation for future national research in improving the decision process of public resources allocation in healthcare.

KEYWORDS: *economic analysis, health outcome, quality adjusted life year, quality of life, public healthcare.*

JEL CLASSIFICATION: *D61, H43, I15, I18, I31, J17, O22*

1. INTRODUCTION

Health cannot be separated from economic development and quality of life, the relationships between health, economics and development are complex and in complete interdependence so that health is both a condition and an effect of economic development.
Although health is assessed in a population by some indicators that aim at specific demographic phenomena such as life expectancy, birth rate, mortality or morbidity, and external factors that influence health: health care services, environment or lifestyle, the greatest difficulty in applying economic analysis in health care is the assessment of social costs and benefits.
In this respect, in this paper we started from the concept and meaning of the term "quality of life" whose dimension "physical welfare" is influenced by access to health care and we identified from the existing measurement tools the most relevant instrument in the context of its use in economic evaluation as part of a cost – benefit analysis for healthcare investments.
The need to measure quality of life lies in treatment decisions that must be weighed against the side effects of the treatment. Although progress has been made in the use of specific therapies whose side effects are lower, physicians remain aware of clinical compromises that are constrained between life and quality of life.
Measuring quality of life and survival not only allows on the one hand that patients, physicians and policy makers choose between curative intent treatment options without determining whether mitigating side effects or alleviate symptoms without healing surplus worth in life expectancy, and on the other hand, to choose between two treatments with similar survival benefits but with different side effects.

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The paper's goal is therefore to propose a methodology to estimate the quality of life indicator identified – quality adjusted life year (QALY).

2. LITERATURE REVIEW – THEORETICAL FRAMEWORK

The quality of life topic is currently a global concern which has its origins in the 20th century although the first mention of the term in economic research indicates that happiness can be sacrificed for quality of life - "Happiness is the purpose of life: life has a purpose, courage is the willingness to sacrifice happiness for a better quality of life" (William & Shaw, 1990).
Whether from an interdisciplinary perspective (sociology, economics, psychology, ecology, medicine and so on) or focused on a disciplinary approach, the paradigm that characterize quality of life research concerns the status quo in relation to people's perceptions and evaluations of their moods, satisfaction / dissatisfaction, happiness / frustration.
The most comprehensive definition of the term states that „quality of life is determined by individuals' perceptions of their social situations in the context of cultural value systems and depending on their needs, standards and aspirations" (WHO, 1998).
A utilitarian definition is proposed by Revicki and Kaplan (1993): "quality of life reflects the preferences for specific health states that allow morbidity and mortality improvements and are expressed through a single weighted index - standardized years of life, according to quality of life".
In this sense, we can state that applied to health, quality of life means the physical, mental and social well being as well as patients' ability to perform common tasks in their daily existence.
According to Carr and Higginson (2001), the quality of life is determined by the extent to which hopes and ambitions are realized in everyday life, by a person's perception of his position in life in a cultural and axiological context and in relation to his goals, aspirations, standards and concerns, by assessing their health status, in relation to an ideal model.
Among the concept's dimensions, we targeted in this paper the physical well being, dimension directly influenced by the population's access to health services and the quality and efficiency of the national health system.
Currently, the most widely used methods in assessing the health of the population range from aggregating individual data to identify the proportion of the population affected by a particular health problem, grouped according to age and sex. Although widely used, this approach has become difficult with the growing number of medical conditions and the need to undertake temporal comparisons between groups of people affected which involve collecting a large number of statistical data.
These problems have led to the development of new measurement tools that accurately reflect health states and allow comparisons of the targeted population.
Many researchers have dealt with synthetic presentation of indicators for assessing quality of life in medical practice, including Orley and Kuyken (1994), Bowling (1997) and Leplège and Hunt (1997).
First used by Zeckhauser and Shepard (1976) in the context of public policy evaluation topics, the concept of quality adjusted life years (QALYs) was developed by Klarman et al. (1968) through an assessment of the effectiveness of dialysis study.
Pliskin et al. (1980) first defined the term in the sense discussed today, therefore helping to demonstrate the usefulness of a medical intervention.
The QALY indicator has increased in use in the decision process regarding health interventions over the last 20 years, being defined in the literature as an indicator that "measures the length and quality of life by considering the impact of treatment on a patient's life expectancy and the quality of his life" (Pantea & Gligor, 2012).
Weinstein et al. (2009) summarized the assumptions underlying the conventional approach in estimating a QALY, as follows:

• Health is defined as a time weighted value in a relevant time horizon;
• Value is measured in terms of preference (utility);
• Measured individual preference can be aggregated and used for a whole group;
• QALY can be aggregated, regardless of who wins / loses.

