

Valuing Food Safety and Nutrition

EDITED BY
Julie A. Caswell

*Book Originally Published by
Westview Press, Boulder, Colorado, 1995*

PART TWO: A Comparison of Valuation Methodologies

5. Contingent Valuation of Health Risk Reductions for Shellfish Products

C.-T. Jordan Lin and J. Walter Milon

Food Marketing Policy Center
Department of Agricultural and Resource Economics
University of Connecticut

Contingent Valuation of Health Risk Reductions for Shellfish Products

C.-T. Jordan Lin

J. Walter Milon

Keywords: Health risk, shellfish, contingent valuation, willingness to pay

Copyright © 1997 by Food Marketing Policy Center, University of Connecticut. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

5

Contingent Valuation of Health Risk Reductions for Shellfish Products

C.-T. Jordan Lin and J. Walter Milon¹

A measure of the value of food safety is an individual's willingness to pay (WTP) for safer foods, the largest monetary amount that she would be willing to pay for a specified improvement in food safety. WTP can be measured empirically using the contingent valuation (CV) method. This methodology has been widely used to assess the values of nonmarket goods such as environmental amenities (see Mitchell and Carson 1989 for a review), mortality risk reduction (Jones-Lee et al. 1985), and morbidity risk reduction (Krupnick and Cropper 1992). Its applications also have received attention from food safety researchers (Buzby et al. (see Chapter 12), Eom 1992, Hammitt 1986, Kramer and Penner 1986, van Ravenswaay and Hoehn 1991a and 1991b, Zellner and Degner 1989).

CV uses surveys to elicit individual valuation of nonmarket goods. Survey respondents are presented with information on the nonmarket good, e.g., reduction of risk of foodborne illnesses. Then, a hypothetical market is described in which the good can be traded with some measure of personal satisfaction such as monetary income (risk-income tradeoff) or another nonmarket good (risk-risk tradeoff). The value of the good is inferred from the amount of income or the other nonmarket good that respondents would be willing to forgo to obtain a specified level of the nonmarket good.

The first objective of this chapter is to investigate: (1) the relationship between valuation and the magnitude of foodborne risk reduction, and (2) whether risk information presented in relative terms and in absolute terms produces different valuation responses. The second objective is to investigate personal factors that may affect an individual's WTP response. We focus on the qualitative influences of various personal factors on WTP responses rather than attempt to derive a precise quantitative measurement of the value.

Background

As pointed out by Mitchell and Carson (1989), WTP is contingent on a hypothetical scenario so WTP responses should vary with the information provided in a CV survey. For instance, based on the theory of value of risk reduction, individuals should be willing to pay more for a larger reduction than for a smaller reduction, other things held constant (Jones-Lee 1974, Harrington and Portney 1987). However, human information processing abilities limit individuals' response to risks and people often have risk perceptions that are different from statistical risk assessments (Akerlof and Dickens 1982, Simon 1955, Slovic et al. 1982, Starr 1969, Tversky and Kahneman 1982). If survey respondents have difficulties understanding the risk in question or they do not or cannot distinguish between different magnitudes of risk reduction, CV responses may not conform to theoretical expectations.

In addition, the framing of risk information may influence valuation responses. A relative information format describes the risk level of a food in relation to another food (e.g., food X has a higher risk than food Y). An absolute information format, on the other hand, uses only a quantitative risk description of a specific food (e.g., food X has a risk of 1 in 1 million). If both formats present equivalent risk information, we should expect the same valuation responses.

Individuals hold different risk perceptions and the degree of familiarity with a risk may influence their evaluation responses to risk reduction. In addition, individuals make food consumption decisions based on multiple attributes of the food such as taste, price, safety, etc. Because safety is but one of the many attributes considered, other food attributes have a role in determining the value of food safety.

Empirical research on the effect of risk information on risk valuation has been sparse. Jones-Lee et al. (1985) conducted personal interviews to elicit individuals' WTP for reducing fatal and non-fatal motor vehicle accident risks in the United Kingdom. Each respondent was asked to value two successive risk reductions with different magnitudes of risk change from a baseline risk level. Survey results indicated that the average WTPs from successive levels of safety improvement were consistent with theory, i.e., the averages were an increasing function of risk reduction. However, forty-two percent of the respondents gave the same valuation response for the two risk reductions.

Similar findings also appeared in more recent CV studies. Eom (1992) investigated consumers' valuation of lower risk associated with pesticide residues on fresh produce. She reported that respondents in her personal interviews were willing to pay a price premium for the safer produce. Nevertheless, the values for risk reductions were not sensitive to the amounts of risk reduction. Eom (1992) suggested two possible explanations. First, respondents in the survey

were focusing more on a general concern about food safety than differences in the level of risk. Second, respondents regarded different magnitudes of risk reduction as comparable because the risk was small. Buzby et al. (see Chapter 12) also reported the invariability of valuation responses with respect to proposed risk reductions. In their analysis, proposed reductions in risk due to pesticide use on grapefruit were a significant determinant of WTP when a dichotomous choice CV survey was used but not when a payment card CV survey was used.

