

ESTIMATING WELL-YEARS OF LIFE FOR A NEW PUBLIC HEALTH INDICATOR

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In recent years, there have been many attempts to define and measure health status (1-3). To convey the most accurate and sensitive characterization of current health status, public health statistics ought to consider both mortality and morbidity. Yet most of our current methods fail to combine these two critical aspects of human health status. Clearly life expectancy is a crucial indicator of health. Equally important, however, are measures of the quality of life prior to death. As suggested by the World Health Organization (4), we must strive to add years to life and to add life to years. In this paper, we criticize traditional public health indicators as tools that are unnecessarily insensitive and ultimately inadequate to evaluate public health programs. Then, we offer a General Health Policy model that might respond to some of the problems with traditional indicators.

Traditional Public Health Indicators

Mortality remains the major outcome measure in most epidemiologic studies and clinical trials. In order to make informed decisions about the nation's health, the Congress receives various reports of statistical indicators including the crude mortality rate, the infant mortality rate, and years of potential life lost. These are important health indicators, but it fails to consider the health status of those who are alive. They give very little information about the presence, distribution, and effects of disabling conditions such as arthritis. Years of Potential life lost, for example, completely ignores those who live longer than 65 years and neglects life quality for those less than 65.

The National Center for Health Statistics also provides information on a variety of states of morbidity. For example, it reports disability days, bed-disability days, work-loss days, school-loss days, and activity limitations. A major problem with these frequently-used indicators is that they are not easy to compare with one another. Administrators often find it easy to interpret years of life or years of potential life lost. Yet comparisons of discrete morbidity categories, such as disability days, or days with activity limitations, are often confusing.

There are several reasons why we need newer and more sensitive measures of health status. First, current measures are very insensitive to variations in health status near the well-end of the continuum. For example, nearly 86 percent of the U.S. population reports no activity limitation (5). In the 1985 National Health Interview Survey, 90% of the population was reported to be in excellent, very good, or good health. Measures of mortality do not represent these individuals and measures of morbidity pertain to only the minority of the population. Yet large numbers of people have minor health problems that cause them to be concerned about their health status, and these minor problems are associated with substantial expenditures on health care.

Over the last 15 years, medical and health services researchers have begun to develop new ways to quantitatively assess health status. These measures are often called quality of life measures. Since they are used exclusively to evaluate health status, we prefer the term "health-related quality of life" (2). In the following sections, we will describe one approach to the measurement of health-related quality of life that combines measures of morbidity and mortality into a common unit. This consistently expresses health outcomes in units analogous to years of

life. The years of life figure, however, is adjusted for diminished quality of life associated with diseases or disabilities.

Health-related Quality of Life

The objectives of health care are two-fold. First, health care and health policy should increase life expectancy. Second, the health care system should improve the quality of life during the years that people are alive. It is instructive to consider various measures in health care in light of these two objectives. Traditional biomedical indicators and diagnoses are important because they may be related to mortality or to quality-of-life. We prefer the term health-related quality of life to refer to the impact of health conditions on function. Thus, health-related quality of life may be independent of quality of life relevant to work setting, housing, air pollution, or similar factors (7).

Well-Years

Our approach is to express the benefits of medical care, behavioral intervention, or preventive programs, in terms of Well-years of life produced. Others have chosen to describe the same outcome as Quality Adjusted Life Years (QALYs) (8). Well-years integrate mortality and morbidity to express health status in terms of equivalents of Well-years of life. If a cigarette smoker died of heart disease at age 50, and we would have expected him to live to age 75, it might be concluded that the disease caused him to lose 25 well years. If 100 cigarette smokers died at age 50 (and also had life expectancies of 75 years), we might conclude that 2,500 (100 people x 25 years) well years had been lost.

