Prologue: One of the central choices of ours or any time, in health as in other areas, is finding the proper balance between individual and collective responsibility. Striking a balance between these two poles is clearly one of the challenges facing health education and promotion—American style. Throughout his distinguished career, Fuchs has taken pains to point out in simple, understandable terms the necessity to make choices. Indeed, in the health sphere Fuchs believes that perhaps the overriding challenge is to determine how to allocate scarce resources so as to best satisfy human wants. But the challenge involves more than money. As Fuchs noted a decade ago in his compelling book, Who Shall Live?, “The notion that we can spend our way to better health is a vast oversimplification. At present there is very little that medical care can do for a lung that has been damaged by smoking, or for a liver that has been scarred by too much alcohol, or for a skull that has been crushed in a motor accident.” Fuchs is a well-respected economist at Stanford University and a leading figure at the National Bureau of Economic Research. In this paper, he explores questions that must be answered before rational priorities are set in health education and promotion. The questions, which face both an individual trying to decide between giving up an unhealthy habit or taking his or her chances or a government crafting a prevention budget, include the cost of any given intervention and the relationship between the intervention and the result of its use. Take cigarette smoking, as Fuchs does. He doubts whether the primary obstacle to the elimination of smoking is the broad-based tobacco lobby. “This dirty, noxious, expensive habit persists mainly because people enjoy smoking,” says Fuchs, pointing out that it reflects on the part of people who partake an eschewing of risk for the pleasure of a puff.
Most health experts today agree that diet, exercise, cigarette smoking, and other aspects of personal behavior are major determinants of morbidity and mortality. Many experts also agree that health education and promotion can result in modification of these behaviors. A key task in the field of public health is to identify those interventions and behavioral changes that can yield the greatest payoff.

The magnitude of this task is readily evident in Promoting Health/Preventing Disease, a publication of the Department of Health and Human Services. This comprehensive document, a follow-up to Healthy People, identifies fifteen major health areas that need attention and provides a rich menu of possible interventions to improve health. It is, however, extremely circumspect in choosing areas and interventions. For each health problem, it lists a large number of possible programs of education and promotion (as well as treatment), but it is cautious about the relative merits of these programs. Such caution is readily understandable. The government officials who released Promoting Health/Preventing Disease may have been reluctant to antagonize important constituencies by designating some problems and programs as more important than others, but even an author who is free of such inhibitions is constrained by the absence of an adequate scientific base on which to build a rational set of priorities.

In this paper, therefore, I will explore questions that must be answered in order to set priorities rationally. In addition, I will discuss some of the alleged obstacles to health promotion and attempt to appraise their significance. I will conclude with a brief case study of cigarette smoking, which is one of the behaviors that most adversely affects health and one of the most important subjects of health education and promotion efforts.

Stating The Problem

At the formal level, the problem of setting priorities for health education and promotion can be viewed as an aspect of the general problem of allocating scarce resources to satisfy human wants. In short, it is a matter of choice. Some choices are made by individuals and families allocating their income to acquire market-produced goods and services and their time and energy to produce goods and services outside the market (home production). Other choices are made by government and are financed by taxes. The best mix between private and public efforts is a subproblem within this general framework.

To simplify the analysis, let us bypass the question of how much of the nation’s productive resources should be allocated to health and how much to other goals; let us assume a predetermined “health budget.” Similarly, let us bypass for the moment the question of choosing between education and promotion efforts and other interventions (diagnostic,
therapeutic, and rehabilitative) to improve health. We will return to this particular tradeoff in the latter portion of the paper. Whatever money, time, and effort are available for health education and promotion permit various possible interventions. A particular intervention, such as an anti-smoking campaign, can have multiple outcomes, such as reduction in lung cancer and reduction in emphysema. Similarly, a particular outcome, such as reduction in myocardial infarctions, can be the result of several interventions, such as increased exercise and changes in diet.

The problem is to choose the best set of interventions. To do this, we need to identify the costs of each intervention; we need to know the functional relationships between the interventions and the outcomes; and we must place a value on each outcome. Given this information, we could, in principle, allocate the scarce resources among the interventions in order to maximize the value of the outcomes.