Valuation of health risk, especially morbidity risk, reduction may be influenced by the amount of knowledge CV respondents have about the risk being valued. In a study of WTP to reduce risks of contracting chronic bronchitis, Krupnick and Cropper (1992) examined the effect of familiarity with a known risk. Their empirical evidence indicated that respondents who had a relative with chronic lung diseases were willing to pay more to reduce the risk than others with no first-hand risk experience. Therefore, WTP responses elicited by the CV survey were sensitive to familiarity with the nonmarket good being valued.

For this study, health risks from eating oysters were selected as the subject for valuation. The food is especially relevant because the U.S. Food and Drug Administration (FDA) (1989) estimates that raw and partially cooked molluscan shellfish (e.g., oysters and clams) are 83 to 122 times more likely to cause human illness than chicken on a pound for pound consumed basis. Illnesses attributed to shellfish products range from minor stomach distress and diarrhea to severe intestinal disorders that can be fatal (Hackney and Dicharry 1988). Yet, shellfish have not been subject to the same type of continuous, on-site inspection used for other meat products such as beef and chicken. Currently, legislative bills are being considered in Congress to overhaul and expand the seafood inspection program. California, Louisiana, and Florida have recently required retailers to inform customers that eating raw oysters may cause severe illness.

Conceptual Framework

The first hypothesis tested in this chapter is that a positive relationship exists between the amount a CV respondent says he would be willing to pay for a risk reduction and the magnitude of the reduction. Following Jones-Lee (1974), an expected utility framework is used to analyze the valuation of risk reduction. Suppose a consumer's satisfaction in a time period depends on both his income (y) and health status. He faces two possible states of the world. He has P ($0 \leq P \leq 1$) probability of getting ill from exposure to a foodborne health hazard and falling into a "sick" state (s). He has $1 - P$ probability of consuming the food without getting sick from it and therefore falling into a "healthy" state (h).

Under certain conditions,² the consumer will maximize his expectation of state-dependent utility given by:

$$(1) \quad E(U) = P U_s(y, Z) + (1 - P) U_h(y, Z),$$

where $E(U)$ is expectation of utility in the time period, U_h is the utility associated with income y given that the "healthy" state occurs, U_s is the utility associated with income y given the "sick" state occurs, and Z represents socioeconomic characteristics.³

Given a food safety inspection program that would reduce the risk, the marginal value of the program to a consumer of the food can be obtained from:

$$(2) \quad P' U_s(y - w, Z) + (1 - P') U_h(y - w, Z) = \\ P U_s(y, Z) + (1 - P) U_h(y, Z),$$

where P' is the reduced probability of illness, and w is his WTP to have the risk reduced by the program. With some plausible assumptions about individual preferences, Jones-Lee (1974) shows that w increases with a larger reduction in risk, given a constant baseline level of risk.

The second hypothesis concerns the relationship between valuation and framing of risk information. In CV research, the current (baseline) risk level (P) and new (reduced) risk level (P') can be stated in various formats. The absolute information format only refers to changes in risk for a specific food. For example, the risk of illness from consuming food X is 1 per 25,000 servings; the risk from food X can be reduced to 1 per 250,000 servings with an inspection program. Alternatively, the risk information can be described by a statement about the risk of eating food X compared to food Y. This is a relative information format. For example, the risk of illness from consuming X is higher than from Y and the risk of illness from X can be reduced to the same as the risk from Y with an inspection program.

The elicited values of safety improvement may differ between the two formats. It is well known that individuals have difficulties judging probabilities and making risk decisions, especially when the risk is small (Tversky and Kahneman 1982). However, comparing risks that have similar characteristics and decision contexts can help people comprehend the magnitude of a particular risk and make knowledgeable decisions about the risk (National Academy of Sciences 1989). Thus, given that survey respondents may find relative information easier to comprehend than absolute information, their valuation responses to relative risk information may be different from their responses to absolute risk information.

Survey Design

Data were collected from two CV questions included in a random digit telephone survey⁴ of adults (18 years or older) in the Mid-Atlantic and South-eastern states.⁵ We selected this geographical region because most oysters harvested in the Southeast are sold in these states. A private market research firm conducted the survey during January 8-19, 1990 and April 10-June 27, 1990. The average completion time of an interview was about 10 minutes. A total of 1,094 interviews were completed.⁶

The sample frame was stratified to provide proportional representation of urban and rural populations within each state. Sixty-one percent of respondents were female. The largest age group was 35 to 64 years. Fifty-two percent in the sample attained more than a high school education. As for household income, the sample was evenly distributed across different categories.