Yet, death is not the only outcome of concern in heart disease. Many adults suffer myocardial infarctions leaving them somewhat disabled over a longer period of time. Although they are still alive, the quality of their lives has diminished. Our model permits all degrees of disability to be compared to one another. A disease that reduces the quality of life by one-half will take away .5 Well-years over the course of one year. If it affects two people, it will take away 1.0 Well-year (equal to $2 \times .5$) over a one-year period. A medical treatment that improves the quality of life by .2 for each of five individuals will result in a production of one Well-year if the benefit is maintained over a one-year period. Thus, using this system, it is possible to express the benefits of various programs by showing how many equivalents of Well-years they produce (9,10). Yet, not all programs have equivalent costs. In periods of scarce resources, it is necessary to find the most efficient use of limited funds. Our approach provides a framework within which to make informed policy decisions that require selection between competing alternatives. Special services for the older adults may in this way compete with traditional medical services for the scarce health care dollar. We believe these services can be competitive in such analyses. Performing such comparisons requires the use of a general health decision model. In the next section, the general model of health status assessment and benefit-cost/utility analysis will be presented.

General Model

The Health Decision Model grew out of a substantive theory in economics, psychology, medicine, and public health. These theoretical linkages have been presented in

several previous papers (11). Building a health decision model requires at least five distinct steps.

Classification of Dysfunction

During the early phases of our work a set of mutually exclusive and collectively exhaustive levels of functioning were defined. Three scales representing related but distinct aspects of daily functioning were created: Mobility, Physical Activity, and Social Activity. The Mobility and Physical Activity scales have three levels, while Social Activity has five distinct levels. Table 1 shows the steps from the three scales. Several investigators have used this function status classification (or a modified version of it) as an outcome measure for health program evaluation (12,13). However, the development of a truly comprehensive health status indicator requires several more steps.

Table 1. Quality of Well-being/General Health Policy Model: Elements and Calculating Formulas (Function Scales, with Step Definitions and Calculating Weights)

Step No.	Step Definition	
Mobility Scale (MOB)		
1	Weight	
2	Did not drive a car, health related; did not ride in a car as usual for age (younger than 15 yrs, health related; <i>ambitor</i> did not use public transportation, health related; or had or would have used more help than usual for age to use public transportation, health related	-.000
3	In hospital, health related	-.000
Physical Activity Scale (PAC)		
1	No limitations for health reasons	-.000
2	In wheelchair, moved or controlled movement of wheelchair without help from someone else; or had trouble or did not try to lift, stoop, bend over, or use stairs or ladders, health related; or had any other physical limitation in walking, or did not try to walk as far as or as fast as other the same age are able, health related	-.060
3	In wheelchair, did not move or control the movement of wheelchair without help from someone else; or in bed, chair, or couch for most or all of the day, health related	-.077
Social Activity Scale (SAC)		
1	No limitations for health reasons	-.000
2	Limited in other (e.g., recreational) role activity, health related	-.061
3	Limited in major (primary) role activity, health related	-.061
4	Performed no major role activity, health related, but did perform self care activities	-.106
5	Performed no major role activity, health related, and did not perform or had more help than usual in performance of one or more self care activities, health related	-.106

Calculating Formulas

Formula 1. Point in time well-being score for an individual (W):

$$W = 1 + (.37X_{wt}) + (.01MOB_{wt}) + (.1PAC_{wt}) + (.5SAC_{wt})$$

where "wt" is the preference-weighted measure for each factor and CTX is Symptom/Problem Complex. For example, the W score for a person with the following description profile may be calculated for one day as:

CTX-11 Cough, wheezing or shortness of breath, with or without fever, 257	
MOB-5 No limitations	-.000
PAC-1 In bed, chair, or couch for most or all of the day, health related, 077	-.077
SAC-2 Performed no major role activity, health related, but did perform self care	-.061
$W = 1 + (-.257) + (-.000) + (.007) + (-.061) = .695$	

For formula 2, Well-years (WY) as an output measure:

$$WY = [N_o \text{ of persons} \times (C/PX_{wt} + MOB_{wt} + PAC_{wt} + SAC_{wt}) \times Time]$$

Symptom and Problem Classification

There are many reasons a person may not be functioning at the optimum level. Subjective complaints are an important component of a general health measure because they relate dysfunction to a specific problem. Thus, in addition to Function Level classifications, an exhaustive list of symptoms and problems has been generated. Included in the

list are 25 complexes of symptoms and problems representing all of the possible symptomatic complaints that might inhibit function. These symptoms and problems are shown in Table 2.

