

**ADVOCACY THROUGH
CONVENIENT
DEFINITION OF
SOCIETAL OBJECTIVES**
Cost-Benefit Analyses
in Health Care

PRAFULLA JOGLEKAR
*Management Department
La Salle College*

In modern democracies, societal objectives are pluralistic, varied, and often mutually conflicting. Consequently, cost-benefit analysts have considerable scope for defining societal objectives in a manner most suitable for advocating their clients' programs. Three different therapies for a hypothetical disease are considered. Alternative definitions of societal objectives suitable for the advocacies of the different therapies are outlined. Some generalized principles of advocacy through convenient definition of societal objectives are identified.

AUTHOR'S NOTE: This study was partially funded by the SmithKline Corporation. The author is indebted to Dr. Morton L. Paterson, Manager of Cost-Benefit Studies at SmithKline for his encouragement and guidance. An earlier version of this article was presented at the ORSA/TIMS meeting in Toronto, May 1981.

In a recent paper (Joglekar, 1980), I reported some important findings from an earlier review (Joglekar, 1979) of the literature on cost-benefit/cost-effectiveness analyses (CBA)¹ of health care programs. I pointed out that

the need for prudent use of scarce national resources in health care dictates that social costs and social benefits of alternative programs be measured carefully. The literature on cost-benefit methodology provides a rich conceptual base for the conduct of such studies. Unfortunately, in practice, analysts have considerable leverage for choosing objectives, assumptions, data, analytical methods and interpretations that would yield desired conclusions.

I (1980) pointed to several studies in the available literature where this leverage for choosing among alternative assumptions and methodologies could be suspected of having been used by analysts to arrive at a result justifying their (or their clients') predetermined choice. Specifically, in the context of choosing among alternative societal objectives for a study, I said:

An attempt at measuring the social costs and benefits of a program assumes that societal objectives are known and precisely defined. Unless these objectives are known, one cannot determine what specific consequences constitute "costs" (because they are undesired), and what consequences constitute "benefits" (because they are desired). In democratic societies, societal objectives are plural, everchanging, and, often, mutually conflicting. A truly scientific analysis which recognizes the multiplicity, the dynamism, and the conflicts among objectives can, at best, only *describe* the various consequences of a given program without attaching any values to these consequences. Such a description would necessitate that policymakers themselves assign values to these consequences, aggregate the sum total of these values, and arrive at the desired course of action. Yet, a policymaker who considers such descriptions as an "analysis" may be rare. Policymakers often desire that the analyst should carry the process further and simplify his choice by imputing values to the various consequences, aggregating these values and coming up with definitive recommendations.

Available CBA studies indicate that analysts are quite willing to comply with these desires of the policymaker. But, this is exactly

where the process of choosing values, assumptions, and methods for desired conclusions may begin. Analysts who are willing to so comply may be particularly inclined to arrive at conclusions that the policymaker (i.e., their client) may want to hear. Consciously or unconsciously, these analysts may choose among alternative societal objectives such that the chosen objectives are best fulfilled by the program their client favors. In specific cases, it is difficult to prove such a bias in the choice of societal objectives. But, certainly there is considerable scope for such a bias. In the health care sector an analyst may choose among a number of societal objectives including (a) maximization of equitable access to health care, (b) maximization of gross national product of a nation state, (c) maximization of per capita income, (d) maximization of number of lives (or life-years) saved per dollar of health care expenditure, (e) the most beneficial allocation of a given health care budget, (f) the most beneficial allocation of the national budget, etc.

Depending upon the chosen societal objective, the values attached to specific consequences of a program can be substantially different. For example, saving the life of an individual whose contribution to GNP is likely to be only marginal (i.e., below average) may be seen as a "cost" under objective (c), as a slight benefit under objective (b), as a substantial benefit under objective (d), and as an unavoidable activity in the pursuit of objective (a). Thus, if a client's health care program is aimed at saving the lives of the poor, the blacks, the women, or the elderly, the analyst should choose objectives (a) or (d) rather than (c) or (b). Perhaps this is why Riddiough (1979), whose study justifies pneumococcal vaccination for the elderly, uses objective (d); whereas Barlow (1969), whose study questions the value of malaria eradication in underdeveloped countries, uses objective (c).