The questionnaire focused primarily on oysters, though questions about chicken and shrimp were also included (for text of the full questionnaire, see Appendix 5.A). Based on four focus groups in the Southeast region (Lin et al. 1989) and 30 pretest interviews, the questionnaire contained five sections of questions in the following order. First, respondents were asked about their frequency of oyster consumption during the one-year period prior to the interview. Second, food safety and four other attributes of oysters (taste, nutritional value, freshness, and cost) were rated on a 1-to-7 semantic differential scale. The safety rating was used to measure the food's overall risk as perceived by respondents. No reference was made to any specific contaminant or pathogen as the cause of oyster safety problems. Therefore, the rating could reflect both morbidity and mortality risks.

The third section dealt with respondents' experience with oyster related illness. Respondents were asked whether they were aware of any illnesses or diseases caused by bacteria-contaminated oysters and whether they had ever been sick from eating unsafe oysters and how serious the experience was. In addition, the questionnaire addressed basic components of perceived risk by asking respondents to assess their chance of getting sick from oysters and the severity of an illness if it did occur.

The next section, which will be discussed in detail later, contained a set of CV questions. The objective was to elicit respondents' intentions to eat safer oysters and their WTP to reduce the health risk from eating oysters. The last section gathered demographic information.

All respondents were asked sections 1 (consumption), 2 (safety and other attribute ratings), 3 (risk knowledge and experience), and 5 (demographics); only a subset of the interviewees were administered the full CV. The CV section began with the following statement: *"Currently oysters are not inspected by the federal government in the same way that meat products like*

chicken are inspected." Then, each respondent was randomly given one of three different formats of risk and contingency descriptions:

Format 1 (Relative Risk)

The U.S. Food and Drug Administration reported recently that the risk of illness from a serving of oysters is higher than the risk from an equivalent serving of chicken. Suppose oysters could be inspected so that the risk of illness from oysters was about the same as the risk from eating chicken.

Format 2 (Absolute Risk—1/10,000)

The U.S. Food and Drug Administration reported recently that each year about 1 out of every 250 servings of oysters causes an illness. This means that each year over 60,000 people get sick from oysters. Suppose a federally administered inspection program could be set up that would reduce the risk of illness from 1 out of every 250 servings to 1 out of every 10,000 servings so that only about 1,500 people would get sick from eating oysters each year.

Format 3 (Absolute Risk—1/25,000)

The U.S. Food and Drug Administration reported recently that each year about 1 out of every 250 servings of oysters causes an illness. This means that each year over 60,000 people get sick from oysters. Suppose a federally administered inspection program could be set up that would reduce the risk of illness from 1 out of every 250 servings to 1 out of every 25,000 servings so that only about 600 people would get sick from eating oysters each year.

The risk of eating chicken was used as the benchmark risk in Format 1 for three reasons. First, both the risk from eating chicken and oysters are associated with consumption of market goods and share similar characteristics. With the availability of substitutes, consumption of these foods and their inherent attributes (in particular, foodborne health risk) can be considered as voluntary behavior. Consumers are able to control, to some extent, the probability of getting sick from these foods by applying "safe" preparation and cooking practices or avoiding the foods, or both. Second, the general public appears well aware of and concerned about the risk from eating unsafe chicken (Lin et al. 1989, Penner et al. 1985, Zellner and Degner 1989). Therefore, comparing the risk of oysters to chicken could make the judgment of oysters' risk an easier task. Third, objective risk levels were available for raw and partially cooked molluscan shellfish (e.g., oysters) relative to chicken.

In contrast to the relative risk information used in Format 1, the other two formats described the baseline risk and risk changes by referring to oysters only. Both stated the same current level of risk. However, the magnitude of risk reduction was larger in Format 3 (which would make oysters as safe as chicken) than in Format 2 (which would leave oysters with a higher risk than chicken).

Use value was the only category of benefits we addressed.⁷ Our conceptual framework presumed that an individual faced the lottery of healthy and sick states if and only if he consumed the food. A change in the food's risk level would not affect nonconsumers. Therefore, we assumed that a price premium was the appropriate payment mechanism for reducing the risk of oysters as there was little ambiguity over who benefited from the risk reduction.

Since only consumers would buy oysters, we screened for CV respondents in the following manner. A respondent was asked: *"If inspection reduced the risk of illness from oysters and did not change the taste or price, would you eat oysters?"* Respondents who would not consume safer oysters were asked about the reason they would not do so. Those who gave an affirmative answer ("potential consumers" hereinafter) were then asked to answer one of the two series of open-ended valuation questions below:

Format 1

- a) *Would you be willing to pay more than the current price for oysters if the risk of illness was reduced to the same as the risk from chicken? (Question 19.c.)*
- b) *Let's say the average price of oysters in your state is currently about \$4.00 per dozen. How much more than \$4.00 per dozen would you be willing to pay for oysters with this lower risk of illness? (Question 19.d.)*

Formats 2 and 3

- a) *Would you be willing to pay more than the current price for oysters if the risk of illness was reduced to the lower level? (Question 19.c.)*
- b) *Let's say the average price of oysters in your state is currently about \$4.00 per dozen. How much more than \$4.00 per dozen would you be willing to pay for oysters with this lower risk of illness? (Question 19.d.)*

If a potential consumer was not willing to pay more than the current price, i.e., answered "No" to a) above, a follow-up question probed why she would not do so. The choices of answer were (1) "the current price is all I can afford," (2) "the new inspection program would not be effective in reducing risk," (3) "the government should pay for food inspection," and (4) "others" or a volunteered answer which did not fall into any one of the categories above.

