



UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

~~19981~~

RELEASED

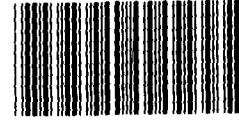
PROGRAM ANALYSIS
DIVISION

B-204658
69CCPAD81

RESTRICTED — Not to be released outside the General Accounting Office except on the basis of specific approval by the Office of Congressional Relations.

NOVEMBER 9, 1981

The Honorable Thomas F. Eagleton
United States Senate



116998

Dear Senator Eagleton:

Subject: Approaches Toward Valuation of Human Life
By Certain Federal Agencies (PAD-82-21)

In your letter of June 19, 1981, you requested that the General Accounting Office conduct a survey of Federal agencies responsible for public health and safety in order to ascertain whether they assign a specific dollar valuation to human life and safety in analyzing program and regulation costs and benefits. You also requested the specific dollar amounts currently assigned for preventing accidents, epidemics, deaths, injuries, etc., and whether discounting to present value is used.

As you suggested in your letter and as we agreed with your office, we did not survey all Federal agencies, but have contacted those we regard as the major safety and health agencies: the Center for Disease Control and the Food and Drug Administration, both of the Department of Health and Human Services; the Department of Agriculture; the Environmental Protection Agency; the Occupational Safety and Health Administration and the Mine Safety and Health Administration of the Department of Labor; the Nuclear Regulatory Commission; the Federal Aviation Administration and the National Highway Transportation Safety Administration of the Department of Transportation; and the Consumer Product Safety Commission. Of these, we found that only Department of Transportation agencies routinely use explicit valuations of safety or health benefits in their analyses, although other agencies have occasionally done the same in the past. In certain other cases, implicit values are assigned when comparisons are made between budgetary outlays and reduced incidence of fatality, injury, or illness.

RESULTS OF OUR SURVEY OF BENEFIT-COST
ANALYSIS BY GOVERNMENT AGENCIES

Our survey of a number of Government agencies with responsibility for health and safety regulation indicates that they have little in common in how they assign dollar values to premature death, injury, or illness. Our survey revealed that while most

(972116)

519153

agencies do not use explicit valuations as a matter of policy, many have used such values in specific analyses. We present survey results in narrative form; the values used in these examples are less meaningful when taken out of context. The examples presented are not the product of an exhaustive survey, but were selected to demonstrate the range of values and methodologies employed by Federal agencies with health and safety responsibility.

Center for Disease Control

The Center for Disease Control has used a variety of figures as proxies for the economic costs and benefits associated with disease and disease prevention. In a study based on a program directed at eradicating measles, cost estimates were based on estimated debility and mortality rates reported to State health departments. ^{1/} Costs per case were based on U.S. Bureau of Labor Statistics indices on costs of various forms of medical treatment--hospitalization, transportation, physician care, custodial care, etc. The benefits per case avoided were estimated at \$73 (in 1969 dollars). ^{2/} This figure was multiplied by average yearly reduction in cases to obtain estimated dollar savings from vaccination programs, and benefits were weighed against the costs of such programs.

The program resulted in a range of outputs including cases avoided, premature deaths prevented, cases of mental retardation prevented, physician days saved, etc. Not counting the intangible effects--pain and suffering averted, loss of association, etc.--the real benefits of Federal Government intervention between 1966-74 were valued at \$1.12 billion, and attained at an estimated cost of \$108 million.

Mine Safety and Health Administration

The Mine Safety and Health Administration has used a value of \$165,000 per case avoided in measuring the benefits and costs of its Respirable Coal Dust in Mines Regulation. The figure is based on compensation levels established by the 1977 amendments to the Federal Coal Mine Health and Safety Act of 1969, commonly known as the Black Lung Benefits Act, 30 U.S.C. 901 et seq.

^{1/}Robert E. Albritton, "Cost and Benefits of Measles Eradication: Effects of a Federal Intervention," Policy Analysis, vol. 4, no. 1, 1978, pp. 1-21.

^{2/}N.W. Axnick, S.M. Shavell, J.J. Witte, "Benefits Due to Immunization Against Measles," Public Health Reports, 84, August 1969.

The use of this figure by the Mine Safety and Health Administration cannot be interpreted as reflecting the "value" of preventing a case of black lung, nor does it imply that a case of black lung is to impose a burden equivalent to \$165,000. A case of black lung will result in an economic compensation of \$165,000; the benefits of preventing a case of black lung, therefore, include the saving of \$165,000.

Nuclear Regulatory Commission

The NRC does not use a specific value to represent the benefits and costs of program objectives such as prevention of premature death, illness, or injury, but does assign a value of \$1,000 per person-rem ^{1/} in estimating the effect of routine releases of radioactivity from nuclear power plants. In applying estimates from the report of the Committee on Biological Effects of Ionizing Radiation, \$1,000 per person-rem translates into approximately \$5 million per premature death, given the assumption that the release of 5,000 person-rems results in one statistical premature death. ^{2/}

Department of Transportation

Agencies within the Department of Transportation (DOT)--the Federal Aviation Administration (FAA), and the National Highway Transportation Safety Administration--have traditionally used explicit values in evaluating the economic benefits and costs of accident prevention programs.