The costs of interventions. Among the education and promotion programs that have been attempted or proposed are health courses in the schools, television programs, and home visits by family health workers. It is usually relatively easy to estimate staff salaries and fringe benefits, outlays for materials and supplies, and other direct costs of such programs. However, careful setting of priorities in the public interest will try to take account of all costs, not just those that constitute charges against the budget of the organization setting the priorities. Other kinds of costs also may be incurred by the program participants. Time costs and psychic costs, for example, are much more difficult but equally important to estimate.

Most health education programs make demands on the time of recipients. It is difficult to imagine any educational effort that does not require time input on the part of the person to be educated. Failure to take account of the value of time will result in an underestimation of the overall cost of health education. This failure will also bias choices among programs, and, other things being equal, will result in an underallocation of resources to programs that are less time intensive. How shall time be valued? Cost/benefit analyses of transportation programs and evaluations of other service activities also confront this problem, but no method of evaluation has been universally accepted. Some analysts consider the value of time equal to the value of the foregone wage—what the individual could have earned if he or she had worked during that time. Others argue that time is worth only a fraction of the wage, if, for example, people would rather spend their time in health education than at work, or if the individual has no opportunity to use the time in question for work.

Consider an intervention such as the 55-mile-per-hour speed limit. This limit has unquestionably reduced the number of deaths attributable to traffic accidents, apparently at low cost. One critic of the speed limit, however, argues that the cost per life saved is actually very high.
He states that the slower speeds result in 459,000 person years of additional driving time per year. He assumes that this time is worth 42 percent of the average wage, yielding a cost of $6 billion in 1977. By dividing this cost by the estimated number of lives saved per year, 4,500, he obtains an average cost per life saved of $1.3 million. Of course, this calculation does not include the value of reductions in nonfatal accidents, of savings in fuel consumption, and other possible benefits of the 55-mile-per-hour speed limit. It does, however, serve as a reminder that the cost of time is relevant to the setting of priorities among health programs.

Another type of cost that needs to be considered is the psychic cost of health promotion interventions. Consider, for instance, a prohibition on the consumption of alcohol. Let us suppose that such a prohibition would unambiguously improve the physical health of the population. Apart from large enforcement expenses and other costly effects, predictable from the experience of the United States with prohibition in the 1920s such an intervention might impose psychic costs on those who would have to forego alcohol consumption.

The relationship between interventions and outcomes. One of the biggest problems in setting priorities for health education and promotion is uncertainty about the relationship between interventions and outcomes. This problem has two major components. One is the effect of education promotion efforts on behavior. For instance, if an antismoking campaign is run on television, how many people will stop smoking, reduce their use of cigarettes, or refrain from starting? The other is the effect of changes in behavior on various measures of health. If people smoke less, will the incidence of lung cancer, heart disease, or emphysema also decrease?

The Stanford Heart Disease Prevention Project, in a three-community study, demonstrated that mass media interventions aimed at reducing cardiovascular disease led to desired changes in cigarette smoking, weight, systolic blood pressure, and other cardiovascular risk factors. The study did not attempt to measure the effect of changes in risk factors on health outcomes, but a new five-city experiment conducted by the same investigators will address that question.

The recently completed Multiple Risk Factor Intervention Trial (MRFIT) attempted to provide information about both components of the intervention-outcome relationship. The results are ambiguous. The special intervention group showed reductions in cigarette smoking, diastolic blood pressure, and plasma cholesterol that were significantly greater than those in the control group, where members received “usual care.” However, heart disease mortality and overall mortality were not significantly lower in the intervention group. In short, even a $115 million ten-year study did not provide the kind of solid information needed to set priorities in a systematic manner:

Valuation of outcomes. Knowledge of the relationships between inter-
ventions and outcomes is necessary, but not sufficient, for setting priorities. Choices must be made arbitrarily unless values are assigned to changes in health outcomes. The assignment of values to illness, disability, even life itself, is disconcerting to many health professionals. It must be recognized, however, that the act of choosing necessarily involves valuation—implicitly, if not explicitly. Viewing human life as an ultimate value does not eliminate the problem. As Isaiah Berlin has written, “The need to choose, to sacrifice some ultimate values to others, turns out to be a permanent characteristic of the human predicament.”