In essence, "QALY is calculated by multiplying the amount of time spent in a particular health state with the utility associated with that state of health" (Sassi, 2006). Utilities reflect the health related quality of life estimated either directly by individuals or indirectly using a variety of measurement methods. Utilities are measured on a cardinal scale from 0 to 1, where 0 is death and 1 indicates full health, being the most important factor in calculating QALY because it transforms a simple life year gained through treatment or intervention in a quality-adjusted life year.

3. RESEARCH METHODOLOGY

3.1 Research problem and hypothesis

In order to use the QALY indicator in the economic analysis of health investment projects, the following research question is required to be taken into account: What is the number of QALYs gained for each medical specialty through health interventions?

The current national and especially international literature review has not revealed the existence of such an approach, identifying only disparate estimates for QALY for specific medical conditions (Miller et al., 2009).

Based on the research problem, we concentrated our efforts in identifying as a first research topic the number of QALYs when no intervention is considered.

As such, the research hypothesis is the following: **There are significant differences in health effects by types of medical specialties in terms of quality adjusted life years.**

3.2 Survey design

Once the research question and assumption were defined, we sought to identify the research method that enables testing and validating the assumptions in the context of the paper's objectives.

The analysis of the methods indicated by the literature review turned our empirical approach to a quantitative research, a sociological survey based on stated preference techniques, the instrument used for data collection being the questionnaire.

In order to estimate the number of QALYs for a group or a population, the following types of information are needed (Pantea & Gligor, 2012):

• Descriptions of the various types of perceived health status in life;
• The duration of each health state;
• Estimation of utilities for each state for a group or an analyzed population.

According to the informational needs, we have considered the development of two investigating tools but also the methodological steps needed to be undertaken to achieve the established objectives.

Step 1 – Identifying the medical conditions that will be included in the study, based on information provided in the Newsletter No. 11 of 2011 of the National Center for Public Health Statistics and Informatics which sets out the causes of death by age and gender of the population.

By prioritizing the 17 causes of death according to their share in the total deaths, in this study we considered only the first two categories of medical conditions causing of death, the selection criterion being the disease with the highest percentage in total deaths (table 1).

Table 1. The main causes of death in Romania 2011

	Medical specialty	**Medical condition (illness)**	**Total deaths / illness (absolute value)**	**Total deaths in the population (absolute value)**	**% medical condition / total deaths**
1	Cardiology	Diseases of the circulatory apparatus	151.538	**251.439**	60.268%
2	Oncology	Tumors	48.356		19.232%

Source: National Center for Statistics and Public Health - Causes of Death in Romania. 2011, Newsletter No. 11, 2011

It should be noted that although each medical condition encounters several stages of evolution, different in features and pathology, in order to create a common framework that allows comparisons between medical specialties, we have considered grouping them into three categories:
• Stage 1 - the initial stage: the first signs of disease onset, when medical interventions are often completely noninvasive and determine a complete recovery;
• Stage 2 - the advanced stage: requires invasive interventions which sometimes cause a partial or complete treatment of the disease:
• Stage 3 - final stage: reserved prediction, reduced ability to use medical interventions

Step 2 - Determining QALYs for the situation without intervention for the studied medical conditions

To determine the number of QALYs in the case without intervention, two issues are considered: determining the associated health utilities for patients' quality of life and the period of time spent in this stage.

In the case of the associated health utilities, we used an adaptation of EuroQol Group's questionnaire – the EQ - 5D, which uses a classification system for the health states of the population.

