

# Valuing Food Safety and Nutrition

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## PART TWO: A Comparison of Valuation Methodologies

### **10. Valuing Food Safety: Which Approaches to Use?**

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# **Valuing Food Safety: Which Approaches to Use?**

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## Valuing Food Safety: Which Approaches to Use?

*Maureen L. Cropper*

The five chapters presented in this section deal with two issues: valuing risk of illness from contaminated food and valuing food attributes, such as the cholesterol content of food. Because of the special problems posed by valuing risk of illness, I will confine my remarks to the three chapters that deal with this problem.

Chapter 9 by Roberts and Marks uses the cost of illness approach. They measure the cost of medical expenses incurred and the value of time lost due to *E. coli*. This approach may be considered unfashionable by economists because it doesn't measure what we really want to measure—people's willingness to pay to reduce risk of foodborne illness. However, in valuing risk of microbial infection, I believe it essential to begin by computing cost of illness estimates for two reasons.

First, the cost of illness approach emphasizes the possible consequences and severity of the disease. In the case of *E. coli* we have five possible severity levels: (1) mild case of diarrhea with no doctor's visit; (2) more severe case of diarrhea, doctor's visit, several days lost from work; (3) hospitalization of children for hemorrhagic colitis; (4) development of HUS, a disease characterized by kidney failure and neurologic impairment; and (5) death from *E. coli* infection.

Emphasizing these consequences is a necessary prerequisite to any valuation exercise. It also reminds us that the model underlying the typical valuation study (Berger et al. 1987) may be a gross oversimplification. The typical model assumes two states of nature—one in which the respondent has the disease and the other in which he doesn't. The reality is much more complicated. There is a probability of ingesting *E. coli* and then, conditional on this, of each possible outcome. Given the complexity of the outcomes, it may be necessary to have several valuation studies, treating the different outcomes separately.

A second reason why the cost of illness approach is useful is that medical costs, especially for more severe outcomes, may not be borne by respondents in a valuation study. These will have to be added to contingent valuation estimates.

The cost of illness approach does, however, ignore two important aspects of the cost of illness—the value of the discomfort suffered and the effort spent to avoid the disease. This suggests that one should go to direct questioning approaches, such as those used by Lin and Milon in Chapter 5 and Fox et al. in Chapter 6. In applying the direct questioning approach to valuing reduced risk of illness four issues must be dealt with:

- (1) Describing the health states to the respondent in a meaningful way.
- (2) Inducing the respondent to understand the probability of each state and the change in the probability that he is asked to value.
- (3) Making sure the respondent understands options for averting behavior.
- (4) Devising an appropriate mechanism to elicit willingness to pay.

#### ***Description of Health States***

As the *E. coli* example suggests, this may not be easy. I'm not sure what percent of the population has ever experienced (or thinks they have experienced) food poisoning, but I think it would be good to have the respondent describe what he thinks the consequences of food poisoning would be. If these are vastly different from the objective consequences, it might be worthwhile educating the respondent. However, this may be difficult, and the respondent may value what *he* thinks the consequences will be, regardless of what he is told. (One advantage of eliciting the respondent's description of the disease is that his description can be correlated with his willingness to pay response.) In the case of rare outcomes—HUS or hemorrhagic colitis—a considerable amount of time will have to be spent describing the outcome to the respondent.

Neither Lin and Milon nor Fox et al. seem to devote enough space in their studies to discussing the consequences of illness. In Fox et al., respondents are given a one-sentence description of the consequences of *Salmonella* after the 10th round of bidding. In Lin and Milon, respondents are asked (on a five-point scale) how severe they think the consequences of eating contaminated oysters would be; however, there is no discussion of *what* the consequences would be.

#### ***Description of Probabilities***

As Lin and Milon note (and rediscover in their survey), people have a difficult time comprehending and valuing changes in probabilities. The first thought that occurs is: Can we eliminate this problem altogether? If we are interested in valuing a reduction in the chances of contracting minor illness (a

day or two of diarrhea and cramps), is it useful to value a reduction in the symptoms with certainty? This raises the question: What is the relationship between valuing a reduction in the *probability* of becoming ill and the *expected value* of avoiding *certain* illness? Berger et al. (1987) claim that the two are close for minor illnesses, but do not offer a formal proof. If they are close, or if one is a lower bound to the other, it might be useful to abandon valuing risk changes for minor morbidity.

In describing probabilities, it is probably better to avoid ratios—1/250 v. 1/25,000—and deal with the number of persons out of 100,000 who will get the disease per unit time. I think that Lin and Milon are to be commended for doing as much as they can on this score. What is necessary is more research on people's understanding of probabilities.

### ***Opportunities for Averting Behavior***

By averting behavior, I mean that the individual can alter the probability of illness from contaminated food, either by avoiding the food altogether (in the case of oysters) or by altering food preparation practices (in the case of pork and chicken). In general, opportunities for averting behavior will alter how one frames the valuation question. If no averting behavior is possible (as in the case hypothesized by Fox et al.), then the probability of becoming ill is exogenous to the individual, and it is meaningful to ask the respondent to value a change in that probability. When averting behavior is possible, the probability of illness is endogenous, and one must define what is to be valued more carefully.

In the case of illness from oysters, for example, people may have stopped eating oysters altogether to avoid risk of illness. It is therefore difficult to speak of changing the probability of illness for these persons. One can, however, ask for their willingness to pay to reduce the *frequency of contaminated oysters*. Their answer should reflect the value to them of eating oysters, assuming they would begin to eat them again. In the case of increased frequency of poultry inspections to reduce the risk of bacterial infection, individuals could already be reducing this risk by adopting strict food preparation procedures. The value of the program (rather than the value of reduced risk of illness) would be the saving in time and money from not having to undertake these precautions.

### ***Elicitation Methods***

Generally, the choices open to researchers in contingent valuation studies include open-ended responses (as used by Lin and Milon), closed-ended responses, and bidding games. Closed-ended responses are generally preferred over open-ended responses because they are easier for the respondent to answer, although they yield less information than open-ended responses, for a given sample size.

The Fox et al. chapter is to be commended for using a bidding procedure that induces people to consider the value to them of the commodity traded, although applying this procedure to random samples of the population may be difficult.

### ***On the Use of Indirect Methods to Value Risk of Illness***

Chapter 8 by Kim and Chern, which uses hedonic techniques to value the cholesterol content of fats and oils, reminds us that indirect methods—those based on observed behavior—could also be used to value risk of illness. The most commonly used indirect methods for valuing illness are the hedonic approach, whereby higher prices paid for safer food are used to infer willingness to pay to reduce risk of illness from contaminated food, and the averting behavior approach. The latter uses expenditures to avoid exposure to contaminated food to infer willingness to pay for safer food.

One caveat here is that, to be used effectively, indirect methods must be accompanied by direct questioning of respondents to find out what they *perceived* the reduction in risk of illness achieved to be. The use of objective measures of risk reduction could lead to biased estimates of the value of reducing illness.

### **Reference**

- Berger, Mark et al. 1987. Valuing Changes in Health Risks: A Comparison of Alternative Measures. *Southern Economic Journal* 53(4):967-984.