Prior to 1973, the FAA used a discounted-future-earnings approach to estimating the costs of premature death or injury. Figures of \$189,000, \$200,000, and \$230,000 were used in various studies in 1971. Differences were primarily attributable to using different discount rates. Presently, FAA and all executive branch agencies use a 10 percent discount rate.

A 1974 study of the FAA ^{3/} concluded that the justification for using a discounted-future-earnings technique was either largely unexamined or rooted in the belief that an individual's contribution to the GNP was an appropriate index of his or her social worth.

^{1/}A person-rem is the dose of ionizing radiation that causes the same effect to humans as one roentgen of x rays.

^{2/}View of the NRC, as reported in David Okrent, "Comment on Societal Risk," Science, vol. 208, April 25, 1980.

^{3/}Steven Rhoads, Policy Analysis in the Federal Aviation Administration (Lexington, Mass.: D.C. Heath and Co.), 1974.

Since 1973, FAA has used figures based on airline settlements of wrongful death suits. The figures used are quite similar to the values derived by the discounted-future-earnings approach, but the change was made because the alternative source appeared more acceptable to critics. 1/

The National Highway Transportation Safety Administration did a benefit cost analysis of safety improvement projects in which annualized benefits were determined by multiplying reported accident reductions by dollar values for fatality and injury prevention. The values used for this study were \$287,175 for fatalities and \$3,185 for non-fatal injuries. 2/

In June 1981, the DOT adopted uniform guidelines for regulatory evaluations. The purpose of this preliminary document is to establish minimum standards for regulatory impact analyses and to provide guidance for other regulatory evaluations as well. The guidelines offer a brief description of a variety of analytical techniques and suggest a number of conventions for use in benefit-cost analyses. 3/

One of the conventions recommended for calculating costs and benefits presented in the DOT guidelines is a schedule of tentative monetary conversions (see table 1). The monetizations were derived from highway accident deaths and injuries and are based primarily on lost earnings. Since the values do not purport to reflect the intangible components of injury, disability, or premature death, the guidelines suggest that such values are to be discounted.

Consumer Product Safety Commission

The Consumer Product Safety Commission (CPSC) has responsibility for regulating a wide variety of consumer products. In its efforts to aid the consumer in evaluating the relative safety of products and to develop safety standards, the CPSC has undertaken substantial research in the area of product safety and the costs imposed by product-related accidents. Through the National Electronic Injury Surveillance System, the CPSC gathers data relevant to type and cause of injury, nature and cost of treatment, personal characteristics of victims, etc. The total cost of injuries is

1/Ibid., pp. 82-83.

2/"An Evaluation of the Highway Safety Program," U.S. Department of Transportation, National Highway Transportation Safety Administration, July 1977.

3/Guidance for Regulatory Evaluations: A Handbook for DOT Benefit-Cost Analysis, draft, Department of Transportation, June 5, 1981.

Table 1

Department of Transportation Regulatory Guidelines
Examples of Monetary Conversions

<u>Impact Component</u>	<u>Impact Measure</u>	<u>Tentative Estimate of Average Monetary Value per Unit of Impact (\$1981)</u>
Personal safety (highway accidents)	Fatalities	\$340,000
	Critical injuries (survival uncertain)	\$230,000
	Severe injuries (life threatening, survival probable)	\$102,000
	Moderate injuries	\$ 68,000
	Minor injuries	\$ 3,400

Source: "Guidance for Regulatory Evaluations," June 5, 1981, Office of Industry Policy, Department of Transportation.

estimated for each of a variety of product types, the primary components being medical treatment and lost earnings.

The CPSC has undertaken this research and developed its injury cost model as a means of estimating the total effect of product-related injuries. Such a model is particularly useful in cases involving injuries where direct effects are short-term and costs are primarily economic and easily measurable. But for accidents involving serious injury, disability, or loss of life, measuring and placing a value on pain and suffering, degradation of functional capacity, and loss of association is more problematical. While the CPSC has undertaken research in this area and its injury cost model does employ dollar values for premature death, serious injury, etc., these values are not used by CPSC analysts as a basis of policy recommendations. Policymakers are presented with a range of values derived through techniques based on several perspectives and are free to incorporate those values which appear most appropriate.