The questionnaire includes a section covering respondents' current health assessment (mobility, personal care, usual activities, pain / discomfort, anxiety / depression), the appreciation of the current health state on a scale from 0 (worst possible health state) to 1 (best possible health state) and the current stage of the disease (of the three options explained above).

As for the period of time spent in this stage, we devised a separate questionnaire for the health professionals' perspective since they are the only group capable of providing valid information related to the patients' remaining period of time if medical intervention is not provided.

After processing the data collected through the survey, we will be able to calculate QALYs by applying formula 1 below.

$$\text{QALY without intervention} = \sum_{t=a}^{a+L} Q_t \qquad (1)$$

where: t – time period; a – age; L – lenght of the disease; Q_t - quality of life utility.

The analysis of the measuring scales' reliability by calculating the α Cronbach coefficient determined values between 0.5 and 1, with an average of 0.77, which demonstrates the reliability of the proposed scales since in the field of sociological surveys a value of the α Cronbach coefficient > 0.7 is considered satisfactory.

The target population consists of people suffering from the two medical conditions mentioned, i.e. the number of patients out of the hospital by class of diseases, according to the Romanian Statistical Yearbook 2011. As an analysis of the total target population is difficult to achieve due to reasons of

high amplitude and resource consumption, a smaller sample population was selected, consisting of patients of the major county hospitals in the Western Region of Romania who did not undergo any medical intervention.
The sampling method used, logic non probabilistic sampling, led to obtaining a sample of 100 persons, 50 persons / medical condition.
The second sample investigated, the medical professionals, consisted of 50 persons, 25 doctors/medical condition, determined by logic non probabilistic sampling.

3.3. Data analysis and results

The necessary data was collected by direct research, with the conscious participation of the population. By applying this method we were able to eliminate the risks related to invalid questionnaires but also to ensure the defined sample volume. Data was collected from June to August 2012 and processed using SPSS 17.
The analysis of the investigated population's socio-demographic characteristics revealed that 52% of the respondents are male and 48% female, the majority age category (48%) is between 35 and 54 years (24% of the investigated population is aged between 35-44 years and 24% of the population is aged between 45 - 54 years), followed by 25-34 years (20%), 55-64 years (17%) under 24 years (8%) and over 65 (7%).
As for the population's perception on their current health state, analyzed through variables such as "mobility", "personal care", "usual activities", "pain / discomfort" and "anxiety / depression", the results indicate a direct link between changes in health status (assessed by the mentioned variables) and the transition from one medical stage to another.
Also, the variation in the responses' percentages suggests a different assessment of the disease' effects related to the medical condition experienced.
Although there are links with a certain degree of intensity between all the analyzed variables, the fact that Pearson coefficient's values vary depending on the medical condition studied reflects a different degree of appreciation of the disease's effects (in terms of movement capacity, activities and personal care performance, pain / discomfort, anxiety / depression), which partially validates the paper's hypothesis, namely: **there is a significant difference in health effects by types of medical specialties**, observation which warrants further research.
In order to calculate the number of QALYs, the data collected was arranged in the form of parallel rows of values and subjected to a preliminary statistical analysis to determine their level of homogeneity by calculating for each variable core indicators of central tendency and dispersion.
The calculated dispersion values are interpreted as follows:
• The amplitude's subunit and close to 0 values reflect high data homogeneity;
• Low variance's values indicate a high homogeneity of the studied feature's individual values;
• The low standard deviation's values indicate a high accuracy of the data series.
Therefore, it can be concluded that the data collected are homogeneous and since the values obtained by calculating the mean, median and mode are approximately equal, which emphasizes a symmetry in data distribution and justifies the use of the average values in determining the utilities associated to each medical condition.
Once the utility values established, the next issue that must be addressed is the remaining period of time spent by patients in each stage of the disease.
Thus, we analyzed the data collected from the medical personnel survey, calculating the central tendency and dispersion indicators, taking into account the age groups of the population.
For stage 3 disease, respondents unanimously indicated an average remaining lifetime of 1 year after diagnosis for all medical conditions when no medical intervention is undertaken.
Using the quality of life utility values determined (Q) and the remaining lifetime after diagnosis (L) determined, we then calculated the number of QALYs by age by applying formula 1 (table 2 (a), (b), (c)).

