

The Value of Human Life Revisited

It has been almost 70 years since the Journal published its first article on "The Value of Human Life" by Dr. Charles V. Chapin.¹ In 1913, Dr. Chapin stated forcefully that it was unwise to emphasize the financial or monetary side of public health by placing a money value on life. Considerable progress has been made since that time. We no longer argue about whether we should attach a value to human life for cost-benefit analyses of health programs. The debate now is on the method to be used as illustrated in the article in this issue of the Journal by Landefeld and Seskin, in which the various valuation methods are reviewed and a new measure is proposed.² The current debate centers around two methodologies for calculating benefits of reductions in loss of life: the human capital (HC) and willingness-to-pay (WTP) approaches. Having been involved for some years in refining the HC method,^{3,4} we enter this discussion to clarify our views that HC and WTP are conceptually different, serve different purposes, and measure different aspects of threats to health.

The HC method for evaluating benefits of reductions in loss of life provides reliable and consistent estimates of forgone earnings but omits the value of non-market activities, leisure, and pain and suffering, thus obviously understating the total impact of death. WTP, on the other hand, has a certain appeal because it can theoretically convert all benefits of living into a money sum, but attempts at practical application have encountered severe problems. In a recent study, the Institute of Medicine concluded value-of-life figures produced so far "are better described as illustrations of methodology than as serious attempts to derive representative values."⁵

An idea frequently, even if only implicitly, conveyed in the literature is that HC and WTP are simply competing methods and a choice must be made between the two. This may occur, at least in part, because the focus of comments is almost always on how well HC and WTP measure the value of life, ignoring the much broader context within which both can be placed. A program that saves lives may also have an impact on morbidity and the utilization of medical care. The HC measure of forgone earnings due to premature mortality is only one component of a framework for estimating the economic costs of disease and other threats to health.⁶ Also included in the HC method are the indirect costs of output lost to morbidity and resources used for medical care. The value of non-market activities—both work and leisure—also lies within the scope of the HC method, but lack of data prevents calculating the monetary loss when these activities are curtailed, except for housekeeping services. HC provides an ex post (after the fact) measure of resources used or lost and therefore unavailable for other uses, some of which result from loss of life. Medical care costs and the value of time lost from work and other productive activities are undeniable losses to individuals and society. If one wants to know what the economic burden of cancer was last year, what resources will be saved by preventive measures that reduce the incidence of cancer, or what the economic impact

of improved survival rates will be, HC provides an appropriate, although partial, measure.

WTP values, on the other hand, whether they derive from surveys or involve the prospective use of revealed preferences, are ex ante (before the fact) measures of the monetary values individuals attach to changes in welfare that would accompany changes in the probability of an event, such as death from a certain disease. WTP could be helpful in indicating how individuals value health and life and in deriving social preferences regarding public policy. WTP might be especially helpful in assessing the burden of pain and suffering, which have an intangible quality that is not amenable to evaluation in terms of the monetary value of resources used or forgone. HC and WTP are not simply alternatives. Together or separately, each can contribute to greater understanding of the burden of disease and other hazards. In its plan for an ongoing study of the costs of health effects of environmental hazards, the Institute of Medicine recommended that both HC and WTP be used, to the extent feasible, recognizing that neither method can measure all relevant costs but both can contribute.⁵

Both HC and WTP would benefit from greater specificity. HC would profit from research and improved data aimed at:

- providing unit costs incurred by type of provider and condition, such as physicians' fees by diagnosis and procedure;
- allocating costs among multiple conditions;
- ascertaining the medical care used, expenditures incurred, disability, morbidity and mortality suffered from onset of a condition until death or cure, thus facilitating the calculation of incidence-based costs;
- distributing costs among diagnosis, treatment, rehabilitation, and continuing care;
- estimating non-health sector costs such as transportation, special diets, equipment, clothing, vocational, social, and family counseling, and indirect losses to family members;
- relating functional health status and costs; and
- estimating costs according to significant attributes of disease, such as tumor site, stage of disease at diagnosis, and treatment modality for cancer.

Progress in these areas would improve HC evaluations and make them more complete.

WTP is essentially the algebraic sum of the amounts all affected persons are willing to pay for the contemplated change in the status quo, such as a program that has life saving potential. In the event there are persons who would be made worse off, their WTP is negative. If the total WTP exceeds the cost of the program, the WTP criterion concludes that the program results in a net increase in social welfare. The virtue attributed to WTP is that it reflects individual preferences, provides freedom of choice, and maximizes social welfare—desirable attributes of a decision-making process. WTP has been criticized because it is

concerned only with the aggregate level of welfare, not the distribution of benefits; assumes individuals have adequate information and make informed, rational decisions regarding their own welfare; and does not adjust for differences in income distribution or ability to pay. These arguments need not be repeated here.