But in all fairness to Riddiough (1979), Barlow (1969), and other analysts, I felt it necessary to add: "Of course, one would never know if these analysts chose their objectives first and then arrived at their conclusions or vice versa."

THE SETTING

Imagine that there is a children's disease for which, at present, there is no FDA-approved therapy. Assume that the disease is

fatal and kills 10,000 one-year-old babies in the United States every year. Physicians have refused to treat the disease except in an experimental setting. Assume that three pharmaceutical firms have developed and tested three new drugs to combat the disease and want to obtain FDA approval to market these drugs.

Drug A from manufacturer M_A can be given on an outpatient basis to babies who have contracted the disease. The episode cost of therapy is estimated to be \$200 per patient—\$50 for physician visits and \$150 for the drug itself. Drug A is effective only if the disease is detected in its early stage. In clinical trials, Drug A saved one out of every four babies, whereas only one of every ten babies was saved in the control group (receiving identical physician care but a Placebo A' instead of the active drug). Babies saved by either A or A' are expected to lead a normal life, as if they never had the disease. Neither Drug A nor Placebo A' have any side effects. Assume that the cost of Placebo A' is insignificant. Thus, if Drug A is used to treat all 10,000 cases, 2,500 deaths will be avoided.

Manufacturer M_B has developed a vaccination B, which would have to be administered to 1,000,000 babies who may be most prone to contracting the disease. The cost of this vaccination is estimated to be \$9 per baby—\$6 for the nurse's cost and \$3 for the drug—and would immunize 95% of the potential cases of this disease. That is, 9500 cases will be avoided each year. Only 500 cases will continue to occur. Drug B has a side effect that would require 1% of all vaccinated babies (i.e., 10,000 babies each year) to be hospitalized and treated at a cost of \$200 per case of side effect. Note that vaccination B is not tested against a placebo.

It is quite possible that well-meaning analysts may inadvertently choose objectives and assumptions that lead to specific conclusions contradictory to their original beliefs. Such analysts may then begin to be the advocates of the policy postures their study recommended, particularly if they never knew the policy implications of alternative definitions of societal objectives. On the other hand, it is often difficult to take the data presented in a published study and show the implications of alternative defini-

tions of societal objectives-- the primary reason being that such data presentations are rather brief and selective.

Consequently, an important warning in my earlier paper (Joglekar 1980) seemed to be ignored by a number of readers. The warning stated that when policymakers are really in doubt as to which program is the best among a set of competitive health care programs, a typical CBA is as likely to mislead them as it is to indicate the right course of action. I believe that the CBA methodology provides such a large potential for the manipulation of objectives, assumptions, data, methods, and interpretations, that any CBA study ought to be suspected of an advocacy unless proven innocent. Some readers, on the other hand, seem to adhere to the norm of the U.S. judicial system of accepting a study as impartial until proven guilty of an advocacy.

Some readers and analysts believe so much in the CBA methodology that they even recommend the results of a CBA as the ultimate criterion for the approval of a new drug for marketing in the United States by the Food and Drug Administration (FDA). In this article, therefore, I make my case once more by showing that within the general context of the CBA methodology, each one of the advocates of a set of competitive drugs can easily choose among alternative definitions of societal objectives to justify the approval of his or her own drug.

Drug C from manufacturer M_c is meant for administration on an inpatient basis to babies who have contracted the disease. The episode cost of therapy with Drug C is estimated to be \$750 per patient -- \$600 for hospitalization and physician fees and \$150 for drug cost. In clinical trials, Drug C saved 99% of all babies treated, whereas only 18% of the babies in the control group (receiving identical hospitalization and physician care but Placebo C' instead of Drug C) were saved. Assume further that only 97% of babies receiving Drug C are expected to lead normal lives, while 2% are disabled for the rest of their lives and would need nursing home care at the cost of \$5000 per year per disabled child (in today's dollars, adjusted for inflation). Thus, if all 10,000 children contracting the disease were treated by Drug C, a total of 9,900 children would survive. Of these 9,900 children,

9,700 would be normal, whereas 200 children would be permanently disabled. Drug C and Placebo C' have no other side effects. Assume that the cost of Placebo C' is insignificant.