Table 2. QALYs without intervention

(a) Stage 1

	Medical condition (illness)	Age group	Q	L	QALYs
1	Diseases of the circulatory apparatus	under 24 years	0,69	6,3	4,35
		25 - 34 years		6	4,14
		35 - 44 years		5,55	3,83
		45 - 54 years		4,1	2,83
		55 - 64 years		2,2	1,52
		over 65 years		1,85	1,28
2	Tumors	under 24 years	0,59	4	2,36
		25 - 34 years		3,85	2,27
		35 - 44 years		3,65	2,15
		45 - 54 years		3,5	2,07
		55 - 64 years		2,6	1,53
		over 65 years		2,1	1,24

Source: Authors' compilation based on analysis described in text

(b) Stage 2

	Medical condition (illness)	Age group	Q	L	QALYs
1	Diseases of the circulatory apparatus	under 24 years	0,58	4,05	2,35
		25 - 34 years		3,85	2,23
		35 - 44 years		3,65	2,12
		45 - 54 years		2,3	1,33
		55 - 64 years		1,6	0,93
		over 65 years		1,3	0,75
2	Tumors	under 24 years	0,49	1,75	0,86
		25 - 34 years		1,5	0,74
		35 - 44 years		1,25	0,61
		45 - 54 years		1,15	0,56
		55 - 64 years		1,1	0,54
		over 65 years		1,05	0,51

Source: Authors' compilation based on analysis described in text

(c) Stage 3

	Medical condition (illness)	Age group	Q	L	QALYs
1	Diseases of the circulatory apparatus	under 24 years	0,4	1	0,40
		25 - 34 years			
		35 - 44 years			
		45 - 54 years			
		55 - 64 years			
		over 65 years			
2	Tumors	under 24 years	0,35	1	0,35
		25 - 34 years			

	Medical condition (illness)	Age group	Q	L	QALYs
		35 - 44 years			
		45 - 54 years			
		55 - 64 years			
		over 65 years			

Source: Authors' compilation based on analysis described in text

It can be seen that the values obtained are significantly reduced from one stage of the disease to another and also that they differ according to the medical condition studied. Therefore, the results validate the hypothesis; **there is a significant difference in health effects by types of medical specialties, in terms of QALYs.**

Given that the average life expectancy was 73.43 years in 2010 (according to the National Institute of Statistics - Statistical Indicators of Sustainable Development, 2011), the values for life expectancy after diagnosis significantly reduce patients' life expectancy if they are not medically treated, observation that emphasizes the importance of public access to health services.

4. CONCLUSIONS AND DISCUSSIONS

The results of this study, obtained by applying the mentioned steps in identifying the number of QALYs by types of medical conditions in Romania, are issues currently addressed only from a theoretical point of view.

The main advantage in using QALY is that the indicator enables an efficient health resource distribution for the whole population. The indicator serves as a tool in determining and channeling resources to those public health interventions imperative for the population.

The methodological framework provides a measurement mean that reflects the value of health gains for the population in relation to the services they receive. This information allow guidance of the public prioritization process because it resolves the system's needs from the society's point of view, basing the resource allocation process on forecasts of patients' clinical outcomes.

The information provided by QALY calculations allow comparisons between the effectiveness of different medical interventions for the same health problem due to estimating the duration and quality of life gained by treatment.

Identifying medical interventions beneficiaries and estimating benefits in terms of their physical welfare, the social welfare maximization objective can be achieved since public resources are allocated to achieve the greatest health gain.

Currently, we are working on calculating QALYs for three other medical conditions (diseases of the digestive apparatus, respiratory diseases and diseases of the nervous system) that have a percentage above 1% in total death and as further research, we will continue our study by concentrating on determining the number of QALYs in case of medical interventions and, using this research's results, we will then proceed to calculate QALYs gained for the medical conditions targeted.

Also, another approach that we envision for our future studies is related to estimating the monetary value of one QALY gained, which will generate the possibility of creating a new comparison database for social benefits in terms of quality of life from health interventions, thereby helping to improve the problems of estimating social benefits by comparing an intervention's cost / QALYs gained between various medical sectors.

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