Table 2. Quality of Well-being/General Health Policy Model: Symptom/Problem Complexes (CTX) with Calculating Weights

CTX No.	CTX Description	
Weights		
1	Death (not on respondent's card)	-.727
2	Loss of consciousness such as seizure (fit), fainting, or coma (not cold or knocked out)	-.407
3	Burn over large areas of face, body, arms, or legs	-.387
4	Pain, bleeding, itching, or discharge (discharge) from sexual organs; does not include normal menstruation (monthly) bleeding	-.349
5	Trouble hearing, remembering, or thinking clearly	-.340
6	Any combination of one or more hands, feet, arms, or legs either missing, deformed (crooked), paralyzed (unable to move), or broken--includes wearing artificial limbs or braces	-.333
7	Pain, stiffness, weakness, numbness, or other discomfort in chest, stomach (including hernia or rupture), side, neck, back, hips, or any joints or hands, feet, arms, or legs	-.299
8	Pain, burning, bleeding, itching, or other difficulty with rectum, bowel movements, or urination (passing water)	-.292
9	Sick or upset stomach, vomiting or hiccups (hiccups), with or without chills, or aching all over	-.290
10	General tiredness, weakness, or weight loss	-.259
11	Cough, wheezing, or shortness of breath, with or without fever, chills, or aching all over	-.257
12	Spells of feeling upset, being depressed, or of crying	-.257
13	Headache, or dizziness, or tingling in ears, or spells of feeling hot, nervous or shaky	-.244
14	Burning or itching rash on large areas of face, body, arms, or legs	-.240
15	Trouble talking, such as lisp, stuttering, hoarseness, or being unable to speak	-.237
16	Pain or discomfort in one or both eyes (such as burning or itching) or any trouble seeing after correction	-.230
17	Overweight for age and height or skin defect of face, body, arms, or legs, such as scars, pimples, warts, bruises or changes in color	-.188
18	Pain in ear, tooth, jaw throat, lips, tongue, several missing or crowded permanent teeth--includes wearing dentures or false teeth, stutty, runny nose, or any trouble hearing--includes wearing a hearing aid	-.170
19	Taking medication or staying on a prescribed diet for health reasons	-.144
20	Wore eyeglasses or contact lenses	-.101
21	Breathing smog or unpleasant air	-.101
22	No symptoms or problem (not on respondent's card)	-.000
23	Standard symptom/problem	-.257
X24	Trouble Sleeping	-.257
X25	Indigestion	-.257
X26	Problems with sexual interest or performance	-.257
X27	Excessive worry or anxiety	-.257

Preference Weights to Integrate the QWB Scale

Using the three scales of function and 25 Symptom/Problem Complexes, we can compare populations in terms of frequencies of each scale step (and, if necessary, Symptom/Problem Complex). Although comparisons of frequencies are common in health services research, our system offers a strategy for integrating the frequencies into a single comprehensive expression. If our intent is to say which of these distributions is "better" off and which "worse," it is necessary to integrate the three scales and the Symptom/Problem Complexes in a manner that will allow a single numerical expression to represent each combination of steps on the scales and Symptom/Problem Complexes. The empirical means of accomplishing this is measured preferences for the health states. These might be regarded as "quality" judgments. As we noted earlier, the General Health Policy Model includes the impact of health conditions upon the quality of life. This requires that the desirability of health situations be evaluated on a continuum from death to completely well. An evaluation such as this is a matter of utility or preference, and thus, function level-symptom/problem combinations are scaled to represent precise degrees of relative importance.