The task of placing a value on human life may be more acceptable with the realization that what is usually involved is not valuing a whole life directly, but valuing a change in the probability of survival. For instance, suppose we know with certainty that out of a population of one million, one thousand will die of a given disease during a given time period. Suppose that we also know with certainty that as a result of some health promotion program, the number of deaths will fall to 500; that is, the probability of death for an individual would be reduced from 1/1,000 to 1/2,000. How much is that reduction worth? Unless a value can be agreed upon, it is impossible to know whether the intervention should be undertaken, or whether the resources required could be more fruitfully used in some other way.

To derive such values, economists have used two principal methods: “discounted future earnings” and “willingness to pay.” The discounted future earnings approach values an intervention that postpones a death from age thirty to age seventy as the sum of the earnings of the individual from thirty to seventy, all discounted back to the time of the intervention. A discount rate must be applied to future benefits (and future costs) to obtain their present value because an investment of resources today is warranted only if it can show a positive rate of return. At a 4 percent per annum rate of discount, a benefit of $10,000 eighteen years from now would justify a present cost of no more than $5,000.

This approach raises several thorny questions. One involves the most appropriate rate of time discount. The choice of a high rate favors interventions that promise a quick payoff (for example, immunization against a lethal disease); conversely, the choice of a low rate favors interventions with long-term benefits (for example, modification of diet).

One way of choosing a rate is to use the rate at which individuals lend and borrow money in private markets. These rates typically include a component that reflects expected inflation and sometimes also reflects risk of nonpayment. The rate should exclude the inflation component if costs and benefits are projected in “real” terms and, according to many analysts, also should exclude the risk component.

Some analysts argue that the private rate is higher than is appropriate for collective decisions through government. I disagree. If I base my pri-
vate choices on a discount rate of 6 percent per annum, I would not want my tax money to support programs that are justified only at 3 percent. Indeed, I believe a government that used a rate much below the rate that constituents thought appropriate for their own actions would soon be voted out of office.

In attempting to estimate the private rate, analysts must also contend with the fact that the rate paid by borrowers is higher than the net rate received by lenders because of taxes. The borrower’s rate presumably influences private decisions about investment, while the lenders’ rate influences consumer choices between saving and spending. The “social” rate—the one used for decisionmaking about public programs—probably should fall somewhere in between.

Another question is whether the value placed on lives should vary according to the prospective earnings of different categories of individuals. For instance, should programs that save the lives of men be valued more highly than those that affect women? Should programs that address the health problems of the well educated be valued more highly than those that affect people with less schooling? Most analysts answer this question in the negative, with one exception. Implicit in the discounted future earnings approach is a consensus that programs that postpone death for young people are more valuable than those that postpone death for old people, other things being equal. Figure 1 shows some typical value of life-age profiles based on discounted future earnings.

Many economists are critical of the discounted future earnings approach; they point out that we do not use it to value other goods and services in the economy. A value of life measure based on “willingness to pay” would rest on stronger theoretical grounds, but it is extremely difficult to obtain reliable empirical estimates based on this approach. Two estimates of the value of life inferred from wage premiums paid to workers in risky jobs differed by a factor of five. One estimate is $200,000, approximately the same figure that could be obtained from a discounted future earnings approach; the other is $1 million or more.

It may be argued that in choosing among interventions the actual value of life is not important, provided that it is calculated in the same way for all programs. There is at least one problem with that argument, however. Programs usually have other outcomes (for example, reductions in morbidity, disability, and pain) in addition to their effects on probability of survival. The importance of these outcomes relative to reduced mortality varies from program to program. Thus, if value of life is overestimated, programs that result primarily in reduced morbidity and disability will be underfunded; if value of life is underestimated, these programs will be overfunded.
Obstacles To Health Education And Promotion

The literature on health education and promotion is replete with complaints about the alleged obstacles to more interventions of this type. The whipping boys include health insurance companies, “business interests” such as tobacco growers, the “irrationality” of the public; and fee-for-service reimbursement of physicians. In my view, these explanations do not stand up to close scrutiny, although other considerations, such as time preference and uncertainty, do pose major obstacles to health promotion.