Using the prevalent criterion of risk-benefit ratio, it would seem that FDA should approve all three of these drugs for marketing and leave it up to individual physicians, patients, or state and local reimbursement agencies to choose what drug to use or what therapy to reimburse for.

Suppose, however, that following the advice of some economists, Congress has changed the FDA's mandate. Given the scarcity of national health care resources, FDA is to approve only one among the competing therapies. Furthermore, this approval is to be based on an economic study indicating which therapy is socially most beneficial.

Given this FDA mandate, it would be up to manufacturers M_A , M_B , and M_C to provide studies that show their own drugs to be socially most beneficial.

THE COMMON SET OF ASSUMPTIONS

Now, as my (1979) review of the available CBAs has indicated, economists hired by these manufacturers will have several equally justifiable choices for assumptions regarding such important factors as:

- (a) the life expectancy of a child saved by their therapy.
- (b) the quality of that extended life.
- (c) the production capacity of the children saved,
- (d) the expected health care costs during the extended life,
- (e) the social time preference rate, i.e., appropriate discount rate for future costs and benefits, and
- (f) the rise in prices of drugs or hospital costs relative to inflation.

Economists could choose among these assumptions carefully so as to obtain results that are most favorable to their client's drug. Of course, the FDA has its own economists who would recognize the arbitrariness (if not the bias) underlying these

assumptions. Presumably, they would require rather extensive sensitivity analysis to verify the effect of alternative assumptions. Now, sensitivity analysis may not always identify the vulnerability of certain conclusions, since what it often requires is changing the value of one variable at a time. It may be that only when a combination of variables obtain alternative values does the recommended choice change. However, that point will not be dealt with here. The purpose of this article is to show that even when there is complete agreement regarding such assumptions, analysts could advocate their own choices simply through convenient definitions of societal objectives.

Let it be said, therefore, that there is a consensus about the following assumptions:

- (1) A normal one-year-old child in the United States is expected to live for 70 years. Furthermore, using the Weinstein-Stason (1977) definition of quality-adjusted-life-years (QALY), let us assume that such a normal baby values the first 50 years of his or her life at 0.95 QALY each, and the last 20 years at 0.85 QALY each.
- (2) Assume further that a normal child expects to spend \$100 per year on his or her health care until age 35; \$500 per year from age 36 to 60; and \$3000 per year from age 61 to 70. Assume that all dollar values here are in terms of today's money. That is, they are already adjusted for inflation, and for any differences between hospital or drug cost changes relative to inflation.
- (3) However, it should be recognized at this stage, that the dollar figures in item 2, as well as the QALY numbers expressed in item 1, deserve to be adjusted further to reflect society's time preference. It is assumed that society values a life-year saved today more than a life-year saved thirty years hence, just as it values an inflation-adjusted dollar saved today at a greater premium in relation to an inflation-adjusted dollar saved thirty years hence. It is also assumed that this social preference for time is fully accounted for by discounting all future benefits and costs (whether in dollar terms or in QALY terms) at 5% per year.
- (4) Thus, when a one-year-old child's death is avoided, and he or she is not disabled, he or she would save 18.27 discounted-quality-adjusted life-years,² and would expect to spend \$4,155.13 discounted-dollars³ on his or her health care during the extended life span.

