Journal of Risk and Uncertainty, 14:259–282 (1997)

Bad Deaths

CASS R. SUNSTEIN
University of Chicago Law School, Chicago, Illinois 60637

Abstract

Evidence is presented to show that people are willing to pay a premium to avoid "bad deaths"—deaths that are especially dreaded, uncontrollable, involuntarily incurred, and inequitably distributed. Public judgments of this kind help explain the demand for regulation. But some of these judgments do not justify current policies, because they stem from selective attention and confusion. Few causes of death are entirely uncontrollable or faced wholly involuntarily; the issue is not whether they can be controlled but at what cost. But three kinds of "bad deaths" deserve special attention: those imposing high externalities, those preceded by unusual pain and suffering, and those producing distributional inequity.

Key words: Value of life, safety regulation, cost-benefit analysis

JEL Classification: I1, K2

Many people think that it is best to die quickly, quietly, and in one's sleep at night. People often say they have a special fear of certain deaths, including those from cancer and AIDS. All deaths are bad. But some deaths seem worse than others.

These points have important implications for both positive and normative work about the value of life. People's beliefs about the special badness of certain deaths should have consequences for occupational choice, life style, and the demand for government regulation. If deaths from automobile accidents involve minimal suffering, and elicit relatively little public concern, manufacturers and regulators will be under correspondingly less intense pressure to make cars safe. If, by contrast, AIDS deaths, and deaths from airplane accidents, are especially adhorrent, we can predict a strong demand for AIDS prevention programs and for regulation of airlines. There are normative implications as well. If some deaths are particularly bad, government should devote additional resources to preventing them.

My purpose in this essay is to investigate the place of bad deaths in the valuation of life.[1] Much psychological work emphasizes apparent public concern with "qualitative" factors aggravating certain deaths. I show how this concern helps explain some conspicuous anomalies in current government regulation. Despite its explanatory power, I conclude that the psychological evidence does not justify those anomalies, because the public concern probably depends on selective attention, mistakes, and confusions. On the other hand, I argue that four sources of public concern should play a role in regulatory policy: these involve deaths accompanied by unusual pain and suffering, deaths concentrated among socially disadvantaged groups, deaths involving especially high costs of risk avoid-

ance, and deaths that produce unusually high externalities. Further research is necessary to identify the actual sources of public judgments and to see if those judgments can survive critical scrutiny.

1. Lives and (decently livable) life years

1.1. Starting points

When government is trying to maximize the value of life, what, exactly, should it be maximizing? Any answer should meet two constraints. First, it should be acceptable from the theoretical point of view. Second, it should be administrable, that is, it should be something that real-world officials can actually use. The two constraints are mutually checking. A practically useful answer might be indefensible from the standpoint of theory. A theoretically appealing answer might be rejected because it is too complex or unwieldy, because it imposes unrealistic informational demands on government, or because it is an invitation to interest-group struggle. Any judgment about what government should maximize might also attempt to be minimally contentious, that is, it might attempt to put to one side the largest theoretical disputes and to attract support from widely divergent starting-points. A degree of philosophical parsimony, achieved through bracketing large-scale controversies, would be promising if it is possible (see Sunstein, 1996).

In recent years many observers and some regulators, seeking a practical answer to the question what they should maximize, have focussed on numbers of lives saved (Breyer, 1993). They decide how to proceed largely by exploring the aggregate number of deaths to be prevented by a regulatory initiative. This is a promising start. But it is increasingly recognized that the idea of "lives saved" has considerable crudeness as the regulatory maximand. Of course no program "saves lives"; at best it extends them. Other things being equal, a regulation that "saves" 100 children seems better than one that "saves" 110 elderly people, because it saves more years of life. Thus, for example, the recent EPA regulation of particulates extends the lives of a large number of terminally ill elderly people by a short period; the resulting modest gains should not be valued at the same rate as any lives "saved." And if government has a choice between preserving lives in a way that ensures decently livable years and preserving lives in a way that ensures a barely functional and extremely painful continued existence, it should do the former. The influential notion of quality-adjusted life years (Zeckhauser and Shepherd, 1976) (QALYs) is intended to account for these judgments, by suggesting that government should pay attention not to the number of lives saved but to both the number and the quality of years saved. People in fact trade off the quantity of life for the quality of life, and vice-versa; it seems reasonable to say that government should do the same in allocating resources.

The use of QALYs is controversial, partly because of the difficulty of deciding how much to count a qualitatively impaired life, and a wide range of variations can be imagined on the basic notion, to be evaluated by examining both theoretical appeal and administrability. It may, for example, be better to extend a life from five to twenty-five years than to extend one from sixty to eighty-five years. Perhaps officials should start with

a notion of "decently livable life years," which is designed to bypass some of the more controversial questions and to set a floor of basic functional capacity, above which each life-year saved should count for no less and no more than one (Sunstein, 1997).

For present purposes let us put to one side the associated controversies and begin with the simple suggestion that government should attend to life-years rather than lives, and make adjustments in that figure when the lives saved either contain severe health impairments or fall below a certain floor. Thus it would be necessary to see what causes of death are most common and to devote resources to addressing the most common causes. (On causes of death, see Appendix A.) The question then becomes how the resulting judgments might be affected if we attend to the perceived fact that some deaths are especially bad.

1.2. Different deaths, different preferences and judgments

There is considerable evidence that when voting, responding to questions, or engaging in market behavior, people evaluate different deaths differently. On this there seems to be general agreement. I summarize some of the relevant evidence here.

1. Government performance. A recent study of different life-saving interventions on the part of government shows dramatic disparities in expenditures per life-year saved (Tengs et al., 1996). Thus the median intervention in the transportation sector costs $56,000/life year, whereas the median in the occupational sector is $350,000/life year. If the occupational interventions are divided into those that prevent fatal injuries and those that involve control of toxic substances, the medians are even more strikingly different: $68,000/life year versus $1,400,000/life year. Agency performance reflects the dramatically different degrees of attention given to different deaths. For the Federal Aviation Administration, the median cost is $23,000/life year; for the Consumer Product Safety Commission, $68,000/life year; for the National Highway Traffic Safety Administration, $78,000/life year; for the Occupational Safety and Health Administration, $88,000/life year; and for the Environmental Protection Agency, no less than $7,600,000/life year.

These numbers are highly suggestive. They fit with both ordinary intuition and psychological studies insofar as they show special concern with cancer-causing substances, especially in the workplace and in air and water. To be sure, the numbers should not be taken to reveal people's actual valuations of different kinds of death. Government policy may well reflect interest-group power, media sensationalism, ignorance, error-producing heuristics, or other factors bearing an imperfect connection with actual preferences and values. Perhaps more interestingly, government policy may be affected by the length of time between learning of the relevant disease and the time of death. If, for example, people with cancer or AIDS have a long period of life with the disease, it is predictable that they will lobby hard for government help. In any case it is certainly revealing that sudden unanticipated deaths (typically produced by car and airplane crashes) receive far less attention than cancer-related risks, which are frequently involved in the work of OSHA and the EPA.