Health insurance. According to the conventional wisdom among those interested in health promotion, preventive care is “underfinanced.” Breslow and Somers, for instance, assert that “virtually all health insurance discriminates against preventive services, both public and private.” They say that “health insurance carriers and programs must be persuaded or mandated to provide coverage for at least a substantial portion of preventive services.”

*Based on discounted future earnings.
In fact, the case is not so open and shut as they suggest. First, to the extent that preventive services demonstrably “pay for themselves” by reducing expenditures for curative health care, health insurance companies have considerable incentive to cover such services. To be sure, a particular insurance company will suffer some “leakage” of benefits if the recipients of the preventive services are not still covered by that company during the payoff period of lower utilization of health care. In many situations, however, this problem by itself is not likely to deter insurers from covering preventive measures.

More importantly, expenditures for preventive services are largely predictable for the individual. For this reason, they are ill-suited for coverage under insurance. The principal purpose of insurance is to protect beneficiaries against unpredictable expenditures, especially expenditures that are large relative to income. It makes no more sense to provide insurance coverage for preventive health services than for shoes, haircuts, or similar items in the budget. (The same argument applies to “first dollar” coverage for ordinary medical expenses. The standard “risk aversion” principle that creates a demand for insurance against large losses does not really account for the popularity of such insurance.)

Preventive services are not expensive. In 1977, Breslow and Somers estimated that their “lifetime health-monitoring program” would have cost about $15 per capita in 1975, hardly a staggering sum. But it is well known that every insurance policy, either private or public, must raise more in premiums or taxes than it pays in benefits because of administrative costs. Thus, in order to obtain $15 worth of preventive services each year, the average person would probably have had to pay $20 or more per year in premiums or taxes. Even if employers nominally pay the additional premiums or taxes, individuals ultimately bear the costs in foregone earnings, lower benefits in some other area, or higher prices. Thus, consumers are understandably reluctant to pay an extra premium to “insure” against a small, predictable expense.

Although there may be an arguable case for subsidizing or even making compulsory preventive services (for example, immunization for a communicable disease) that provide significant external benefits for others, mandating insurance coverage is not likely to be the most effective way of making sure that everyone gets immunized.

At bottom, the case for mandatory insurance coverage of preventive services must rest on an appeal to paternalism. Suppose individuals neither wish to buy these services voluntarily, nor seek insurance policies that cover such expenditures. If they can be forced to take policies that have such coverage, some will be induced to receive the preventive services. The real issue is not finance, but the degree of reliance on voluntary behavior vs. compulsion.

“Business” interests. According to health promotion advocates, one of
the biggest obstacles to better health is the baneful influence of “business” interests as epitomized by the growers and processors of tobacco. I have no desire to defend tobacco farmers, tobacco subsidies, or cigarette manufacturers, but I doubt that they are the primary obstacle to the elimination of cigarette smoking.

This dirty, noxious, expensive habit persists mainly because many people enjoy smoking. Tobacco use plagued the world long before Madison Avenue existed. King James I of England found that even the death penalty could not eliminate tobacco consumption. The contemporary People’s Republic of China has done many wonderful things to improve the health of the population, but it has not attempted to stop the production and distribution of cigarettes—and clearly not because of private business interests.

The “irrational” public. It has frequently been observed (and lamented) that people acting individually or collectively are willing to spend much more to treat an illness than to prevent it. Such behavior is often characterized as “irrational” and “inefficient.”

These characterizations would be justified if the goal of individuals were to maximize life expectancy for any given level of expenditure. It is more plausible, however, to assume that their goal is to maximize utility, and under that assumption so-called irrational behavior could be quite rational. The amount that individuals are willing to pay for a glass of water, for example, undoubtedly depends on how thirsty they are. Other things being equal, willingness to pay varies directly with thirst. Similarly, willingness to pay for a given change in the probability of survival (for example, an increase of .05) probably varies directly with the individual’s proximity to death. For instance, if an individual is very sick (let us say the probability of survival is .05), it may be worth a great deal to raise the probability to .10 through some form of treatment (the chance of survival is doubled). On the other hand, if the individual’s probability of survival is .90, he is unlikely to value as highly a preventive service that will raise it to .95.