IMPLICIT VALUATIONS

Even when policymakers do not make explicit valuations of the type discussed above prior to making a decision, the outcomes of budgetary and regulatory policymaking reveal implicit valuations. For example, the decision of the Mine Safety and Health Administration to require the use of self-rescue devices reveals such an implicit valuation. These devices cost the industry \$50 million, and the regulation was based on the judgment that approximately half of the 70 lives lost in coal mine fires during the previous 5 years could have been prevented had such devices been available. The effect of such a judgment, then, is the implication that the possibility of preventing 35 premature deaths over a 5-year period is worth at least the expenditure of \$50 million, or approximately \$1.43 million per premature death prevented. Table 2 illustrates the range and diversity of implicit valuations revealed by selected Government programs.

USING BENEFIT-COST ANALYSIS

Your letter expressed concern regarding the use of benefit-cost analysis and discounting procedures as a means of evaluating Federal programs when these programs are aimed at preventing death, injuries, or illness. We would like to offer several brief observations. The true value of a human life or the true psychic costs of injuries or illness cannot be calculated. In short, life-saving activities cannot be compared with the attainment of other goals such as reducing travel time or costs of production.

In practice, however, decisions must be made among competing objectives and programs in safety. Thus, an agency must implicitly

Table 2Sample Estimates of the Cost per Life Saved in Programs Supported, Operated, or Mandated by Government

<u>Program</u>	<u>Cost per Life Saved</u> (dollars)
Medical Expenditure (a)	
Kidney transplant	72,000
Dialysis in hospital	270,000
Dialysis at home	99,000
Traffic Safety	
Estimate for eliminating of all railroad grade crossings	100,000 (b)
Military Policies (a)	
Instructions to pilot on when to crash-land airplanes	270,000
Decision to produce a special ejector set in a jet plan	4,500,000
Mandated by Regulation	
Coke oven emissions standard, OSHA	4,500,000 to 158,000,000 (c)
Proposed CPSC lawn mower safety standards	240,000 to 1,920,000 (d)
Proposed standard for occupational exposure to acrylonitrile	1,963,000 to 624,976,000 (e)

Sources: (a) Dan Usher, "An Imputation to the Measure of Economic Growth for Changes in Life Expectancy" in M. Moss, ed., The Measurement of Economic and Social Performance (New York: National Bureau of Economic Research, 1973).

(b) Robert F. Baker, The Highway Risk Problem (New York: Wiley, 1971).

(c) Statement on behalf of the Council on Wage and Price Stability by Dr. John F. Morrall III, before OSHA, May 11, 1976.

(d) Comments of the Council on Wage and Price Stability before CPSC, August 15, 1977.

(e) Statement on behalf of the Vistron Corporation by James C. Miller III, before OSHA, April 4, 1978.

or explicitly place a value on the alternatives and the costs associated with them. The Congress also makes an implicit valuation of this sort when it decides which programs to authorize and the level at which to fund them. Even though benefit-cost analysis permits a formal review of the economic efficiency of alternative approaches, it does not and cannot be used to make the final decision. First, to the extent that it cannot convert benefits into dollar values, benefit-cost analysis underestimates benefits, particularly health and safety ones. Second, to the extent that it deals with the efficient or productive uses of resources and not equity in the distribution of benefits and costs, benefit-cost analysis tells the policymaker nothing about the other implications of his or her choices even within the safety program area.

Clearly, any economic calculation of the value of a human life is incapable of correctly encompassing all the psychic costs of death, illness, and suffering. On the other hand, the value of a human life does include real economic components. These economic components can be explicitly calculated and placed in the benefit-cost calculation. Those who perform these calculations are correct in assessing that to acknowledge that some values are unknowable should not be justification for avoiding any explicit enumeration and evaluation of the objectives, costs, and benefits of various programs or projects within the safety area.

When using monetizable values of life, injury, or health, account can be taken that benefits and costs do not occur in the same time periods. Budgetary resources are, of course, limited. Because those resources are productive and have alternative uses, analysts must allow that presently available resources are more valuable to us than equivalent resources at some later date. This difference in value is accounted for through the process of discounting. Benefit-cost analysis traditionally expresses the benefit and cost of programs in terms of their present discounted values--what such future costs or benefits are worth in terms of today's dollars. To the extent that the effect of human life, safety, and health program alternatives can be objectively measured and monetized, it appears appropriate to discount those values. In cases where such valuations also attempt to subjectively value the noneconomic component of life, health, or safety, the discounting process is not analytically defensible because the psychic component of loss of life, injury, or health is neither quantifiable, nor does its "value" erode, in a financial sense, with the passage of time.

B-204658

At the request of your office, we did not obtain agency comments on this report. As arranged with your office, unless you publicly announce the contents earlier, no further distribution of this report will be made until 30 days after the report date. At that time, we will make copies available to others upon request.

I hope this report is responsive to your request. If we can be of further assistance, please call us.

Sincerely yours,

A handwritten signature in cursive script that reads "Morton A. Myers". The signature is written in dark ink and has a long, sweeping horizontal line extending to the right.

Morton A. Myers
Director