The final questions in the CV section explored the attitudes of all respondents (potential consumers and nonconsumers) toward the controllability of the risk by individuals and the federal government's responsibilities in ensuring shellfish safety. These questions were intended to evaluate the influence of these attitudes on WTP responses. An individual may feel that he can do something to avoid the risk or it is not the federal government's job to make shellfish products safer. He then might not be willing to pay for an inspection program or might perceive smaller benefits.

Data Analysis and Results

Potential Consumption of Risk-Reduced Oysters

Within the full sample, 360 respondents indicated they would not eat inspected oysters. None of these respondents had eaten oysters during the preceding year. They were asked to choose one of three reasons why they would not consume inspected oysters. Four and 3 percent of them chose "oysters would still not be safe" and "oysters are already too expensive," respectively. The dominant (93 percent) reason, however, was that they did not like oysters. But why did they dislike oysters? A correlation analysis between intention (1 = would eat the inspected oysters, 0 = would not eat) and oysters' taste rating (7 = excellent taste, 1 = terrible taste) indicated a significant positive correlation.⁸ In other words, a respondent who did not have a favorable impression of oysters' taste was less likely to be influenced by changes in product risk. Other regression analyses also suggested taste perception was one of the primary factors that determined oyster consumption (Lin and Milon 1993). Thus, risk reduction alone would probably not make the food more appealing and induce changes in its consumption.

This finding has three methodological implications. First, many nonmarket goods or amenities (e.g., food safety, water quality, scenery) evaluated in CV studies are inherent in goods that have multiple attributes. It is important for researchers to recognize the influences of all relevant attributes on valuation responses. Second, nonconsumption that results from non-safety factors constitutes a legitimate reason for a zero use value for food risk reduction. Researchers should identify nonconsumption and distinguish it from zero bids produced by other reasons such as protest and income constraints. Third, more information on personal attributes and tastes, in addition to socioeconomic background, should be collected so the WTP responses can be thoroughly evaluated.

Zero WTP Responses and Outliers

In our survey instrument, only potential consumers were asked whether they would pay more than the current market price of oysters (\$4.00 per dozen) if the risk of illness were reduced. The amount of WTP by those who would pay an additional price was then sought in the open-ended question: "*How much more than \$4.00 per dozen would you be willing to pay for oysters with this lower risk of illness?*" In recording answers, interviewers were instructed to enter the increment over \$4.00 (e.g., \$0.25, \$1.50) rather than a response including the reference price (e.g., \$4.25, \$5.50).

The total number of potential consumers was 646, distributed evenly among the three information formats. As commonly found in CV surveys, many

respondents (344 out of 646) offered zero bids, i.e., they would not be willing to pay a higher price for the risk-reduced oysters. In the follow-up question on why they answered as they did, 56 percent of the zero bidders chose "the current price is all I can afford."

This result can be interpreted in two ways. On the one hand, potential consumers considered the price-risk tradeoff and their income constraint in making the valuation responses. Either the risk reduction was not worth any incremental price or an individual simply could not afford to pay more for oysters. On the other hand, the large number of zero bids indicates potential strategic bias (underbidding) in using price premium as the payment vehicle for valuing food safety. As suggested by Mitchell and Carson (1989), underbidding is possible when potential consumers believe they would have to pay the amount bid to have the risk reduced, yet the nonmarket good will be provided regardless of their bids. Hence, survey respondents may offer nothing.

Most other zero bidders (26 percent) felt the inspection program would not be effective in reducing the risk or the government should pay for food inspection. These potential consumers did not respond directly to the proposed risk change so we considered these responses as protest bids and excluded them from all analyses hereinafter. Of all zero bidders, five percent of them were not willing to pay due to dislike of oysters.⁹

There were 22 outliers, defined as a WTP amount exceeding \$4.00. It could be that respondents misinterpreted the valuation question by giving the full price that they were willing to pay. Since these extreme values had a significant influence on the distribution of WTP responses, we report the results with and without outliers.

Mean WTPs and Hypothesis Tests Between WTPs

The mean WTP amounts ranged from 80.32 cents for Format 2 to 72.37 cents for Format 3 with Format 1 falling in between at 73.27 cents, when outlier responses were included (Columns 2, 3, and 4 in Table 5.1). Without outliers, the range narrowed to 56.57 cents and 54.08 cents for Format 2 and Format 3, respectively, with Format 1 again falling in between. Due to the large share of zero bids and some high bids (relative to the reference price), there were large standard deviations for all formats, particularly with outliers included. Since unusually high or low observation values can result in an unrepresentative mean, we also report the medians in Table 5.1 (Columns 6 through 8).