In short, when people are healthy they are not eager to spend money to become even healthier, but when they are sick, and especially when they are facing death, they are willing to spend a good deal for even a small chance of improvement.

Fee-for-service reimbursement. Fee-for-service reimbursement has long been blamed for the failure of physicians to emphasize health education and disease prevention. In its crudest form, the argument runs that because physicians make money when their patients are sick, they do not pay enough attention to keeping their patients well. As one who has long advocated capitation methods of reimbursement, I am not about to enter a blanket defense for fee-for-service medicine, but it seems to me that this particular criticism is far off the mark. In the first place, if physicians
were motivated only by financial rewards, it would be relatively simple to induce them to emphasize health education and promotion by paying them to do so. In fact, neither private patients nor private insurers nor government are willing to pay as readily or as handsomely for prevention as for treatment. Where they are willing to pay, such services are forthcoming.

Secondly, medical care systems that are not based on fee-for-service, such as those in England and the Soviet Union, place no greater emphasis on health education and promotion than the United States. Even within the United States, a comparison of a large, well-established, prepaid group practice with a large fee-for-service group practice has revealed that the patients in the latter system actually received more preventive services.\(^{10}\)

Finally, fee-for-service reimbursement is even more widespread for dentists than for physicians, but dentists have long been advocates of fluoridation, preventive care at home, and other measures that help preserve dental health. Fee-for-service is not the explanation. More relevant obstacles may be time preference and uncertainty.

**Time preference.** Health promotion typically involves incurring a current cost in exchange for the chance of some future benefit. In my opinion, this difference in the timing of costs and benefits constitutes one of the major obstacles to more health promotion and disease prevention. If individuals had very low rates of time discount—if they valued future benefits almost as highly as current ones—health promotion might fare better. But many individuals seem to have high rates of time discount, paying high interest charges for installment credit, personal loans, and the like. Compound interest is a powerful phenomenon. Consider a benefit that will materialize in twenty years. If the value of that benefit is $10,000 (in dollars of constant purchasing power), at a discount rate of 7 percent its present value is only $2,500. At a discount rate of 11 percent, its present value is only $1,250. Thus one important consideration in setting priorities for health education and promotion is to choose programs that yield benefits fairly soon after the costs are incurred.

**Uncertainty.** Future benefits promised by health promotion efforts are, for the individual, usually highly uncertain. We may know that on average nonsmokers will be less likely to get lung cancer than will smokers, but not all smokers get lung cancer, and not all nonsmokers escape lung cancer. Giving up smoking thus involves incurring a known cost (for example, nicotine withdrawal or the foregone pleasure of smoking) in exchange for an uncertain benefit. Psychologists Kahnemann and Tversky have shown that most people are risk averse with respect to gains and risk preferring with respect to losses.\(^{11}\) That is, if offered a choice between a guaranteed gain of, say, $500, and an equivalent gamble—a 50 percent chance of getting $1,000 and a 50 percent chance of getting...
nothing—most people choose the sure $500.

A good way to increase acceptance of health promotion efforts would be to reduce the uncertainty surrounding the benefits. One of the objectives of research should be enabling health experts to pinpoint with greater accuracy who will get what benefit from any given intervention.

Cigarette Smoking—A Case Study

If one were to poll health experts for their judgment concerning the highest priority area in education and promotion, it is likely that cigarette smoking would be the most frequent response by a considerable margin. Sir George Godber, for instance, has written, “The abolition of smoking would within a short time produce the largest reduction in morbidity and premature mortality that could result from any health-promoting activity open to us.”

A recent survey of practicing physicians reported that 93 percent regarded the elimination of cigarette smoking as “very important” to the average person. No other behavior was rated as very important by more than 70 percent of the physicians, and most behaviors did not achieve even a 50 percent positive response.