Although there may be some overall average WTP for a statistical life, WTP values need to be based on more specific objectives than simply reductions in the probability of death. Besides the change in risk being considered, WTP is also a function, possibly nonlinear, of the initial level of risk, and the nature of the adverse health outcome that may cause death, such as cancer versus automobile accident. In addition, the nature of the program that saves lives may affect WTP. Is life to be saved by reducing the probability of death through prevention and reduction in the incidence of the life threatening hazard, by cure, or by improvement in survival? If by cure, will the process be with or without pain? What will be the functional status and quality of life after cure? WTP for a given change in the probability of death may vary with a complex set of parameters related to the contemplated change.

Furthermore, in practice it is more likely the issue will involve a program with multiple outcomes, not only lifesaving. At the extreme, a program of air pollution control might lower the incidence and prevalence of several diseases, reduce mortality, morbidity and the need for medical care, prolong the useful life of materials and property, and provide aesthetic benefits. In both the revealed preference and survey approaches to deriving WTP values of life that have been published to date, the outcome is the net WTP for a number of benefits or utilities, and even disutilities, only one of which is life itself. One may purchase a smoke detector not only to save lives, but to avoid injury and property loss. Hazardous jobs include risks of both death and injury, with the type of injury ranging from the very minor to total blindness or loss of limbs, and extra wages compensate for such risks. Faced with a set of multiple outcomes, it may be necessary to know WTP for the combination of benefits in order to evaluate programs as a whole, or WTP for one or more separate benefits. In the survey approach, can an individual reasonably be expected to assess the value to himself or herself of a set of outcomes? Can he or she isolate the value of one of the outcomes? Additional insight is needed.

It is often not possible to separate the compensation for death and injury in revealed preference studies.⁷ The range of WTP estimates of the value of life in revealed preference studies of the labor market and consumption activities² indicates that a host of factors are involved which have not been taken into account. The number of WTP values that would be required to reflect the specific vector of benefits the individual is paying for—taking into account such attributes as type of threat (cancer, air pollution), impact (loss of life, injury), program (prevention, cure), level and change in risk every time WTP is used in the decision-making process—is enormous. If every application of WTP required a study, however, it would be prohibitively time consuming and expensive. The question is, what level of generality in

WTP estimates will make the application of WTP feasible while maintaining acceptable reliability in the estimates?

WTP does not allow for an ordering of preferences; it does not recognize that some things are more important than others, even if the dollar costs are equal. Economic theory to the contrary, in practice an individual will value a dollar taken from one use differently than that taken from another. WTP for a program that reduces the probability of death from cancer may vary according to whether the program is financed from new taxes or at the expense of an existing public program, and whether the program that gives up funds is education, welfare, environmental control, national defense, etc. Unless an individual will directly pay for a given program, either out of pocket or through an increase in taxes, it is impossible to rationally respond to a query of WTP without knowing the specific tradeoffs involved.

In this issue of the Journal, Landefeld and Seskin outline strengths and weaknesses of HC and WTP and contribute a new measure to the literature, the adjusted willingness-to-pay/human capital estimate (adj WTP/HC).² Adj WTP/HC wedges the conceptual foundation important to WTP advocates through its link to welfare economics with consistent and objective measures of income, including income losses due to death (human capital values). This marriage of WTP and HC produces an average value of a statistical life based upon, and limited to, economic losses to the individual associated with his death. Adj WTP/HC takes into account, however, that a person may be willing to pay far more than the expected loss to avoid the pecuniary consequences of a rare event that could have a disastrous outcome and large financial loss.

We have stressed that HC and WTP are fundamentally different approaches, each providing valuable information. Landefeld and Seskin have advanced an important step, developing a measure that combines positive aspects of HC and WTP for evaluating loss of life. Whether adj WTP/HC estimates can also be derived for outcomes other than death is an important topic for further research. However, at the forefront of all efforts at evaluation should be the realization that whatever the measure, it is only an input in the decision-making process and not the decision criterion. It is a means to the end and not the end itself.

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ERRATUM

In: Kambic R, Kambic M, Brisius AM, Miller S: A thirty-month clinical experience in natural family planning. *Am J Public Health* 1981; 71:1255-1258.

The authors have advised the Journal that they did not compute women-months correctly, and the proportions given in their Table 2 (p 1257 of the published version) are incorrect. They also state that the corrected, condensed version of the Table, published here, does not affect the results or discussion.

TABLE 2 (revised)—Net Cumulative Proportion of Cycling Women Avoiding Pregnancy Who Dropped Out of Natural Family Planning (NFP) Study during the First Year per 100 Women Entering NFP Study the First Month

Months of NFP Use	Women Entering Month	Personal Discontinuation	Planning Pregnancy	Released from Study	Lost to Follow-up	Unplanned Pregnancies	Total Termination	Unplanned Pregnancies	
								Method Related	User Related
1	235	1.8	0.4	0.4	3.2	2.7	8.6	0.0	2.7
3	167	6.9	1.4	2.0	4.1	9.4	23.9	1.6	7.8
6	107	8.0	3.8	3.7	6.5	15.9	38.1	1.6	14.3
9	77	10.9	6.6	4.3	6.5	17.2	45.7	1.6	15.7
12	58	10.9	6.6	5.3	6.5	18.2	47.6	1.6	16.7