Two statistical tests are conducted between the reported valuation amounts and information formats. The first test addresses the relationship between the stated WTP and the magnitude of risk reduction. In this survey, the risk change described in Format 3 (from 1 out of 250 servings of oysters to 1 out of 25,000 servings) was larger than that in Format 2 (from 1 out of 250 servings of oysters to 1 out of 10,000 servings). Hence, the null hypothesis (Hypothesis (1) in

TABLE 5.1 Descriptive Statistics for WTP Responses by Format and Hypothesis Tests Between WTP Responses

Hypothesis	Mean				Median			
	(1) Test Stat. (T)	(2) Format 1 (Relative Risk)	(3) Format 2 (Abs. Risk — 1/10,000)	(4) Format 3 (Abs. Risk — 1/25,000)	(5) Test Stat. (Z)	(6) Format 1 (Relative Risk)	(7) Format 2 (Abs. Risk — 1/10,000)	(8) Format 3 (Abs. Risk — 1/25,000)
(1) $F_3 > F_2$								
w/outliers ^a	0.59	-	80.32¢ (134.59¢) ^b	72.37¢ (125.21¢)	0.43	-	6¢	2¢
w/o outliers ^c	0.31	-	56.57¢ (79.48¢)	54.08¢ (73.18¢)	0.17	-	5¢	2¢
.....								
(2) $F_1 = F_3$								
w/outliers ^d	0.07	73.27¢ (123.03¢)	-	72.37¢ (125.21¢)	-0.11	5¢	-	2¢
w/o outliers ^e	0.05	54.45¢ (80.85¢)	-	54.08¢ (73.18¢)	-0.24	1¢	-	2¢

^a The sample sizes are 187 (Format 2) and 190 (Format 3), respectively.

^b Standard deviations in parentheses.

^c The sample sizes are 178 (Format 2) and 184 (Format 3), respectively.

^d The sample sizes are 179 (Format 1) and 190 (Format 3), respectively.

^e The sample sizes are 172 (Format 1) and 184 (Format 2), respectively.

Table 5.1) states that the WTP response to Format 3 (F3) is not larger than the response to Format 2 (F2). As shown in the upper half of the table, this hypothesis cannot be rejected at the 1 percent significance level with either a t-test (Column 1) or a Wilcoxon rank-sum test (Column 5) and with or without outlier responses.

The second test concerns the relationship between WTP and the framing of risk information. The null hypothesis (Hypothesis (2) in Table 5.1) states that WTP response to relative risk information (F1) is not different from WTP response to absolute risk information (F3). The lower half of Table 5.1 indicates there is no significant difference between responses to Format 1 and Format 3 (Columns 1 and 5).

The key finding from the hypothesis tests is that WTP for foodborne risk reduction was insensitive to risk changes and the framing of risk information. There are three possible reasons why this could have happened. First, individuals have difficulties handling risk decisions; respondents did not or could not tell one magnitude of risk reduction from the other. Even the provision of relative risk information to CV respondents did not help them comprehend the magnitude of risk and risk reduction and make knowledgeable decisions about the risk. Second, there may be a subjective threshold level of the baseline risk below which the different magnitudes of risk reduction are irrelevant. Respondents regarded different magnitudes of risk reduction as comparable because they felt that the different magnitudes were trivial and indistinguishable since the baseline risk was small. Therefore, the different risk reductions were valued similarly by respondents. The telephone survey methodology could have contributed to these two reasons. Third, consumers may desire absolute certainty; any improvement toward perfect safety would be acceptable and the level of improvement does not matter. Consequently, respondents might have simply valued the reduction in risk itself regardless of the magnitude.¹⁰

Regression Analysis

To evaluate the effects of respondent characteristics on valuation responses, an ordinary least squares regression was fitted using data from positive WTP observations. Normally, the omission of zero bids can lead to selection bias in a regression of valuation responses and researchers have used sample selection models to correct for the bias (see Smith and Desvousges 1987, for example). Nevertheless, we chose to ignore the sample selection issue in this study; we felt the follow-up question on zero bids gave us a direct and plausible explanation as to why respondents answered as they did.

The empirical model specified the logarithm of WTP as a linear function of the following variables: FORMAT 1, FORMAT 2, RISK PERCEPTION, "20/20," ILL, CONSUMPTION, AVOIDABILITY, INCOME, and AGE (for variable definitions, see Table 5.2). The hypothesis tests above indicated that

the valuation responses did not vary across different formats of risk information or different magnitudes of risk reduction. Nevertheless, these tests did not take into account differences in respondents' characteristics. To isolate the effects of risk information, we included two zero-one dummy variables, FORMAT 1 and FORMAT 2, in the model.