2. Survey data. There is substantial evidence that people perceive certain hazards as worse than others. Several studies indicate, even if they do not prove, that people are especially averse to some deaths. A recent study (Savage, 1993) concludes that people are willing to pay significantly more to contribute to lower the risks of cancer than they are willing to contribute to lower the risks posed by automobile accidents, home fires, and aviation. In terms of willingness to pay, cancer ranks first, followed in order by automobile accidents, home fires, and aviation. (As noted above, government expenditures per life year saved correlate with these findings.)

A national survey in England offers evidence on how people compare deaths from cancer, heart disease, and motor vehicle accidents (Jones-Lee, Hammerton, and Philips, 1985). Respondents were asked whether they would prefer to save 100 lives from one or another of these three causes. Nearly three-quarters of people ranked a cancer death as worse than a death from heart disease or motor vehicle accidents. The authors conclude that people "would be willing to pay very substantial sums to avoid the protracted period of physical and psychological pain prior to cancer death" (id., p. 68). These findings have been taken to show that people are willing to pay nearly twice as much to reduce heart disease deaths as motor vehicle deaths, and that they are willing to pay nearly three times as much to prevent a death from cancer as a death from motor vehicle accidents (Tolley, Kenkel, and Fabian, 1994 at 339). Consider Table 1:

Table 1. Ratings of serious conditions by cause of death

Cause of death	% Ranking disutility highest	Mean willing to pay for reduction (in millions of £)°
Motor accidents	11	7.53
Heart disease	13	13.23
Cancer	76	23.12

Using similar data, private willingness to pay to avert cancer deaths (from $1.5 million to $9.5 million) has been found to be systematically higher than private willingness to pay to avert unforeseen instant deaths (from $1 million to $5 million). More specifically (Tolley, Kenkel, and Fabian, 1994, at 342) Table 2:

Table 2. Mortality values by cause of death

Category (per statistical life)	Value estimates, in million $, low, medium, and high		
Unforeseen instant death	1	2	5
asthma/bronchitis	1.3	2.5	5.5
heart disease	1.25	2.75	6
emphysema	1.4	3.5	9
lung cancer	1.5	4	9.5

These findings strongly suggest that people view some deaths as worse than others, but for purposes of both positive and normative work, they should be taken with many grains of salt. It is not clear that people in good health have adequate information from which to

assess deaths from diverse causes. The notion of a "cancer death" may produce irrational and ill-considered fear, perhaps because people call to mind especially stressful periods of pain and suffering that are not representative, or because those incidents may assume undue salience (dwarfing the very fact of death itself) when the relevant question is asked. I return to these points below.

A study of 1,000 randomly chosen American citizens showed related results (Cropper & Subramanian, 1995). The study revealed significant differences in peoples' preferences among programs that would save exactly the same number of lives at exactly the same cost. Thus 55% of respondents chose a program controlling industrial air pollution over one involving smoking education; 54% chose a program reducing water pollution over one involving colon cancer screening; 54% chose one controlling auto emissions over one involving colon cancer screening; 63% chose one involving industrial air pollution over one involving pneumonia vaccination; 65% chose a smoking ban in the workplace over controls on radon in homes; and 72% chosen a program banning pesticides in fruit over one regulating radon in homes. A pattern emerges from these choices. Important variables in the disparity were the ease with which the risk can be avoided and the extent to which beneficiaries of the program were to blame for their deaths.

I conducted a survey (see Appendix B) of 116 University of Chicago law students, designed to obtain further information on "risk-risk tradeoffs."[2] Students were asked how many heart attack deaths would equal 100 deaths saved from cancer. Sixty-three students answered 100; seven answered less than 100; forty-eight, or 40.2%, answered more than 100. Students were also asked how many deaths from airplane crashes would equal 100 deaths saved from cancer. Fifty-students, or 44.4%, answered 100. Thirty-two, or 27.4%, answered less than 100. Thirty-four, or 27.2%, answered more than 100.

Students were also asked to choose among a set of policy options involving how to allocate $100 million among various life-saving "policy options." The first policy option would involve spending the entire sum on AIDS-related policies, for a total saving of 120 lives. The second option involved spending the entire sum on smoking-related policies, for a total saving of 200 lives (this was by a significant margin the best policy in terms of total lives saved and cost per life saved). The third option involved $50 million for AIDS-related policies and $50 million for antismoking policies, for a total estimated savings of 160 lives. The fourth option was a mixture: $20 million on AIDS-related policies, $25 million on antismoking policies, $20 million on airport security, and $10 million on nuclear power plant inspections, for a total saving of 79.5 lives. The fifth option involved $50 million for preventing lead ingestion by children in the inner city and $50 million on smoking policies, for estimated savings of 150 lives. The last option involved $50 million for preventing lead ingestion and $50 million for AIDS policies, for estimated savings of 110 lives. Here are the results:

Respondents were asked, finally, about whether to chlorinate drinking water. They were told that chlorination can cause a small cancer risk, but that it also can prevent acute gastrointestinal illness, which can also be fatal. They were asked whether to chlorinate the water if the lifetime fatality risks were the same. Thirty-nine percent said yes, 29.7% said

Table 3.

policy option	lives saved/cost	first choice	second choice	weighted ranking of options	last choice
AIDS prevention	120/$100 million	1 (.8%)	7 (5.9%)	6	23 (19.5%)
smoking prevention	200/$100 million	25 (21.2%)	7 (5.9%)	4	15 (12.7%)
AIDS and smoking	160/$50 million on each	24 (20.3%)	42 (35.6%)	1	7 (5.9%)
AIDS, smoking, airport security, nuclear power plant inspections	79.5/$20 million on AIDS, $25 million on smoking, $20 million on airport security, $10 million on plant inspection	22 (18.6%)	17 (14.4%)	5	51 (43.2%)
lead ingestion/smoking	150/$50 million on each	32 (27.1%)	20 (16.9%)	2	16 (13.6%)
lead ingestion/AIDS	110/$50 million on each	14 (11.9%)	24 (20.3%)	3	6 (5.1%)

no, and 30.5% had no preference. They were also asked about many deaths from microbial illness would equal 100 deaths from cancer. Of the 116 respondents, 56, or 47.5%, said 100; 31, or 25.4%, said more than 100; exactly the same number said less than 100.