- (5) Assume also that side effects of Drug B do not cause children to revise their perceptions of the first year's QALY (which is set at 0.95 for all normal children), so that a child saved by Drug B is also expected to save 18.27 discounted QALYs. His or her health care costs would depend on whether or not he or she has side effects. The side effect costs will be accounted for separately.
- (6) Assume that a child belonging to the 200 disabled by the use of Drug C would survive for 70 years, but would value each year of his or her life at 0.5 QALY. Thus, he or she would save 9.67 discounted QALYs⁴ (compared to death), and expect to spend \$96,713.38 discounted-dollars⁵ on his or her nursing home care.
- (7) Assume that a baby restored to normality by one of the drugs (or placebos) in our example will earn nothing at all until age 20, will earn an average of \$6,000 per year (in today's dollars) from age 21 to 40, an average of \$10,000 per year (in today's dollars) from age 41 to 65, and nothing after the age of 65. Thus, the present value of the production contribution of a baby restored to normality is \$48,201,⁶ using a *real* discount rate of 5%.
- (8) Assume further that the babies disabled by Drug C earn on an average only one-fourth of what they would have earned if they were restored to normality. Therefore, the present value of the production contribution of such a disabled baby is \$12,050.25.⁷

With these commonly agreed on assumptions about the consequences of various therapies, the next step is to see how economists hired by M_A , M_B , or M_C could still make a case for the approval of their clients' drugs. The trick lies in the choice of suitable definition of societal objectives.

ADVOCACY OF DRUG A

The economists hired by M_A recognize that their client's drug is not medically the most effective for it can only save 25% of the 10,000 babies that would otherwise die. But they also recognize that A is relatively inexpensive. They therefore argue that given limited health care resources, it is in the best interest of the society to seek the most "cost-effective" treatment for each disease. That is, society should seek the "biggest bang" for each dollar of expenditure. Quoting earlier works in CBA literature

particularly the work by Weinstein and Stason (1977)—they point out that the criterion for cost-effectiveness is the ratio of the net increase in health care costs due to a therapy to the net increase in life expectancy and quality of life due to the same therapy.

Net health care costs include:

- the incremental cost of the therapy (ΔC_{RX}),
- the increase in treatment costs resulting from increased cases of morbidity, as in the case of Drug C (ΔC_{MORB}),
- the costs of treating side effects of a therapy as in the case of Drug B (ΔC_{SE}), and
- the costs of treating any other diseases that occur in the added years of life expectancy conferred by treatment and that, therefore, would not have occurred in the absence of the treatment ($\Delta G_{RX\Delta LF}$).

Net health effectiveness is measured in terms of increased years of life expectancy, adjusted to account for changes in the quality of life due to pain, suffering, morbidity, side effects, and so on. It is measured by the algebraic sum of:

- the increase in life expectancy resulting from a therapy as adjusted by the quality-of-life considerations (ΔY_{LF}),
- the reduction in the value of the extended life-years due to morbidity caused by therapies like Drug C ($-\Delta Y_{MORB}$), and
- the reduction in the quality of life resulting from side effects like those caused by Drug B ($-\Delta Y_{SE}$).

Given these measures, the cost effectiveness of a therapy would be judged by the cost to effectiveness (C/E) ratio calculated as:

$$\frac{C}{E} = \frac{\Delta C_{RX} + \Delta C_{MORB} + \Delta C_{SE} + \Delta C_{RX\Delta LF}}{\Delta Y_{LF} - \Delta Y_{MORB} - \Delta Y_{SE}}$$

The lower the C/E ratio, the more cost effective a therapy is. Hence, the appropriate decision rule using this criterion is to

select from among competing therapies the one that minimizes the C/E ratio.

Having argued all this, an advocate of Drug A would then present Table 1, which summarizes the costs and health effectiveness consequences of the three therapies compared with the alternative of no treatment at all. As can be seen, compared to no treatment at all, Drug A costs \$2,000,000 for the therapy, and \$10,387,825 for health care costs during the life extended by the drug for a total cost of \$12,387,825. On the other hand, Drug A saves 45,675 discounted QALYs and has no associated QALY reductions due to morbidity or side effects caused by the drug. Thus, for Drug A, the C/E ratio is \$271.22 per discounted QALY.

Similarly, a therapy by Drug B costs \$9 million in treatment, \$2 million in the treatment of resultant side effects, and \$39.47 million in health care costs during the extended life years. On the other hand, Drug B saves 173,565 discounted QALYs due to treatment, and indicates no further loss in QALYs due to either morbidity or side effects. The resultant C/E ratio for the therapy with Drug B is \$290.81 per discounted QALY.