Unlike objective risk, individuals differ in their subjective assessment of how risky a food is. If a consumer believes that the risk of getting sick from eating oysters is high, she would consider the risk reduction program more valuable. Thus, valuation for risk reduction may vary with the subjective RISK PERCEPTION. Similarly, valuation responses may be influenced by awareness of and familiarity with the risk. In particular, two measures of risk knowledge were used in the model. First, the American Broadcasting Company's (ABC) "20/20" program aired a report featuring shellfish safety on February 9, 1990. Viewers of the program could have more knowledge about shellfish risk; they might be willing to pay a higher price for safer oysters than others who did not see the "20/20" story. Second, consumers acquire familiarity with the risk when they become ILL from eating the food. It is a plausible assumption that respondents with past sickness experience might perceive more benefits from the inspection and offer larger amounts of WTP.

The effect of oyster CONSUMPTION patterns on the valuation response is indeterminate. On the one hand, the benefits of safety improvement are higher for a consumer who eats oysters often. This is because a frequent consumer faces a larger baseline risk than an infrequent consumer, given the same particular risk level.¹¹ On the other hand, consumers are concerned about how much they can afford to pay for the food when they are asked to value the safety improvement. When price rises, frequent consumers would have to pay proportionately more for oysters than infrequent consumers. Consequently, it would not be surprising if an individual who eats oysters on a regular basis responds to the CV question with a smaller amount of WTP than another who rarely consumes the food. Additionally, underbidding behavior can lead to a negative relationship between WTP and consumption.

Another factor that may cause WTP to vary among individuals is their beliefs about the AVOIDABILITY of the risk by average consumers. If one feels that he can control the degree of riskiness by, say, using safe cooking practices, he would not be willing to pay as much for a public food safety program as someone who does not believe so. In regard to demographic background, INCOME is expected to have a positive relationship with WTP. A respondent's AGE may also influence his response. Older consumers may be more concerned about food safety and would be willing to pay more for safer oysters. Yet, they also may be more experienced in food handling practices and would not offer much for someone else (the government) to ensure food safety (Zellner and Degner 1989). Hence, we cannot predict the direction of influence of respondents' age on valuation responses.

TABLE 5.2 Ordinary Least Squares Estimates of the Willingness to Pay Model (Outliers Excluded)

Variable	Coefficient
FORMAT 1	0.115
1 = format 1	(0.542)
0 = otherwise	
FORMAT 2	0.054
1 = format 2	(0.245)
0 = otherwise	
RISK PERCEPTION	0.009
1 = not safe at all	(0.146)
7 = perfectly safe	
"20/20"	0.051
1 = had seen ABC "20/20" story	(0.181)
0 = no	
ILL	0.420
1 = had been sick from eating unsafe oysters	(1.460)***
0 = no	
CONSUMPTION	-0.407
0 = did not eat any oysters in the past year	(3.094)*
1 = ate oysters once per month or less	
2 = ate 2 to 4 times per month	
3 = ate more than 4 times per month	
AVOIDABILITY	-0.130
1 = strongly agreed that the average person cannot avoid shellfish safety problems	(1.618)***
2 = somewhat agreed	
3 = somewhat disagreed	
4 = strongly disagreed	
INCOME	0.015
1 = less than \$20,000	(0.184)
2 = \$20,000-\$35,000	
3 = \$35,000-\$50,000	
4 = more than \$50,000	
AGE	-0.069
1 = 18-34 years	(0.495)
2 = 35-64	
3 = over 65	
Constant	4.820
	(8.744)
N	235
Adjusted R ²	0.018

Note: Numbers in parentheses are t-statistics based on heteroscedasticity consistent covariance matrix of the estimates. The superscripts * and *** correspond to levels of significance of 1 percent and 10 percent, respectively.

Regression results are reported in Table 5.2. The estimates were similar with and without outlier responses so we report results without outliers. As expected, the estimates for the format dummy variables were not statistically significant at the 10 percent significance level. Hence, this analysis, using only positive responses, confirmed our earlier results that respondents did not give different WTP amounts in response to different risk information formats.

Both risk perception and viewing of the ABC "20/20" story on shellfish safety had a positive effect on WTP, but the effect was not statistically significant at the 10 percent significance level. Individuals who had been ill from consuming unsafe oysters offered significantly larger WTPs, at the 10 percent significance level, than others who had not.¹² This result suggests that subjective risks are weighted differently by individuals when it comes to valuing the benefits of food safety improvement. Overall impression or mere knowledge of the risk may not be as important as personal experience in the process of assigning a value to a possible risk reduction.

The consumption pattern had a significantly negative relationship with the valuation response at the 1 percent significance level. The more frequently a consumer ate oysters the less of a price premium she would pay for the safety improvement. This result suggests underbidding behavior and is consistent with the finding reported earlier that many consumers would not be willing to pay for the inspection program because they thought the current price was all they could afford. Furthermore, the result indicates that food consumption decisions are made in a multiattribute context. Food safety is but one, and perhaps an insignificant, factor in the choice of foods to consume.