There are several notable features of this study. First is the fact that substantial numbers of respondents thought that cancer deaths were worse than heart attacks; substantial numbers of respondents said the same thing for airplane deaths. But many respondents also thought that airplane deaths were worse than cancer deaths. Thus while cancer deaths were disfavored compared to heart attack deaths, there was no general preference as between airplane and cancer deaths. This may be because airplane deaths seem more terrifying; it may be because airplane deaths seem more likely to befall and more tangible to the respondents themselves (most of whom were in their twenties); it may be because cancer deaths and heart attack deaths involve, on average, older people, and thus more life-years can be saved by saving people from airplane deaths; it may be because heart attack and cancer deaths seem more voluntary and controllable.

Perhaps the most striking finding of the "policy options" study is that only about a quarter of students chose the option that would save the most lives. Lives saved was not even a primary factor in choice. Surprisingly, the correlation between the lives saved number and the mean rating for each policy is only 0.512, that is, lives saved explains only about 25% of the variance in mean ratings. A correlation between lives saved and each subject's rating for the policy was small, at 0.159, which means that only 2.5% of the variance in individual subject responses can be explained by reference to lives saved.

It is also interesting to find a general conclusion that addressing two problems by half is better than curing only one problem in full—accompanied by a judgment that addressing too many problems at small fractions each (spreading too thin) is worse still. AIDS policies were perceived as important, but less important than smoking, and apparently are most attractive only in conjunction with some other problem. The most popular option—combining saving children in the inner city and would-be smokers—may have been well-regarded because it involved a large number of life-years and also reflected distributional considerations. AIDS-related policies were in one sense a distinctly unpopular option, as can be seen from the fact that only one respondent favored an AIDS-only choice (though this choice was pretty good in terms of aggregate lives saved and also life-years saved) and the fact that the inner city children plus AIDS policies option did much worse, as first choice, that the inner city children plus smoking policies option. On the other hand, the "lowest lives" option was also the most frequently cited *last* choice, and option five received significant support as a second choice. There is a great deal of "noise" in the study, however, and because many variables change across the comparisons, it would be hazardous to say what factors actually accounted for choice. Here much room remains for further work.

From this discussion a general conclusion emerges. Much existing evidence suggests that people view some deaths as especially bad and that people are willing to do and pay a nontrivial amount to avoid such deaths. These judgments appear to help account for current disparities in expenditures per life-year saved. But the actual grounds for these judgments remain unclear, and it is also unclear whether those grounds, once identified, can survive scrutiny. A great deal of positive and normative work remains to be done. With that qualification, let us proceed to examine some of the underlying questions.

2. Positive accounts: Lay vs. expert judgments, selective attention, and contextual cues

In identifying what makes certain deaths seem especially bad, a natural place to look is in the psychological literature showing variations between lay and expert judgments of risk. Some of these variations stem from heuristic devices that make ordinary people peculiarly prone to factual error. But some of these variations (it is widely said) come from the wide range of variables that ordinary people think relevant in assessing risks to life and health (see, e.g., Slovic, 1991). Experts tend to focus on aggregate lives or life-years at stake. Ordinary people—on the now-conventional account—look at a range of more qualitative variables. They care not simply about number of lives at risk but also about whether the risk is equitably distributed, potentially catastrophic, controllable, voluntarily incurred, and so forth. Here is a representative compilation (developed from the summary in Margolis, 1996):

At this stage it is not clear whether and to what extent these factors actually account for judgment and choice; the psychological work should be seen as suggestive hypotheses rather than as demonstrations. Moreover, it is readily apparent that some of these factors

Table 4.

	aggravating	mitigating
familiarity	new	old
personal control	uncontrollable	controllable
voluntariness	involuntary	voluntary
media attention	focussed on by media	ignored by media
equity	unfairly distributed	fairly distributed
children	children at special risk	children not at risk
future generations	at risk	not at risk
reversibility	irreversible	reversible
dreadedness	especially dreaded	not especially dreaded
identifiability of victims	victims known	victims not identifiable
accompanying benefits	benefits clear	benefits not visible
human or natural origin	human origin	created by nature
trust in applicable institutions	lack of trust	good deal of trust
timing of effects	delayed	immediate
understanding	mechanisms or process not understood	mechanism or process understood
past history	major or minor accidents	no past accidents

are not helpful in suggesting which deaths should be treated as especially bad. On the contrary, many of them are easily accounted for under the "decently livable life years saved" criterion. Media attention, for example, is closely connected with the well-known availability heuristic, and the fact that the media are focussed on a certain risk does not suggest that government should give that risk special attention too. Past history should be similarly understood; it is a rough proxy for future probability, not a reliable guide to the future. So too with trust. If people do not trust an institution's assurances, they are thinking that the risk is more serious than they are being told. And if children and future generations are at risk, more life years are at stake.

But some of these factors do suggest reasons why people might see some deaths as worthy of more attention than others. Deaths that are particularly "dreaded" may have aggravating characteristics; deaths that are concentrated among socially disadvantaged groups might be bad not because they are distinctly bad to experience, but because they reflect perceived distributional injustices that policymakers might try to counteract. The notions of voluntariness and control may also be relevant insofar as they suggest that some deaths are accompanied by terror, or are especially poignant or disturbing and therefore deserving of unusual public concern.

There is, however, reason to question the now-conventional view that qualitative factors of this kind in fact explain people's disagreement with experts about certain risks of death (see the instructive discussion in Margolis, 1996, on which I draw here). Certainly it is puzzling to find that people treat as quite serious death-risks that are microscopically small as a statistical matter, while risks that are statistically much larger are treated as "just a part of life." No doubt it is *possible* that people's judgments about risk severity are a product of some of the more qualitative considerations listed above; this idea leads to the widespread view that ordinary people have a "richer" rationality than do experts, since ordinary people look at the nature and causes of death, not simply at aggregate deaths at

issue. But it is also possible that an apparently "rich" conclusion that a certain risk is severe, or not severe, depends not on well-considered judgments of value, but instead on an absence of ordinary contextual cues, on a failure to see that tradeoffs are inevitably being made, on heuristic devices that are not well-adapted to the particular context, or instead on a range of confusing or confused ideas that people cannot fully articulate. When people say, for example, that the risk of nuclear power is very serious, they may be responding to their intense visceral concern, possibly based on (uninformed) statistical judgments about likely lives at risk and on their failure to see (as they do in other contexts) that that risk is accompanied by a range of social benefits. The fact that nuclear power, and application of pesticides, produce benefits as well as risks may not "register" on the lay viewscreen, and this may help produce a "high risk" judgment (see Alhakami and Slovic, 1994).