In Table 1, a similar computation for the therapy with Drug C indicates a C/E ratio of 374.80 per discounted QALY.

Thus, an economist favoring Drug A has a clear-cut recommendation that Drug A be approved, for it is the most cost-effective.

ADVOCACY OF DRUG B

Now the economists hired by manufacturer M_B recognize that Drug B is not the most cost-effective therapy for the disease under consideration. But they suggest that cost-effectiveness is not the right objective for the society. Drug A may be least costly per QALY saved, but it cannot save as many QALYs as do Drugs B or C. Second, if one must adhere to cost-effectiveness criterion, the best decision for the society would be to administer Placebo A' and not Drug A. Table 2 shows that when Placebo A' is

TABLE 1
Comparison of Therapies Using Cost-Effectiveness Ratios

ALTERNATIVE	COST CONSEQUENCES (\$)					EFFECTIVENESS CONSEQUENCES (QALY)				C/E RATIO
	ΔC_{RX}	ΔC_{MORB}	ΔC_{SE}	$\Delta C_{RX/LE}$	TOTAL INCREMENTAL COST	ΔY_{LE}	$-\Delta Y_{MORB}$	$-\Delta Y_{SE}$	TOTAL INCREMENTAL QALYS	\$/QALY
No Treatment	0	0	0	0	0	0	-0	-0	0	N.A.
Drug A	2,000,000	0	0	10,387,825 ^a	12,387,825	45,675 ^b	-0	-0	45,675	271.22
Drug B	9,000,000	0	2,000,000	39,473,735 ^c	50,473,735	173,565 ^d	-0	-0	173,563	290.81
Drug C	7,500,000	19,342,676 ^e	0	40,304,761 ^f	67,147,437	180,873 ^g	-1720 ^h	-0	179,153	374.80

- a. 2500 babies saved each requiring \$4,155.13 of health care cost.
- b. 18.27 discounted QALYs multiplied by 2500 babies saved.
- c. 9500 babies saved each requiring \$4,155.13 of health care cost.
- d. 18.27 discounted QALYs multiplied by 9500 babies saved.
- e. 200 babies each costing \$96,713.38.
- f. 9700 babies saved each requiring \$4,155.13 of health care cost.
- g. 18.27 discounted QALYs multiplied by 9700 babies saved.
- h. A normal baby saved provides a saving of 18.27 discounted QALYs, but a disabled baby provides a saving of only 9.67 discounted QALYs. Therefore, net morbidity loss is 8.6 QALYs each for the 200 disabled babies.

TABLE 2
Cost-Effectiveness Comparisons on an Incremental Basis

ALTERNATIVE	COST CONSEQUENCES					QALY CONSEQUENCES				C/E
	C _{RX}	C _{MORB}	C _{SE}	C _{RX} × LE	TOTAL COST	Y _{LE}	Y _{MORB}	Y _{SE}	TOTAL QALY	
No Treatment	0	0	0	0	0	0	0	0	0	N.A.
Placebo A' Compared to No Treatment	500,000	0	0	4,155,130 ^d	4,655,130	18,270 ^b	0	0	18,270	254.80
Drug A Compared to Placebo A'	1,500,000	0	0	6,232,695	7,732,695	27,405	0	0	27,405	282.16
Drug B Compared to No Treatment	9,000,000	0	2,000,000	39,473,735	50,473,735	173,565	0	0	173,565	290.81
Placebo C' Compared to No Treatment	6,000,000	0	0	7,479,234 ^d	13,479,234	32,886 ^e	0	0	32,886	409.88
Drug C Compared to Placebo C'	1,500,000	19,342,676	0	32,825,527	53,668,203	147,987	-1,720	0	146,267	366.92

a. 1000 babies × \$4,155.133 health care cost per baby.

b. 1000 babies × 18.27 discounted QALYs.

c. Note that in Table 1, all costs and benefits were attributed to Drug A, whereas in this table, they are shown separately for Placebo A' and Drug A. The same is true for Drug C.

d. 1800 babies × \$4,155.13 health care cost.

e. 1800 babies × 18.27 discounted QALYs.

compared with no treatment, its C/E ratio turns out to be only \$254.80 per QALY, substantially smaller than the C/E ratio for Drug A. But, of course, approving a placebo treatment would not be ethical.