Human judgment studies are needed to determine weights for the different states. We have asked random samples of citizens from the community to evaluate the

relative desirability of a good number of health conditions. Random sample surveys were conducted in the San Diego community during two consecutive years. The probability sample included 867 respondents ethnically representative of the population. When necessary, interviews were conducted in Spanish. From a listing of all possible combinations of the scale (Mobility, Physical Activity, Social Activity, and Symptom/Problem Complexes), we drew a stratified random sample of 343 case descriptions (items) and divided them into eight sets of computer-generated booklets. All respondents were assigned randomly to one of the eight booklets, creating eight subgroups of approximately 100 respondents each. In a series of studies, a mathematical model was developed to describe the consumer decision process. The validity of the model has been cross-validated with an R^2 of .94 (10). These weights, then, describe the relative desirability of all of the function states on a scale from zero (for death) to 1.0 (for asymptomatic optimum function). Thus, a state with a weight of .50 is viewed by the members of the community as being about one-half as desirable as optimum function, or about halfway between optimum function and death.

Some critics have expressed concern that community, rather than specific population weights are used. The advantage of community weights is that they are general (like the model) and do not bias policy analysis toward any interest group. More important, however, is that empirical studies consistently fail to show systematic differences between demographic groups (14), providers, students and administrators, (15) and Americans versus British (16). Relevant to the general versus disease specific issue, Balaban and colleagues (17) found that weights provided by rheumatoid arthritis patients are remarkably similar to those we obtained from members of the general population.

Using preference weights, one component of the general model of health is defined. This is the "Quality of Well-being Scale," which is the point-in-time component of the General Health Policy Model (18). The Quality of Well-being score for any individual can be obtained from preferences or "quality" judgments associated with his/her function level, adjusted for symptom or problem.

The example in Table 1 describes a person classified on the three scales of observable function and on a symptom/problem. The table shows the adjustments for each of these components. Using these, a weight of .605 is obtained. By including symptom/problem adjustments, the Index becomes very sensitive to minor "top end" variations in health status. The adjustments for particular symptom/problems are shown in Table 2. For example, there are symptom-problem complexes for wearing eyeglasses, having a runny nose, or breathing polluted air. These symptom adjustments apply even if a person is in the top step in the other three scales. For example, a person with a runny nose receives a score of .83 on the Quality of Well-being Scale when he is at the highest Function Level (ie. the top step on each scale shown in Table 1). Thus, the Model can make fine as well as gross distinctions.

Transitions among health states.

The Quality of Well-being Scale is the point-in-time component of the model. A comprehensive measure of health status also requires an expression of prognosis or the probability of moving between health states over time. People who are well now want to remain well. Those who are at sub-optimal levels want to become well, or at least not get worse. A General Health Policy Model must consider both current functioning and probability of transition to other levels of functioning over the course of time. When transition is considered and documented in empirical studies, the consideration of a particular diagnosis is no longer needed. We fear diseases because they affect our current

functioning or because they alter the probability that there will be a limitation in our functioning some time in the future. A person at high risk for heart disease may be functioning very well at present, but may have a high probability of transition to a lower level (or death) in the future. Cancer would not be a concern if the disease did not affect current functioning or the probability that functioning will be affected at some future time.

When weights have been properly determined, health status can be expressed precisely as the expected value (product) of the preferences associated with the states of function at a point in time and the probabilities of transition to other states over the remainder of the life-expectancy. Quality of Well-being (W) is a static or time-specific measure of function, while the Well-life Expectancy (E) also includes the dynamic or prognostic dimension. The Well-life Expectancy is the product of Quality of Well-being times the expected duration of stay in each Function Level over a standard life period.

The Benefit-Cost/Utility Ratio.