Consider some other examples. It is clear that the risk of cancer death from the use of X-ray technology does not now produce an intense public outcry, perhaps because people know that the technology contains benefits as well; thus it is false to say that cancer-related risks always produce intense public concern. For automobile accidents, similarly, people's uninformed statistical judgments may not lead to overestimates of risk or to visceral judgments of great concern, partly because people are well aware that automobile travel produces high benefits as well as costs. Thus it is possible that a judgment that a certain risk of death is unusually bad is not a "rich" qualitative assessment but an (unreliable) intuition based on a rapid balancing that prominently includes perceived lives at stake and the perceived presence of small or no benefits associated with the risk-producing activity. When, for example, nuclear power "codes" as a serious risk, this may be because the benefits are off the viewscreen, and the potential for catastrophe looms large, perhaps because of heuristic devices (such as availability). And when people are asked to say why they believe that some risk is especially bad, their answers may not be truly explanatory, but instead post hoc rationalizations of more visceral judgments (based partly on faulty quantitative assessments). In other words, the reasons given may not actually lie behind the judgments; people are not always good at giving accounts of what underlies their judgments (Margolis, 1996).

All this raises the possibility that people's references to "control" and "involuntariness" do not explain the actual basis of their judgments. This possibility remains to be investigated and tested. For the moment let us put this issue to one side and assume that the psychological evidence does suggest that certain risks are perceived as bad very much for the more qualitative reasons that are typically invoked. The important question is which of them justifies a qualification of the basic criterion of decently livable life-years.

3. Normative issues

By itself the fact that people perceive certain risks and deaths as especially bad should not be decisive for purposes of policy. Suppose, for example, that ordinary judgments stem from heuristic devices that produce predictable factual mistakes, so that both private

behavior and the demand for regulatory protection are affected. Certainly government should not incorporate judgments based on mistakes—a point that raises doubts about some uses of willingness to pay as a basis for regulatory policy. To the extent that WTP is a function of factual errors, government should not rely on it. The appropriate remedy is inform people of relevant facts. This general point suggests that it is important to examine not simply what deaths people especially abhor, but also *why* those deaths are abhorrent, and whether the underlying reasons can survive scrutiny. The American political system aspires to be a deliberative democracy, in which citizen preferences are supposed to be subject to a process of reflection. They are not to be automatically translated into law (Sunstein, 1993; Bessette, 1996).

Thus the question becomes whether citizen judgments that certain deaths are especially bad can survive a process of reflection. My conclusion is that understood in a certain way, the notions of dreaded deaths and unfairly distributed deaths are fully reasonable, and do deserve a role in policy. But the special concerns about deaths stemming from involuntarily run and uncontrollable risks raise serious doubts; as frequently invoked, they do not justify according additional concern to deaths that "code" as a product of involuntary or uncontrollable risks. At most, they suggest that government might spend more resources on deaths where the cost of risk-avoidance is especially high, and devote less attention to deaths where the cost of risk-avoidance is especially low. Particularly interesting is a question left implicit in the psychological studies: How to handle deaths that have high externalities.

3.1. Dread

It is often said, on the basis of evidence like that outlined above, that especially dreaded deaths deserve special attention. Deaths from cancer and AIDS fall in this category. There is nothing at all mysterious to this idea. The underlying point is that the relevant deaths are especially grueling and hence there is a kind of "pain and suffering premium"—not merely a life lost, but an antecedent period of intense emotional and physical difficulty as well. This period of intense difficulty might impose costs on those with the illness and on friends and family members as well. Sudden, unanticipated deaths can be dreaded too—consider the extremely unpleasant idea of dying in an airplane crash. But the dread here stems from some factor (perhaps terror) different from and much shorter than the extended period of suffering that precedes some deaths. Thus it might be concluded that dreaded deaths deserve special attention in accordance with the degree of suffering that precedes them.

A special problem with cancer deaths is that people like to have upward-sloping utility. It is particularly bad to be in a situation in which things will constantly get worse (Loewenstein and Sicherman, 1991). With cancer deaths, the slope goes downward fairly consistently until the point of death. Since the time sequence of disutility matters a great deal, cancer deaths are associated with especially severe hedonic losses.

As reasons for according special concern to deaths preceded by pain and suffering, these ideas seem sound. But some qualifications is necessary. First, some recent work in

psychology has shown that people often fear certain risks ex ante, but when those risks come to fruition, they are able to adapt much better than they believed possible, and the utility loss is less severe than they anticipated (Loewenstein and Schkade, forthcoming; Kahneman, 1996; see also Kahneman, Wakker, and Sarim, forthcoming). Notably, people think that they will respond much more negatively to a positive result for HIV than they do in fact (see Sieff, Dawes, and Loewenstein, forthcoming). Thus people may dread certain diseases more than they "should" in the sense that the lived experience of the disease is less horrible than was thought before the fact. If true, this point makes it necessary at least to question whether ex ante fear justifies the degree of attention that uninformed people seek from government, if ex post adaptation is possible.

Second, some pain and suffering may well be an inevitable part of a desirable period in which people, including families, can plan and adapt themselves to the fact of death and achieve a measure of peace with it. On this count, a sudden unanticipated death may be worse. The desirable features of a death that is not sudden, and for which planning becomes possible, may not register when people are asked, in surveys, to compare an automobile death with a cancer death.

Third, it seems sensible to say that the period of pain and suffering that precedes death ought—in all but the most unusual cases—to be far less important, relatively speaking, than the fact of death itself. Thus something appears to have gone wrong if people say that they would like to devote (say) three times as much to preventing cancer deaths as they would like to devote to preventing deaths from automobile accidents. Perhaps they are focussing too intensely on certain vivid instances of intense suffering. Perhaps the valuation would not survive a modest degree of information and critical reflection. Perhaps the fact that the relevant scale is unbounded and in dollars produces distortions.

These points suggest the possibility of relying not on responses to survey questions, and perhaps not even on market behavior, but instead on a kind of "deliberative opinion poll" that seeks to inform answers and to allow an exchange of opinion (see Fishkin 1995). On this view, it is important not to ask people to offer their quick, likely uninformed reactions to hypothetical questions (how much worse is death from cancer than death from a heart attack?), but instead to offer underlying facts and to take account of informed answers. As noted, an extended period before death can actually contain benefits, since it allows a period for grief and adjustment. Much better responses might be expected after people are given a solid basis for assessing the relevant deaths, for making comparisons, and for putting the period that precedes death in context with the death itself.

3.2. Inequitable distribution

Some risks might be, or be thought to be, inequitably distributed, above all because the victims are disproportionately members of socially disadvantaged groups. Certain deaths might, for example, be concentrated among poor people, African-Americans, or homosexuals. Consider the risk of lead paint poisoning suffered by inner city children, or the risk of AIDS, faced disproportionately by African-Americans as well as homosexuals. Citizens or elected representatives may think that inequitably distributed risks of death

deserve special attention from government. Here the relevant deaths are bad not because each one is especially bad to experience, but because there is social concern about the fact that a certain cause of death falls disproportionately on members of certain social groups.