The advocates of Drug B say that society ought to be concerned with maximizing the net present value of production benefits less health care costs. They summarize their analysis as in Table 3. The health care costs of each therapy are derived in the same manner as in Table 1. However, instead of accounting for the quality-adjusted life-years saved by each therapy, Table 3 reports the discounted value of future earnings of the children saved by each therapy. Net benefits are obtained by subtracting the health care costs from the earnings. From Table 3, it is clear that Drug B contributes the greatest benefit to society.

ADVOCACY OF DRUG C

The economists hired by manufacturer M_C recognize that their drug is neither the most cost-efficient nor the most beneficial in terms of the net present value of benefits less costs. But they can still advocate the approval of Drug C on the basis of a more convenient (and justifiable) definition of societal objectives.

First, they can argue that society's objective ought to be to save as many human lives as one can unless costs are truly prohibitive. Drug C's average cost of \$374.80 per QALY saved cannot be considered prohibitive. In other health care programs, as well as in other sectors of the economy, the United States spends a considerably larger amount of money per QALY. Hence, Drug C should be approved since it promises to save the greatest number of lives among the three therapies.

If, however, the criterion of saving the largest number of lives is unacceptable to the FDA, manufacturer M_C can point out that the only reason its drug does not do as well as Drug A or Drug B on the other two criteria (namely, C/E ratio and net benefit criterion) is because Drug C saves 200 babies, albeit disabled, who would not have been otherwise saved. M_C could,

TABLE 3
Comparison Using the Net Benefit Criterion

Alternative Therapy Compared to No Treatment	Present Value of Total Health Care Costs ^a	Present Value of Earnings by Children Saved	Net Benefit
No Treatment	0	0	0
A	12,387,825	120,502,500 ^b	108,114,675
B	50,473,735	457,909,500 ^c	407,435,765
C	67,147,437	469,959,750 ^d	402,812,313

a. Figures taken from Total Incremental Cost column in Table 1.

b. PV earnings of \$48,201 per baby for 2500 babies saved.

c. PV earnings of \$48,201 per baby for 9500 babies saved.

d. PV earnings of \$48,201 per baby for 9700 babies saved (\$467,549,700) plus the PV earnings of \$12,050.25 (¼ of \$48,201) per baby for the 200 disabled babies (\$2,410,050).

therefore, devise a clever scheme of administering a lethal poison Z to babies who are disabled by Drug C, as soon as their disability is detected. All M_C now claims is that it has developed a new therapy D that consists of administering Drug C and adding Z in case of adverse side effects. The new therapy D saves and restores to normal life 97% of the babies suffering from this disease.

M_C 's economists can then claim that Therapy D is most cost effective since its health care costs are only \$47,804,761,⁸ while its QALYs saved are 177,219⁹ for a C/E ratio of \$269.75¹⁰ per QALY.

Therapy D also turns out to be the best if one wants to use the criterion of net benefit. As said before, the health care costs of Therapy D are \$47,804,761, while the production contribution of the 9700 babies saved by D is \$467,549,700.¹¹ Consequently, the net benefit of D (\$419,744,939) is far greater than the net benefit promised by either Drug A or Drug B.

Manufacturer M_C would recognize that this type of administration of a lethal dose to disabled babies might not have been ethical in an earlier era, but may feel that it is justifiable when the FDA insists on economic evaluation as the sole criterion for drug approval.

CONCLUSION

In modern democracies, societal objectives are pluralistic, varied, and often mutually conflicting. The foregoing examples have shown that policy analysts have considerable scope for defining societal objectives in a manner most suitable for advocating their clients' programs. Readers would agree that there was nothing inherently right or wrong about the three alternative definitions used in the foregoing examples. They seem to be equally justifiable, depending on the circumstances. Furthermore, these alternatives are not the only options available. In constructing a definition of societal objectives most suitable for their positions of advocacy, analysts may use one or more of the principles presented in Figure 1. (The list of principles in Figure 1 is clearly preliminary and incomplete. The author would appreciate any additions to that list from the reader.)