In a variety of publications, the San Diego group has shown how the concept of a Well-life Expectancy can be used to evaluate the effectiveness of programs and health interventions. The output of a program has been described in a variety of publications as Quality Adjusted Life Years, Well-years, Equivalents of Well-years, or Discounted Well-years (11). Weinstein (8) calls the same output Quality-Adjusted Life Years (QALYs), and this has been adopted by the Congressional Office of Technology Assessment (19). It is worth noting that the Quality Adjusted Life Years terminology was originally introduced by Bush, Chen & Patrick (20), but later abandoned because it has surplus meaning. The term "wellness" or "Well-years" implies a more direct linkage to health conditions. Whatever the term, the Index shows the output of a program in years of life adjusted by the quality of life which has been lost because of diseases or disability.

Sensitivity of the Methods

Many authors have expressed concern about the sensitivity of health outcome measures. In this section, we will consider two aspects of sensitivity. First, there is sensitivity in population studies. Second, sensitivity in clinical studies will be reviewed.

As we have suggested elsewhere (21), about 85% of the respondents in national surveys report themselves to be not limited in major activities. Further, 50% report themselves to be in excellent or very good health. As a result, current health indicators provide little information about "well" populations, or at least those unlimited in their major activity. In contrast, the QWB questionnaire finds very few people who score at the top of the 0 to 1.0 continuum. For instance, a 1975 survey of a random sample of San Diego residents revealed that only 12% were completely functional and had no symptom/problem on a particular day. The increased sensitivity is gained through the greater precision of the questions and through the inclusion of symptoms and problems. Thus, an individual who has itchy eyes, wears eyeglasses, or has a cough scores below the optimal level on the scale.

Defining clinical sensitivity is more difficult. Some investigators (22) suggest that measures be designed in order to maximize differences between treatment and control groups in experimental trials. The quality of life measures, according to these authors should be evaluated by their ability to detect differences between groups of patients treated in different ways. However, a statistically significant difference between groups is not necessarily a clinically meaningful one. For example, in a very large clinical trial, with several thousand patients per condition, essentially

trivial differences can be statistically significant. Conversely, relatively large differences in small trials may be statistically non-significant. The issue of clinical versus statistical significance has been debated for many years. One of the advantages of the QWB system is that it presents differences between groups in a well defined unit. For example, a difference of .05 units means that the treated and the untreated groups differ by an amount that is equal to 5% of the utility difference between optimum function and death. If this difference is maintained for one year, each patient will have gained .05 equivalents of a life year. If the effect is maintained 20 years, or if it accrues to 20 individuals, the treatment will have produced the equivalent of one year of life. Within the QWB system, levels of functioning and symptom/problem complexes have been evaluated such that they represent perceived meaningful differences along the death to well continuum. In order to justify two separate levels of function, it was necessary that the perceived differences along the continuum from death to optimum function were too small to be detected by human judges, they were merged into a single level.

QWB Estimates From General Surveys

Several surveys have been used to estimate the QWB values for the general population. One of these was household interview survey involving 867 respondents randomly sampled from the San Diego general population. Data were also gathered about a supplementary probability sample of 370 children and 89 dysfunctional persons identified in the sample households by a screening question. During a 1.5 hour interview, data were gathered about socioeconomic characteristics, role performance, number and kinds of symptoms and problems, and a variety of other health related questions such as physician contacts and numbers of chronic medical conditions.

Age

According to our conceptual framework, the expected mean value of well-being decreases with greater age in any population. Many studies underestimate the age effect because they represent only the survivors of a birth cohort and do not include those who would be the same age but are not now living. The calculation of the Well-year requires two different data sets. In addition to point-in-time Well-being, a life table is required to specify the proportion of people from each birth cohort who are still alive.

Figure 1. Survival curve and QWB curves for general population and those reporting arthritis, San Diego CA.