This widespread opposition to cigarette smoking among physicians largely stems from the very strong circumstantial evidence that links cigarette smoking to lung cancer, heart disease, respiratory diseases, and other health problems. Many of these problems affect people at ages when they would normally be highly active and productive. Implicitly, if not explicitly, society is more interested in preventing a death at age fifty-five than at age seventy-five. The difference in number of deaths between smokers and nonsmokers is particularly large between fifty and sixty-five, as Table 1 shows. This, however, also illustrates how time preference and uncertainty pose obstacles to antismoking efforts.

Consider the situation of a male smoker age thirty-five. For simplicity, let us assume that the benefit he will derive from giving up smoking will

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<td>Smokers, 1,000 males age 35</td>
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\textsuperscript{a}Death rates were standardized using the 1965-1970 life insurance Male Basic Table; they are appreciably lower than the rates in the U.S. Life Tables.

consist of the lower probability of death shown in Table 1. (He will undoubtedly receive some immediate benefits as well, such as better breath and more wind. This discussion illustrates a general principle; it is not intended to be a complete evaluation of smoking cessation.) In the years between thirty-five and fifty, this benefit is relatively small; not smoking increases his probability of survival from .945 to .982. He will not realize the greatest benefit for fifteen to thirty years after he stops smoking. If he has a high rate of time discount, the current value of that benefit will be quite small.

Furthermore, even in the period of greatest payoff, Table 1 does not offer much certainty regarding the benefit. Between ages fifty and sixty-five most smokers (about 75 percent) will not die, while a substantial proportion of nonsmokers (about 10 percent) will die. If the individual is strongly risk-averse to gains and risk-preferring for losses (as Kahnemann and Tversky suggest), the uncertainty of its effect makes him perceive the benefit of giving up smoking as even smaller.

Some experts contend that “Simply providing information about various substances and their physiological and psychological effects usually produces no reduction in the onset of behaviors like smoking or drinking.” The aggregate statistics on cigarette smoking, however, refute this proposition. Information about the harmful effects of cigarettes on health first became available to the public in 1953 and then again in 1964; each time, releasing the information brought about substantial changes in smoking behavior. These changes also are evident in a cross-sectional multicohort analysis of smoking behavior at ages seventeen and twenty-four that showed a reduction in the probability of smoking among those cohorts who came to maturity after 1953 (see Figure 2).

This study also revealed two important aspects of the change in smoking behavior. First, the reduction in the probability of smoking varied directly and closely with education. The higher the level of schooling, the greater the reduction in the proportion who smoked. Second, the subjects differed in smoking behavior as sharply at age seventeen (when they all had completed approximately the same amount of schooling) as at age twenty-four (when they had completed different amounts). Thus, the additional years of schooling did not cause the more educated subjects to alter their smoking behavior. Differences in family background, type of school attended, and other factors probably account for both the choice to remain in school and the choice to refrain from smoking. Of course, both of these choices may be related to individual time preferences—that is, willingness or ability to incur current costs for future benefits. Schooling has long been recognized as a form of investment; decisions about cigarette smoking involve a similar tradeoff between current pleasure and future health.

**Concluding comments.** This paper should not be interpreted as a
"counsel of perfection." It would be unreasonable and unwise to expect policymakers to refrain from setting priorities until all the relevant information is available. Furthermore, we should not set higher standards for proof of efficacy of preventive programs than we do for diagnostic and therapeutic interventions. Health officials must work with what they have.

This paper has attempted to provide a framework for identifying the necessary data and indicating how they can be brought to bear on the problem of allocating resources to health education and promotion. I have also tried to show why some of the favorite "whipping boys" of health promotion are not the real obstacles, and have discussed two others, time preference and uncertainty, that seem to me to merit more attention.

At a time of tight budgets for health agencies, it is becoming increasingly important to ask how tax dollars can be used most effectively to enhance the health and welfare of the population. State and local governments should look closely at the potential payoff from health education, health promotion, and similar interventions that will modify personal behavior. But they must do this in as hard-headed a fashion as possible.

Ten years ago I wrote, "The greatest potential for improving health lies in what we do and don't do for and to ourselves." My views have not changed. But I also still agree with Walter Lippman that "A rational man acting in the real world may be defined as one who decides where he will strike a balance between what he desires and what can be done. It is only in imaginary worlds that we can do whatever we wish."
NOTES