Meanwhile, I would like to reiterate my position that CBA methodology affords such a large potential for the manipulation of objectives, assumptions, data, methods, and interpretations that any CBA study ought to be suspected of a desired advocacy unless proven innocent. The potential for advocacy through suitable definition of societal objectives is particularly serious since one rarely expects a sensitivity analysis on the definition chosen.

Given this scope for advocacy, one wonders if making a CBA mandatory in the FDA's drug approval process would really lead to better decision making, since most probably the FDA would require each applicant to submit his or her own CBA. It is also questionable whether society should avail itself of only one of

1. When your favored program saves a relatively small number of lives but at a smaller cost, try the cost-effectiveness ratio or the cost-benefit ratio, rather than the present value of net benefits criterion.
 2. When your program saves relatively more lives, even if at a higher cost per life saved, try the present value of net benefits criterion.
 3. When your program saves the greatest number of lives, even if at substantially high cost, insist upon the ethics of saving human lives.
 4. When your program saves the lives of the poor, the elderly, the blacks or women, avoid monetary valuation of earnings. Instead, insist upon the cost to QALY ratio.
 5. When your program is aimed at 25-year-old white males, insist upon the cost-benefit ratio or the net benefit criterion, rather than the cost-effectiveness criterion.
 6. If your program does not necessarily save lives but alleviates pain and suffering, use maximization of consumer surplus as the criterion.
 7. If the program you disfavor saves the poor, the elderly, etc., use the effect on per capita income as the criterion.
 8. When a program you disfavor saves primarily the lives of 25-year-old white males, insist on equitable access to health care as the primary objective of society.
-

Figure 1: Some Principles for Convenient Definitions of Societal Objectives

the types of alternative therapies discussed. The current posture is to approve all therapies justified by simple risk-benefit considerations. This may be the best approach.

NOTES

1. We refer to all studies that evaluate societal advantages and disadvantages of specific health care programs as CBAs. In the available literature, of course, there are some fine distinctions among the cost-benefit studies (which attempt to estimate all

benefits and costs in dollar terms), the cost-effectiveness studies (which attempt to measure all monetary costs or benefits in dollar terms and all nonmonetary costs and benefits in life-year terms), and others.

2. Present value (PV) of .95 QALY each for the first 50 years (17.343) added to the PV of .85 QALY each for the last 20 years (.923) the discount rate is 5% per year.

3. Present value (PV) of \$100 per year for 35 years (1637.42) plus the PV of \$500 per year for the next 25 years (1277.55) plus the PV of \$3000 per year for the last 10 years (1240.16).

4. PV of a flow of 0.5 QALY each for 70 years.

5. PV of \$5000 (nursing home care cost) per year for 70 years.

6. PV of \$6000 per year from year 21 to year 40 (\$28,181.16) plus the PV of \$10,000 per year from years 41 to 65 (\$20,019.84).

7. One-fourth of \$48,201.

8. The \$7,500,000 cost of prescription plus the \$40,304,761 health care cost during extended life years for 9700 babies.

9. 18.27 discounted QALYs multiplied by 9700 babies saved by Drug C.

10. 47,804,761 divided by 177,219.

11. \$48,201 times 9700.

REFERENCES

- BARLOW, R. (1969) "The economic effects of malaria eradication." Research Series 5. Bureau of Public Health Economics. Ann Arbor: University of Michigan.
- JOGLEKAR, P. (1980) "Cost-benefit studies of health care programs: choosing methods for desired results." Washington, DC: TIMS, ORSA. (forthcoming in *Evaluation & the Health Professions*)
- (1979) "Cost-benefits of health programs: a review of methodologies." New Orleans: TIMS, ORSA.
- RIDDIOUGH, M. (1978) "Cost-effectiveness analysis of vaccination." Washington, DC: Office of Technology Assessment. (unpublished)
- WEINSTEIN, M. C., and W. B. STASON (1977) "Foundations of cost-effectiveness analysis for health and medical practices." *New England J. of Medicine* 296, 13: 716-721.