When such social concern exists, and when it is not objectionable on constitutional or other grounds, it is entirely legitimate for officials to respond. Thus regulators should be permitted to give *distributional weights* to risks whose distributional incidence is especially troublesome. The point supports special efforts to control AIDS; environmental risks like asthma, which are concentrated among inner city children; and perhaps the spread of diseases whose incidence is concentrated among women.

Of course this idea raises familiar issues about appropriate redistributive policies. A risk policy with distributional weights is an in-kind redistributive scheme, likely more effective than strategies of redistribution through regulation, but less effective, probably, than redistribution via cash. It is also possible that any distributional weighting will subject the political market to pressures from well-organized groups, which will predictably offer equitable arguments for their preferred outcome, perhaps at the expense of the weakest and least organized members of socieyy. Finally, it is hardly clear that in-kind benefits should *generally* be distributed in a way that benefits the less well-off. It does not seem to make sense to say that homosexuals and women, for example, should receive better transportation, better dental care, more food stamps, and better housing than heterosexuals and men. In these circumstances, public judgments about the need for distributional weights in risk regulation may neglect the possibility and even the fact that redistributive efforts are being made through other routes. My minimal claim is that if there is a public judgment in favor of according a distributional weight to a certain death-reduction policy, and if that judgment is not unconstitutional or otherwise illegitimate, policy makers should not be barred from respecting that judgment.

3.3. Voluntariness

People seem to perceive voluntarily incurred risks as less troublesome than involuntarily incurred risks. Consider diverse public reactions to airplane crashes and automobile crashes. Or consider the fact that tobacco is by far the largest source of preventable deaths in the United States. Why do we not devote much more of our regulatory effort to reducing smoking? The reason seems to lie in a judgment that smoking is a voluntary activity and hence the resulting deaths are less troublesome than other sorts of deaths. Here people have voluntarily assumed the relevant risks (there is of course a detailed literature on this general topic; see, e.g., Viscusi, 1992).

1. Puzzles: high cost of avoidance rather than involuntariness? It is tempting to think that the apparent lay preference for according greater weight to "involuntary" risks to life requires significant qualification of the criterion of lives or life-years saved. But a simple reference to voluntariness, if taken to suggest something special about "lay rationality," raises many puzzles. The most important problem is that it is not simple to know when a

risk is voluntarily incurred. "Voluntariness" may be entirely absent in the case of an unforeseeable collision with an asteroid; but voluntariness is not, in the cases under consideration, an all-or-nothing matter. Instead it is a matter of degree. Return to the conventional thought that airplane crashes are "involuntary" and automobile crashes more "voluntary." Certainly it would be possible to see the risks from air travel as voluntarily run; people have a choice about whether to fly, and when they do fly, they pay a certain amount for a certain package, including risks of various sorts. The same is true of automobile safety—and it is not in any way less true, however disparate the two kinds of risks may "seem." Perhaps people are responding to the perceived fact that they have no control over the pilot's behavior, whereas they have considerable control over automobile safety since they are themselves drivers. But airlines respond to market forces, including the market for safety, and many people injured in automobile accidents are not at fault, and thus along the dimension of voluntariness this is hardly a crisp distinction. The difference between the two risks is hardly so categorical as to justify an assessment that they fall on poles of some voluntariness-involuntariness divide. Indeed, it is not clear even what is meant by the suggestion that one is voluntary and the other is not. Something else appears to underlie that suggestion.

2. Three cases. To shed some light on the issue, let us consider three classes of cases. First, consider the question whether workers exposed to cancer risks are voluntarily or involuntarily so exposed. If workers do not know about such risks—if they lack relevant information—we seem to have an easy case of involuntariness. Thus it makes sense to say that risks are run involuntarily when the people running them do not know about them. Lack of adequate information provides a legitimate case for a judgment of involuntary exposure to risk. But of course information itself can be obtained at some cost, pecuniary or otherwise. We are thus dealing, in cases of this kind, with high costs of risk avoidance, in the distinctive form of high costs of acquiring relevant information.

Second, suppose that people who are exposed to a certain risk are aware of the risk, but are not in a contractual relation with the risk-producer. Many victims of pollution are in this position; recall that in surveys air pollution is a particular source of public concern. People in Los Angeles may well know that they face high levels of smog. Are they exposed involuntarily? If we conclude that they are, we may mean that a risk is incurred involuntarily when and in the sense that it is typically very expensive for people to avoid it—and when someone else can reduce the risks more cheaply. Here a claim that the risk is faced "involuntarily" may mean that those who "run" the risk can reduce it only at very high cost, at least compared to those who "produce" the risk. (The quotation marks are necessary for obvious Coasian reasons.) Or it is possible that we mean that on nonutilitarian grounds, the people exposed to the risk have a moral entitlement to be free from it, at least if they have not explicitly sold it.

But turn now to a third class of cases, involving a wage package or contract that does include compensation for the relevant risks. Assuming that point, we might want to distinguish between two different possibilities. In a case of a high-level scientist, knowledgeable about relevant risks and involved in work that he finds rewarding, people may well conclude that we have an instance of voluntariness. (In the same category can be found the case of an astronaut.) But people might not say the same about a low-level worker who does not like his work at all (cf. Anderson, 1993). What distinguishes the two cases? If knowledge is present, or if the compensation package includes payment for the relevant risk, it is not clear how the two differ. The underlying judgment must be that the compensation is inadequate, perhaps because background inequality has produced a wage package that seems unfair even if voluntarily chosen by the parties.

From this discussion it seems reasonable to speculate that any judgment that a risk is run "involuntarily" is probably based on 1) a lack of knowledge of the risk, or, more accurately, high costs of obtaining information about the risk, 2) a belief that information to one side, it would be very costly for people to avoid the risk, or 3) a belief that the risk is unaccompanied by compensating benefits, notwithstanding a belief that the contract is in some sense worth signing. It may seem hard to make sense of 3); what might be at work is a judgment that background inequalities are producing the relevant bargain (not by itself a good reason to disrupt the deal), or perhaps a belief that workers are competing to their collective detriment, and an agreement not to compete would be in their best interests (Frank, 1983). On this view, the question whether a risk is run voluntarily or not is often not a categorical one but instead a matter of degree, associated with information cost, risk-reduction cost, and the existence or not of accompanying benefits. Of course there are interesting background questions about why and when a risk "codes" as voluntary or involuntary; undoubtedly the answer depends a great deal on heuristic devices and selective attention.

3. The purpose for which the risk is incurred and problems of responsibility and blame. Death-risks may seem "voluntarily" run when observers do not approve of the purpose for which people run the relevant risks, and involuntarily run when observers think that the purpose for which the risk is run is laudable. It is predictable that people will not want to pour enormous taxpayer resources into lowering the risks associated with sky-diving, even if the dollars/life-years saved ratio is quite good. By contrast, it is doubtful that people think that it is wrong to spend enormous resources on the prevention of death from childbirth or being a police officer, even though the decision to have a child is (with appropriate qualifications) voluntary, and so too with the decision to become a police officer. People may think that when the appeal or purpose of the activity is associated with its very riskiness, resources should not be devoted to risk-reduction. At least this is plausible when the risk is an independent good or part of the benefit of the activity. And it is easy to imagine a belief that some activities—unsafe sex, cigarette smoking—are like the sky-diving case, perhaps because the risk is sometimes part of the benefit, perhaps because the risks are not incurred for a purpose that observers find worthy or valuable.