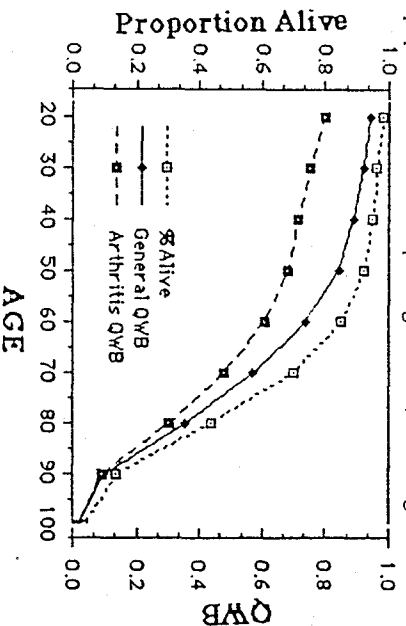


Figure 1 shows an extension of the age graph that includes mortality. The points on the graph are found by multiplying W for age group A by the proportion of persons who would still be alive at age A, according to a life table

constructed from current local mortality rates. The area under the curve represents a simple static or nonstochastic approximately of the Well-life Expectancy. As the figure demonstrates, the curve is relatively flat until about age 45. From then on, it assumes a substantial downhill course.

Impact of Arthritis.

The other curves are shown in Figure 1. The top curve in the figure is the percentage of individuals alive at different ages based on life tables from the National Center for Health Statistics (23). The top curve is referenced against the left axis describing the proportion alive at different ages. The remaining two curves are interpreted using the right horizontal axis for QWB score. The area between the first two curves is the difference in life expectancy that occurs as a function of quality adjustment. The bottom curve displays the QWB for individuals who suffer from arthritis as estimated from the San Diego survey. As the figure shows, there are substantial differences in QWB between the general population and arthritis sufferers. Interestingly, these values are most different early in the life course. For example, at ages 20, 30, and 40, the general population and arthritis sufferers differ by nearly .15 QWB units. However, the prevalence of arthritis is not as high in these age categories. Thus, the total public health impact of arthritis still remains relatively small for younger individuals because that arthritis remains a relatively rare disease in younger age categories. Current estimates suggest that juvenile arthritis, although very disabling, affects only about 71,000 individuals. Rheumatoid arthritis, which typically has its onset during mid-life, is severely disabling but affects only about 1% of the population. There are an estimated 2.1 million cases currently in the U.S. The most common form of arthritis is osteoarthritis which affects an estimated 15.8 million Americans. Although less disabling, osteoarthritis has a significant impact upon the public health of older citizens because of its extremely high prevalence (24).

We are currently working on estimates on the number of equivalent life years lost due to arthritis. The impact of arthritis upon older citizens is often difficult to judge because current health indicators either underestimate the impact of the condition, or express the impact in numbers that are not directly comparable to the effects of other illnesses. For example, arthritis has very little impact upon mortality, except in some specific subconditions, such as systemic lupus. Because the disease is not life threatening it is often considered nonglamorous and discounted in public policy decisions. Current methods of assessing the impact of disabling but nonfatal conditions often understate the problem. It has been estimated that 27 million workdays are lost annually to arthritis at a cost of \$8.6 billion dollars (24). Yet the older individuals most likely to be affected by arthritis are often out of the work force and are not counted. Indicators that do allow for this accounting are complex and can be confusing to policy makers. The Well-year expresses the impact of a condition in a year of life summary number that combines mortality and morbidity. The unit is not specific to age and can be used to compare investments in programs for the old and the young.

Gender Differences.

Another use of the system is to compare Well-being among groups that have different demographics of clinical characteristics. In a recent paper we estimated the Well-life Expectancy for men and women in San Diego, California. Considering only life expectancy, women have a 7 year advantage (78.3 vs. 71.3 years). However, women experience greater morbidity and mortality after age 40. Combining morbidity and mortality reduces the female advantage to about 3 years. Morbidity considerations reduce the 78.3 year female life expectancy to 62.70 years. For men the 71.3 year life expectancy is reduced to 59.78 year (25).