A respondent's belief about the avoidability of the risk significantly affected, at the 10 percent significance level, the valuation response. Higher levels of agreement with the statement that the average person cannot avoid shellfish safety problems were correlated with higher WTP for a government inspection program. Finally, the amount of WTP had no statistically discernible relationship with either a respondent's income or age at the 10 percent significance level.

Discussion

There are four important implications from this CV study. First, our survey results failed to support the theoretical expectation that the value of risk reduction increases with the magnitude of risk reduction, holding the baseline risk constant. The primary reason may be that individuals face difficulties in making risk judgments in a CV survey. Generally speaking, this study as well as the studies by Jones-Lee et al. (1985), Buzby et al. (see Chapter 12), and Eom (1992) raise doubt about the usefulness of valuation responses elicited in a CV survey. The absence of a systematic relation between elicited WTP and

risk information is especially troublesome in that the problem occurred regardless of the survey instrument and kind of risk.

Second, we found the reported valuation amount was insensitive to the risk information format. Perhaps the reference risk (of eating chicken) did not help respondents' comprehension of the risk from oysters, though consumers were presumably more familiar with the former. This observation suggests the need to investigate the usefulness of other risk information formats in future research.

Third, WTP responses were influenced by personal experiences with the risk; individuals who had been sick from eating unsafe oysters generally valued safer oysters more than others. This result reinforces Krupnick and Cropper's (1992) conclusion that familiarity with a risk can lead to larger WTP. The implication is that CV respondents may rely more on their own direct contact with the risk to answer WTP elicitation questions than on risk information included in a CV questionnaire. The result also suggests the need to distinguish between valuation responses by those with risk experiences and those without, if the distribution of benefits of risk reduction matters. An average value of benefits would not reflect different risk preferences held by two subsets of the population with different personal risk experiences.

Fourth, the screening and follow-up mechanisms used in this study provided useful information to understanding respondents' motives for their WTP responses. In particular, consumers considered other characteristics of a food when they were asked to put a value on the food's safety attribute. Not surprisingly, taste and price stood out as the most prominent considerations. To the extent that consumers are heterogeneous in their subjective perceptions of a food, the collection of perception data should be incorporated in future CV surveys of food safety improvement.

This study is limited in its focus and the results should be taken as preliminary based on the research methodology and product in question. In particular, two caveats need to be mentioned. First, the health risk from eating raw oysters is in general larger than that from cooked oysters; the value of risk reduction may be higher for raw oysters. This survey did not distinguish the two product forms, however. Second, other characteristics of the risk were not mentioned in our CV survey. Factors such as potential degree of severity associated with the risk, different mortality and morbidity probabilities, risk factors associated with high-risk consumers, and alternative risk reduction strategies could have led to different valuation responses.

The findings of this chapter demonstrate some potential problems in applying CV to food safety valuation. Further exploration is needed to understand how respondents answer valuation questions, especially the cognitive process involved. This knowledge could help to improve the design of CV surveys for valuing safer foods.

Notes

1. This research was partially funded through the U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, and Florida Sea Grant College. The authors wish to thank Chuck Adams, Emerson Babb, Julie Caswell, Joseph Cooper, Robert Degner, Ann Fisher, Phil Kaufman, Steven Otwell, Steven Payson, and Jim Zellner for helpful comments and suggestions. Opinions, errors, or omissions are the sole responsibility of the authors.

2. These are the axioms of conditional expected utility (see Luce and Krantz 1971 for details).

3. The risk from eating unsafe foods is, for the most part, associated with acute rather than chronic illnesses. If chronic cases were more prevalent, a two-period or multi-period model would be appropriate.

4. Although many CV studies employ mail or face-to-face surveys, telephone interviews have been used to measure values of human lives (Cropper and Portney 1992), willingness to accept a radioactive waste site (Kunreuther and Easterling 1990), and WTP for safer chickens (Zellner and Degner 1989).

5. These states were Delaware, Maryland, Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

6. The response rate was 35 percent and computed as: $(1,094 \text{ completed interviews}) / (1,094 \text{ completed interviews} + 1,077 \text{ initial refusals} + 79 \text{ mid-interview refusals} + 86 \text{ communication barriers} + 781 \text{ unreachable after three attempts})$.

7. It is possible, however, that elicited value might include an element of existence value (i.e., a seafood inspection program is better than none, regardless if I eat seafood or not).

8. The Spearman correlation coefficient was 0.63 and statistically significant at the 1 percent level.

9. It was believed that some reasons volunteered by respondents and classified as "others" also related to dislike of oysters. Unfortunately, we did not have sufficient information from the survey firm to identify these respondents.