It might seem that this consideration—the purpose for which the risk is incurred—overlaps with or is even identical to the question whether there are high costs of risk-avoidance. When the costs are low, as in sky-diving, the purpose might seem inadequate. But on reflection the two ideas are hardly the same. It may well be that failing to sky-dive, or sky-diving with some safety-increasing technology, imposes high costs on sky-divers. There seems to be an objective judgment, not necessarily connected with subjective costs, in the claim that some risks are voluntary, or deserve less attention, because they are run for inadequate purposes.

Relatedly, airplane accidents may seem different from automobile accidents not because the former are less voluntary, and not because of higher costs of risk avoidance, but because the victims of airplane accidents are less blameworthy than the victims of automobile accidents, in the sense that the death is not a product of their own negligence or misconduct. In the case of an airplane disaster, weather conditions, mechanical failure, or pilot error are likely causes; in the case of an automobile accident, it is more likely (though not of course certain) that the victim could have avoided death through more careful driving. The point is crude, since many victims of automobile accidents are not drivers, and many drivers in accidents do not behave negligently. But the perceived difference, in a significant number of cases, may underlie an apparent judgment of "voluntariness" that is really a judgment about responsibility and blameworthiness.

4. Underlying questions and assumption of risk. We might therefore conclude that whether a risk qualifies as involuntary raises many of the questions raised by the question whether government should regulate the market at all. A risk might be characterized as involuntarily run because affected people lack relevant information; because the transactions costs of bargaining are high; because the risks should be seen to amount to externalities; because collective action problems make market outcomes unsatisfactory since (for example) workers are in a prisoner's dilemma best solved through law; or because some motivational or cognitive defect makes successful solutions through markets unlikely. These of course are among the conventional grounds for regulation in the first instance. When a risk seems voluntary, and not worthy of substantial regulatory resources, the term "voluntary" is serving as a placeholder for an argument that there is no sufficient ground for government action, because the accompanying benefits are high or the risk-reduction costs are low, and because market arrangements take adequate account of these facts.

Should voluntarily run risks of death receive no public attention, on the ground that the relevant people have already received compensation? We might imagine a death-risk to be incurred voluntarily when an informed person decided to incur it in light of its costs and benefits. Suppose, for example, that someone purchases a small car with fewer safety features, or decides to become a boxer, an astronaut, or a police officer in a dangerous neighborhood. If a death results from such a choice, it might seem that the chooser has no legitimate ground for complaint; there has been ex ante compensation for the risk. But even in such cases, it is not clear that government lacks a role. If government can reduce a serious risk at low cost, and thus eliminate deaths, it should do so even if there was ex

ante compensation for the relevant risk. There is a general point here. Sometimes observers confuse two quite different questions: (1) Should people be banned from running a certain risk, when they have run that risk voluntarily? (2) Should government attempt to reduce a certain risk, when people have run that risk voluntarily? A negative answer to question (1) does not answer question (2).

From this point we should conclude that a lay judgment that a risk is "voluntary" should not be decisive. A better understanding of what factors underlie and support that judgment should be used for purposes of regulatory policy. The basic criterion of decently livable life years might, then, be adjusted upward when those at risk lack relevant information or when the costs of risk-avoidance are especially high—or downward when those at risk have the information and when the costs of risk-avoidance are low.

3.4. Control

People find risks less acceptable if those risks do not seem to be within their control. Automobile accidents may seem less troublesome than airline disasters partly for this reason.

The perceived difference between "uncontrollable" and "controllable" deaths may stem from a desire to reduce the fear of dying. People who feel in control also feel less afraid. This feeling may be irrational, but it is not necessarily irrational to try to minimize an irrational feeling. Or the perceived difference may involve a distinctive utility loss at time of death. Perhaps a death from an airplane crash is especially horrifying because of one's feelings at the time the crash is happening. Undoubtedly some of the horror at airplane crashes has to do with empathetic identification with people in that position. Thus it would be reasonable to put a special premium on some deaths if informed people believe that the risk-reduction reduces social fear in a reasonable way, or that the terror and panic in the period preceding death deserves special attention. Empirical work would be necessary to show whether these are in fact widely held judgments.

The reference to control is probably based above all on the perceived possibility of avoiding death altogether though one's own acts. But this idea links control with voluntariness, and it should be clear from the previous discussion that the question is not whether risks can be controlled, but how expensive it is for individuals to control them. People can control their subjection to airplane-related risks by refusing to fly; people can control their subjection to risks from coal-fired power plants by living in areas served by solar energy. The question is not whether a risk can be controlled or not, but at what cost it is controllable, and with what benefits it is hard to control. Individuals tend to "frame" risk control in "all or nothing" terms, depending on the particular temporal event on which they focus. But this is an obvious form of selective attention. As with voluntariness, "controllability" is a conclusion more than it is an analytic tool. It is best to look at the factors that account for a judgment that a risk is not controllable.

3.5. High externalities, catastrophes, and "meaning"

The psychological evidence suggests, thought it does not squarely identify, an important and relevant fact: Some deaths produce unusually high externalities, in the sense that they generate widespread losses, including those stemming from empathy and fear, in a way that leads to predictable pecuniary and nonpecuniary costs (see Zeckhauser, 1996, for an illuminating discussion of catastrophes). Consider, for example, the death of the President of the United States, a death that imposes a wide range of costs and that taxpayers invest significant resources to prevent. A parallel can be found in the relatively large level of resources devoted to prevent the assassination of many important public officials. But the point is hardly limited to the highest public officials. An airplane hijacking or crash, partly because it is likely to be well-publicized, may produce large externalities in the form of empathy and fear. It may even deter air travel by making people unusually frightened of air travel, simply because of heuristic devices (availability) and other predictable factors that make people's probability assessments go awry. This fear may be damaging because it is itself a utility loss and because it may lead people to use less safe methods of transportation, such as automobiles. Or an airplane crash might be especially disturbing because the sudden loss of dozens or hundreds of people seems so unusually and senselessly tragic, in a way that produces large empathetic reactions, or because it signals the further possibility of random, apparently inexplicable events in which large numbers of people die.

