MEASURES OF QUALITY ADJUSTED LIFE AND QUALITY OF LIFE DEFICIENCY: STATISTICAL PERSPECTIVES

Pranab K. Sen

University of North Carolina at Chapel Hill

In the broad range WHO interpretation of Quality of Life, albeit made from an individualistic perspective, there are numerous qualitative factors along with some relatively more quantitative ones which are useful in the context of health related quality of life assessment problems. Though item analysis is commonly used in practice for (quantitative) risk assessment, for drawing valid conclusions, statistical reasoning is essential. Quality of life, survival time and quality adjusted life are important (population-based) measures that need to be appraised in light of statistical and health-related undercurrents. This paper addresses some basic statistical issues prevailing in this context.

1. Introduction

The medical community has been using quality of life (QOL) measures to assess the health status of patients who have undergone specific treatments (e.g., surgery, radiation therapy, etc.) for disease (e.g., cancer, cardiovascular disease, diabetes, etc.). For some patients, their life their physical, mental and functional abilities are likely to be impaired to a greater or lesser extent, perhaps for the rest of their lives. Aside from the question of survival it is also important to assess QOL for remaining life. In the clinical context, some medical diagnostic charts (e.g., Karnofsky performance status) are used to quantify QOL in a way that can be used for risk assessment for making medical decisions. There is widespread use of psychometric and therapeutic item analysis to quantify some of the apparent qualitative states, so that suitable measures can be formulated as a quantitative index of health-related QOL (Cox et al., 1992). Because of extreme variability of human physiological and physical reactions to drugs and virus, as well as mental health behavior, and immense difficulties in the assessment of exact physiological and psychological states, there is a genuine need to have statistical appraisal in assessment of health-related QOL. The health regulatory agencies all over the world also use QOL measurement for guiding health care management decisions; however, their view is predominantly from a population perspective. Thus, there is a need to look at the QOL measure from individual as well as a population perspective.

During the past decade, the World Health Organisation (WHO) has been probing into QOL measures from a broader perspective. The WHOQOL protocol, developed in the early 1990's, came up with the following interpretation: Quality of life is defined as an individual’s perception of their position in life in the context...
of the culture and value system in which they live and in relation to their goals, standard and concerns (WHOQOL, 1994). This interpretation has led to a broad ranging concept of QOL affected in a complex way by the person’s physical health, psychological state, level of independence, social relationships, and his or her relationships to salient features of his or her environment. Primarily the WHOQOL instrument is designed to measure QOL related to health and health care.

Two statistical concepts have emerged in QOL assessment. First, the quality adjusted life (QAL) concept has often been used by the medical community as a measure of the medical and psychological adjustments that are needed to induce an affordable QOL for patients with health problems. At the same time, QAL results in some deficiency of the normal activities in a broad interpretation, and hence, quality of life deficiency (QOLD) measures, introduced by Sen (1996), are also appropriate in this respect. In the WHOQOL interpretation, there is a primary emphasis on individual versus the concerned population. Viewed from a population perspective (as is important for health care and service management), we need to examine the WHOQOL interpretation and assess the QAL/QOLD picture in a more interpretable manner. See Sen (1996) for a broad population complex that underlies health-related QOL assessments in general. The general emphasis is on the intricate network of socio-economic, cultural-religious, physiological, environmental, and mental health impacts, taking the WHOQOL interpretation and extending it to a population-based picture. This population perspective is also evident in quality adjusted survival analysis in clinical trials where Q-TWiST methods have been advocated (Goldhirsch et al., 1989; Glasziou, Simes and Gelber, 1990). This paper emphasizes the statistical aspects that have been disseminated more recently (Sen 1999, Chatterjee and Sen 2000), and appraises the Q-TWiST methodology.

Section 2 presents the QOL picture in a broader perspective. For the QAL and QOLD measures, statistical perspectives are presented in Section 3. Section 4 deals with the main results, and in this context, concepts from socio-economic fields are incorporated to formulate refined QAL and QOLD measures. In spite of the basic difference between socio-economic and QOL measures, they share a common goal: to formulate an interpretable quantitative measure in a context that is dominated by a large number of qualitative or imprecisely defined traits. Section 5 is devoted to general remarks and observations with discussion of Q-TWiST methodology.

2. QOL: The Interface

Like the standard of living in a monetary sense, in socio-economic, cultural-religious, environmental, psychological, and health perspectives, there are numerous measures of QOL. Some of these are specifically geared towards individual health problems, such as a specific disease and disorder, while others are health-related in a broad sense. In this spectrum, there are measures based on an individual’s perception and measures based on population perspectives. For medical/clinical decisions, it may be more pertinent to look at QOL from an individual’s (e.g., the patient’s) point of view. On the other hand, from a health regulatory agency’s point of view, it is more appropriate to look at QOL from a much broader perspective, taking into account a variety of diseases and disorders that prevail in the concerned population as well