Comparison of Illnesses.

An important report from the Medical Outcomes Study demonstrated the impact of several diseases upon general health outcomes. They reported that physical and role performance were most affected by heart disease, followed respectively by arthritis and hypertension (26). Although the Medical Outcomes Study is a milestone accomplishment, data from the investigation do not place the relative impact of various diseases along a continuum that is well anchored by death and optimum function. As a result, estimation of equivalents of life years lost cannot be obtained.

Using our small San Diego data set, we estimated the impact of heart disease (N=64), arthritis (N=127), ulcer (N=70), and allergy (N=248). These comparisons are shown in Figure 2. The mean dysfunction associated with heart disease was .695 while that for allergy was .790. Thus, the difference between heart disease and allergy, on average, was about .10. Each decade a heart patient suffers the loss about the equivalent of 1 life year in comparison to allergy victims.

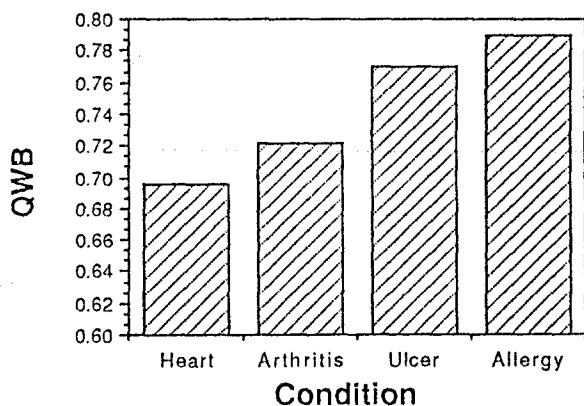


Figure 2. QWB scores for four chronic conditions, San Diego population survey.

Morbidity is only part of the problem for those with heart disease. Considering both morbidity and mortality, we magnify the differences between conditions since heart disease causes significantly early mortality and allergy does not. We are currently working on these analyses.

Estimating Well-years from National Data Sources

Given the advantages of general health status or health-related quality of life measures, it would seem valuable to employ them for national data efforts. However, data have not been collected to directly compute these values. Ultimately, we hope national surveys will include these measures. In the absence of more concrete measurements, the National Center for Health Statistics, in collaboration with Social and Scientific Systems of Bethesda, MD, has been attempting to estimate QWB values from four years of the NHIS. This is possible because items on current-health surveys are similar in many respects to the QWB items. Review of previous NHIS instruments suggested that the years 1977, 1979, 1980, 1984 were the most comparable. The actual methods used for these computations are difficult and rest upon several complex assumptions. The problems are considerable and have been discussed elsewhere (21).

Early evidence suggests that the imputed QWB provides a more sensitive estimate of dysfunction than does the do traditional NHIS indicators. For example, we have previously compared three indicators of well-being: activity limitation, composite measures of function combining mobility, physical activity, and social activity, and the overall QWB score. In these comparisons, we simply considered the percentage of persons with no dysfunction.

These comparisons were made for those less than age 17, between the ages of 17 and 44, between the ages of 45 and 64, and for those over the age of 65. Using traditional activity limitations as an indicator for well-being finds nearly all of those under age 17 as unlimited (96%). However, the QWB finds less than 70% of the 17 and under group to have no limitations. At the other end of the age spectrum, 45% of those 65 and over have some activity limitation. Yet, the QWB finds almost no persons who are without limitations. Composite measures that focus on areas of dysfunction are more sensitive than activity limitations alone, but are much more similar to activity limitations than are QWB scores. For the total U.S. population, the activity limitation indicator gives an approximately 10% higher estimate of the Nation's health than does the composite function status measure. There is an overestimate of 12% for persons younger than 17 years, and 8% for persons 65 years and older (Erickson, et al, 1989). Comparing activity limitations with the overall QWB score highlights even greater discrepancies. Using the overall QWB score, limitations of activity as an indicator underrepresents QWB function by at least 50% in all categories. (see Figure 3 and reference 21)