Some catastrophes are especially disturbing because they appear to produce pointless and especially unnatural deaths. A recent airplane crash in Israel, killing over seventy soldiers, is an example, producing an extended period of national mourning—stemming from the youth of those who were killed, the fact that they were serving their country, and the highly unusual character of the accident, apparently stemming from preventable human error. These considerations suggest that special attention might justifiably be devoted to air safety in the time following a crash even if the relevant precautions do not cause a significant drop in deaths. The same idea may justify special safeguards of nuclear reactors. Even a minor and harmless accident may produce a kind of day-to-day fearfulness that properly places a role in an official calculus, at least if educative efforts cannot work against public fears to the extent that they are irrational or based on error-producing heuristic.

Special public concern about catastrophic events may thus reflect a judgment that certain kinds of deaths have ancillary effects, well beyond the deaths themselves. Consider in this regard the "Buffalo Creek Syndrome," documented several times in the aftermath of major disasters. Nearly two years after the collapse of a dam that left 120 dead and 4000 homeless, psychiatric researchers continued to find significant psychological and sociological changes; survivors were characterized by a loss of direction and energy, other disabling character changes, and a loss of communality (Fiorino, 1989). One evaluator attributed this loss of direction specifically to "the loss of traditional bonds of kinship and neighborliness" (Robinson et al. 1983). The non-linearity of lay evaluations of risk in the context of potential disasters may thus reflect a high premium on avoiding the distinctive kinds of losses distinctly associated with catastrophes. If so, differences between lay and

expert assessments rest on genuine value differences (four times as many deaths may be much more than four times as bad) rather than on factual errors in cognitive processes of ordinary people.

Another way to put the point is that the socially perceived "meaning" of a death, or a series of deaths, may affect and form part of public judgments about appropriate responses. Some deaths are taken to be part of life, whereas others seem disruptive and terrifying. The point follows from the fact that people are selectively fatalistic, a phenomenon that bears on the demand and supply of regulation. If the social meaning of an airline disaster is that air travel has "become unsafe," government may have an obligation to respond with special intensity, because the social perception will produce significant social losses in various spheres (including, as noted, net mortality itself, if people shift to more dangerous forms of travel). There is a separate possibility. People may think it is worse for an entire family (consisting of, say, four people) to perish than for four members of four different families to perish; in the latter case, at least some siblings and children are left. A distinctive problem of a catastrophe is that it destroys whole families.

These various points raise a number of questions. We do not yet have a full understanding of the basis for special public concern with catastrophes. Moreover, the argument for devoting special resources to deaths with externalities is strongest when the externalities do not reflect irrationality or cannot be reduced through other means. For example, some of the fear that follows certain widely reported deaths is based on confusion or ignorance about actual probabilities; if it is possible to dispel the confusion, the fear should dissipate as well. Here the question is whether government can legitimately spend extra resources to avert the harms associated with irrational public attitudes. Perhaps information-based strategies would be preferable to allocating additional resources to deaths whose occurrence produces widespread panic. On the other hand, there are undoubtedly instances in which information is ineffective, and there are also cases in which high externalities, in the form of special fear, are not a product of factual ignorance. In such cases government is justified in giving additional resources to death-prevention.

Conclusion

People do not consider all death-related events to be the same. Some deaths seem especially bad. It follows that valuation of life should not be based on a uniform number per life or life year saved, but should instead incorporate different social judgments about different kinds of death, to the extent that these judgments can survive critical scutiny.

Some such judgments do not really treat some deaths as worse, **in themselves**, than other deaths. They are based on the fact that deaths of some kinds occur very early, and thus a large number of life-years are lost. This point can easily be incorporated by reference to the criterion of life-years rather than lives saved. Moreover, judgments based on pre-death pain and suffering do not treat death-events as themselves deserving different levels of attention. But when a death is preceded by a period of pain and suffering, it is appropriate to make special efforts to guard against it. Much further work remains to

determine the appropriate "bad death premium" to be placed on such deaths; a special problem stems from the fact that public judgments or private willingness to pay may be ill-informed. When people believe that deaths are inequitably distributed, it may well be sensible to make particular efforts to prevent them, at least if the judgments about what is inequitable are legitimate. Finally, and perhaps most important, it is appropriate to devote unusually high levels of resources to preventing deaths accompanied by high externalities, at least if those externalities cannot be reduced through education and information.

Far harder puzzles are posed by the familiar idea that some deaths are especially bad because they involve a lack of control and involuntariness. If the point is that there is a special hedonic loss at the point of death—a special feeling of powerlessness—perhaps that loss deserves consideration in resource allocation. Or it may be that some risks are accompanied by especially low or especially high costs, informational and otherwise, of mortality avoidance. In such cases those especially low or high costs might qualify the starting point defined in terms of decently livable life years saved.

Appendix A

Sources of Deaths

Table A. Leading Causes of Death: 1993

Cause of Death	Number of Deaths			Death Rate Per 100,000 Population		
	Total	Male	Female	Total	Male	Female
All ages	2,268,553	1,161,797	1,106,756	880.0	923.5	838.6
Leading causes of death:						
Heart disease	743,460	367,479	375,981	288.4	292.1	284.9
Malignant neoplasms (cancer)	529,904	279,375	250,529	205.6	222.1	189.8
Cerebrovascular disease (stroke)	150,108	59,048	91,060	58.2	46.9	69.0
Chronic obstructive pulmonary disease	101,077	54,371	46,706	39.2	43.2	35.4
Accidents	90,523	60,117	30,406	35.1	47.8	23.0
Pneumonia	82,820	37,996	44,824	32.1	30.2	34.0
Diabetes	53,894	23,430	30,464	20.9	18.6	23.1
HIV infection	37,267	32,093	5,174	14.5	25.5	(NA)
Suicide	31,102	25,007	6,095	12.1	19.9	4.6
Homicide and legal intervention	26,009	20,290	5,719	10.1	16.1	4.3

Table B. Age-adjusted death rates, by selected causes: 1980 to 1993 [Rates per 100,000 population]

Cause of death	1980	1990	1993
All causes	585.8	520.2	513.3
Major cardiovascular diseases	256.0	189.8	181.8
Malignancies	132.8	135.0	132.6
Accidents and adverse effects	42.3	32.5	30.3
Motor vehicle	22.9	18.5	16.0
All other	19.5	14.0	14.4
Chronic obstructive pulmonary diseases and allied conditions	15.9	19.7	21.4
Pneumonia and influenza	12.9	14.0	13.5
Diabetes melitus	10.1	11.7	12.4
Suicide	11.5	11.3	11.4
Chronic liver disease and cirrhosis	12.2	8.6	7.9
Nephritis, nephrotic syndrome, and nephrosis	4.5	4.3	4.5
Homicide and legal intervention	10.8	10.2	10.7
Septicemia	2.6	4.1	4.1
Other infectious and parasitic diseases	1.8	12.0	15.9
Benign neoplasms	2.0	1.7	1.7
Ulcer of stomach and duodenum	1.7	1.3	1.2
Hernia of abdominal cavity and intestinal obstruction	1.4	1.1	1.0
Anemias	0.9	0.9	0.9
Cholelithiasis and other disorders of gallbladder	0.8	0.6	0.5
Nutritional deficiencies	0.5	0.5	0.9
Infections of kidney	0.7	0.2	0.2
Tuberculosis	0.6	0.5	0.4
Meningitis	0.6	0.3	0.3
Viral hepatitis	0.3	0.5	0.8
Acute bronchitis and bronchiolitis	0.2	0.1	0.1
Hyperplasia of prostate	0.2	0.1	0.1
Symptoms, signs, and ill-defined conditions	9.8	7.3	7.4
All other causes	36.8	38.4	39.7