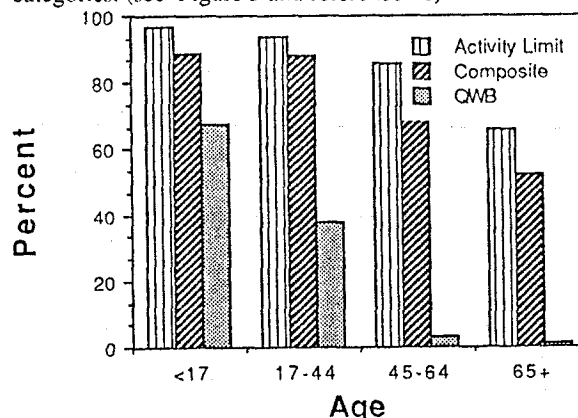


Figure 3. Percent of respondents with no dysfunction in activity, composite or QWB, NHIS, 1980 (Source: ref 21)

Conclusions

Public health planning, health services, and clinical research require new methods for quantifying health outcomes. Traditional public health indicators are deficient for several reasons. First, measures of mortality provide limited information about living. Infant mortality rates ignore all those who live beyond one year while years of potential life lost ignore all those 65 years and older. The life expectancy will probably not exhibit large changes in the near future (27).

In response to these problems, we propose an alternative public health indicator; the Well-year of life. The Well-year of life allows the comparison of treatment interventions that are very different from one another. In addition, it expresses the impact of disabling diseases, such as arthritis, in equivalents of life years. By combining morbidity and mortality, it is possible to express the impact of any health condition in a common unit. The unit reflects the impact of diseases in different organ systems and evaluates the relative importance of various health conditions. The availability of this unit allows for direct comparisons of the cost-benefit/utility of various policy options in health care. A preliminary analysis suggests that these new indicators may also be more sensitive than current approaches for detecting minor variations in health status. However, these minor variations may have important correlates including utilization of health care services. In addition, these methods can be used for policy making. We hope these methods will find expanded applications in future studies.

There are many serious shortcomings with our current methods for estimating Well-years from national data sources. The major ones arise from attempts to estimate refined data from more crude questions. Several studies have documented that specific interview techniques do improve precision (28). For example, studies have suggested that the optimal window for evaluating health status is six days rather than two weeks. Although the NHIS does not ask about symptoms or problems, we know that a considerable portion of the variability in well-being is accounted for by symptomatic complaints. In the retrospective analysis of the NHIS to form QWB-type estimates, information on symptoms and problems was drawn from data collected on self-reported health conditions; this imputation process was based on many tenuous assumptions. The experience from this retrospective analysis indicated that it is possible to collect data for estimating well-years on a national basis. However, it is clear from the assumptions and imputations on which the analysis is based that the best estimates will be obtained if data on all relevant types of functioning and on symptoms and health problems are collected prospectively. It is also clear that in order to apply methodologies such as those employed in collecting data for the QWB, that additional study will be needed to standardize them for the large-scale processing necessary for conducting the NHIS.

In summary, although the work presented here is preliminary, it does suggest it is possible to use the General Health Policy Model to calculate well-years for the U.S. population using large-scale population surveys, and that such estimates provide important information for health policy purposes. To move toward more precise estimates of well-years, we urge the continued research and development needed to modify our national health surveys to collect information for this valuable public health indicator.

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For more information on different approaches to defining and measuring health status and health-related quality of life, contact the Clearinghouse on Health Indexes, Office of Analysis and Epidemiology, National Center for Health Statistics, 3700 East-West Highway, Room 2-27, Hyattsville, MD 20782.

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