Table C. Acquired immunodeficiency syndrome (AIDS) deaths, by selected characteristics: thru 1995

Characteristics	Number									Percent Distribution	
	Total cases	1985 and before	1989	1990	1991	1992	1993	1994	1995	1995	1993–1995
Total	305,843	12,493	26,355	29,934	34,651	38,813	41,077	43,975	31,256	100.0	100.0
Age:											
13 to 29 years old	53,632	2,558	4,924	5,427	6,059	6,481	6,815	6,930	5,105	16.3	16.2
30 to 39 years old	138,660	5,714	12,056	13,695	15,582	17,437	18,548	20,037	14,083	45.1	45.3
40 to 49 years old	77,425	2,726	6,205	7,329	8,943	10,339	10,975	11,921	8,543	27.3	27.0
50 to 59 years old	25,383	1,104	2,218	2,433	2,822	3,175	3,389	3,721	2,572	8.2	8.3
60 years old & over	10,743	391	952	1,050	1,245	1,381	1,350	1,366	953	3.0	3.2

Appendix B

Questionnaire on kinds of death

1. Assume that you are entrusted with the task of allocating $100 million among a number of possible regulatory activities. The possibilities include:
1. Spend all $100 million on AIDS education, prevention, and treatment. Estimated annual savings: 120 lives.
2. Spend $50 million on enforcement activity relating to toxic air pollutants. Estimated annual savings: 10 lives ($5 million per life saved).
3. Spend $50 million on safety inspections involving nuclear power plants. Estimated annual savings: 0 lives. Many members of the public are, however, much concerned about nuclear power plant safety, and are demanding greater attention to safety risks.
4. Spend $25 million on greater security measures at airports. Estimated annual savings: 0.5 lives. But recent, highly publicized accidents have produced a much greater public demand for security at airports.
5. Spend $100 million on a vigorous anti-smoking campaign, involving education, restrictions of sales to minors, and higher taxes on tobacco products. Estimated savings: 200 lives.
6. Spend $50 million on preventing lead ingestion by children in the inner city. Estimated savings: 50 lives.

Your advisers have narrowed the list of "policy options" to the following:

1. Follow option 1 in its entirety.
2. Follow option 5 in its entirety.
3. Spend $50 million in accordance with 1 and $50 million in accordance with 5, for a total estimated annual savings of 160 lives.
4. Spend $20 million on AIDS-related policies, $25 million on anti-smoking policies, $25 million on toxic air pollutants, $20 million on airport security, and $10 million on safety inspections for nuclear power plants, for a total estimated annual savings of 79.5 lives.
5. Spend $50 million on option 6 and $50 million on smoking policies, for estimated annual savings of 150 lives.
6. Spend $50 million on option 6 and $50 million on AIDS-related policies, for estimated annual savings of 110 lives.

Which is your **most** preferred policy? Mark here:
Which is your **second** most preferred policy? Mark here:
Which is your **least** preferred policy? Mark here:

2.a. How many lives would you need to save from Heart Disease so that you would find it equally important to save those lives and to save 100 lives from Cancer?

Lives saved from Heart Disease—

(Note: If you find it equally important to save lives from Cancer and lives from Heart Disease, the number you report should be 100. If you would prefer to save lives from Cancer rather than from Heart Disease, the number you report should be greater than 100. If you would prefer to save lives from Heart Disease rather than from Cancer, the number you report should be smaller than 100.)

b. How many lives would you need to save from airline crashes so that you would find it equally important to save those lives and to save 100 lives from cancer?

Lives saved from airline crashes—

3. Many communities treat their drinking water with chlorine to reduce microbial contamination. Microbial contamination in drinking water can cause acute gastrointestinal illness, which in some cases is fatal. But by-products of the chlorination process (such as trihalomethanes like chloroform) may create a cancer risk to those drinking the water.

Assume that chlorination completely prevents microbial contamination, and that the lifetime fatal-cancer risk from chlorination is equal to the lifetime fatality risk from microbial contamination without chlorination. Would you prefer that your town's drinking water be chlorinated or not?

Chlorinated — Unchlorinated — No preference —

For every 100 deaths due to cancer from chlorination, what is the number of deaths from microbial illness such that you would find the risks equally serious? (Note: If you find the risk of chlorination more serious, your number will be greater than 100; if you find the risk of not chlorinating more serious, your number will be less than 100.)

Number of microbial illness deaths —

Acknowledgment

I am grateful to Richard Craswell, Gertrude Fremling, John Lott, Martha Nussbaum, Richard Posner, Mark Ramsayer, David Strauss, W. Kip Viscusi, and Richard Zeckhauser for very helpful comments. I am also grateful to Jonathan Weiner for helpful discussion and to Christopher Houston for excellent research assistance.

Notes

1. I do not deal here with the distinctive problem of deaths produced by intentional or malicious action. It may well be appropriate to devote special attention to deaths so produced (Anderson, 1992). Nor do I discuss the distinctive questions raised by deaths in the course of war.
2. These students may not be representative, to be sure. Information is lacking about the students' personal characteristics—about whether, for example, a significant percentage were smokers. As a kind of control, part of the survey asked students a standard question involving fairness, used in psychological studies: A store sells snowshovels for $10; after a storm, it raises the price to $15. Respondents were asked to describe this outcome as completely unfair, acceptable, unfair, or extremely unfair. In some studies 80% of respondents consider this outcome unfair or extremely unfair. Among Chicago law students only 18.2% considered this outcome unfair or extremely unfair. This result certainly shows a degree of distinctiveness to the sample. It connects with work suggesting that economics majors have different inclinations about whether to cooperate in prisoners' dilemma situations. See Frank, Gilovich, and Regan, 1993). It raises the further question whether the effect observed in my study is a law school effect, a University of Chicago law school effect, or an effect related to some training in economics.
3. I am grateful to Jonathan Weiner for his conference, "Risk in the Republic," held at Duke University in the fall of 1996, dealing with comparative risk analysis, and circulating a comparative risk survey on which I drew for the "cancer deaths" and "chlorination" questions. The results of the survey held there will be reported in a paper by James Hammitt.

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