10. The second and third reasons have also been suggested by Buzby et al. (see Chapter 12) and Eom (1992).

11. Suppose the risk is 1 out of 250 servings of oysters and the risk-dose relationship is linear. The baseline risk would be 0.04 for consumer A who eats 10 servings and 0.10 for consumer B who eats 25 servings during the same period of time. If the risk is reduced from 1 out of 250 servings to, say, 1 out of 1,000 servings, while A and B eat the same number of servings as they did, the risk they face would become 0.01 and 0.025, respectively. According to Jones-Lee (1974), the risk reduction would be more valuable to B than A because B faced a higher initial risk. (Interested readers should see Smith and Desvousges (1987) for an empirical test of this hypothesis.)

12. The average WTP's were \$1.22 and \$1.04 per dozen of oysters for those who had been ill from eating unsafe oysters and those who had not, respectively, without outlier responses. The corresponding averages were \$2.12 and \$1.32 per dozen with outliers included.

References

- Akerlof, George A. and W. T. Dickens. 1982. The Economic Consequences of Cognitive Dissonance. *American Economic Review* 72(3):307-315.
- Cropper, Maureen L. and Paul R. Portney. 1992. Discounting Human Lives. *Resources* 108:1-4.
- Eom, Young Sook. 1992. Consumers Respond to Information About Pesticide Residues. *Food Review* 15(3):6-10.
- Hackney, C. R. and A. Dicharry. 1988. Seafood-Borne Bacterial Pathogens of Marine Origin. *Food Technology* 42(3):104-109.
- Hammitt, James K. 1986. *Estimating Consumer Willingness to Pay to Reduce Food-Borne Risks*. Prepared by Rand Corporation for U.S. Environmental Protection Agency, R-3447-EPA, Washington, D.C.
- Harrington, Winston and Paul R. Portney. 1987. Valuing the Benefits of Health and Safety Regulations. *Journal of Urban Economics* 22(1):101-112.
- Jones-Lee, Michael. 1974. The Value of Changes in the Probability of Death or Injury. *Journal of Political Economy* 82(4):835-849.
- Jones-Lee, M. W., M. Hammerton, and P. R. Philips. 1985. The Value of Safety: Results of a National Sample Survey. *The Economic Journal* 95(377):49-72.
- Kramer, Carol S. and Karen P. Penner. 1986. Food Safety: Consumers Report Their Concerns. *National Food Review* NFR-33:21-24.
- Krupnick, Alan J. and Maureen L. Cropper. 1992. The Effect of Information on Health Risk Valuations. *Journal of Risk and Uncertainty* 5(1):29-48.
- Kunreuther, Howard and Douglas Easterling. 1990. Are Risk-Benefit Tradeoffs Possible in Siting Hazardous Facilities? *American Economic Association Papers and Proceedings* 80(2):252-256.
- Lin, C.-T. J., J. W. Milton, E. M. Babb, and R. L. Degner. 1989. Consumer Perceptions of Shellfish Related Safety Risks: Results from East Coast Focus Groups. *Proceedings of the Symposium on Seafood Advertising and Promotion*, Orlando, FL.
- Lin, C.-T. Jordan and J. Walter Milton. 1993. Attribute and Safety Perceptions in a Double-Hurdle Model of Shellfish Consumption. *American Journal of Agricultural Economics* 75(3):724-729.
- Luce, R. D. and D. H. Krantz. 1971. Conditional Expected Utility. *Econometrica* 39(2):253-271.
- Mitchell, Robert Cameron and Richard T. Carson. 1989. *Using Survey to Value Public Goods: The Contingent Valuation Method*. Washington, D.C.: Resources for the Future.
- National Academy of Sciences, National Research Council. 1989. *Improving Risk Communication*. Washington, D.C.: National Academy Press.
- Penner, Karen P., Carol Kramer, and Gary Lee Frantz. 1985. *Consumer Food Safety Perceptions: A Survey of Consumers in Eight Kansas Counties*. Manhattan, KS: Cooperative Extension Service.
- Simon, H. A. 1955. A Behavioral Model of Rational Choice. *Quarterly Journal of Economics* 69(1):99-118.

- Slovic, Paul, B. Fischhoff, and S. Lichtenstein. 1982. Facts Versus Fears: Understanding Perceived Risk. In *Judgement Under Uncertainty: Heuristics and Biases*, eds. D. Kahneman, Paul Slovic, and Amos Tversky, 463-489. Cambridge, MA: Cambridge University Press.
- Smith, V. Kerry and William H. Desvousges. 1987. An Empirical Analysis of the Economic Value of Risk Changes. *Journal of Political Economy* 95(1):89-114.
- Starr, Chauncey. 1969. Social Benefit versus Technical Risk. *Science* 165:1232-1238.
- Tversky, Amos and D. Kahneman. 1982. Judgment Under Uncertainty: Heuristics and Biases. In *Judgement Under Uncertainty: Heuristics and Biases*, eds. D. Kahneman, Paul Slovic, and Amos Tversky, 3-20. Cambridge, MA: Cambridge University Press.
- U.S. Food and Drug Administration. 1989. Continuous Inspection of Meat and Poultry: Should It be Applied to Seafood. Unpublished document, referenced in letter from W. R. Dowdle, Acting Director, Centers for Disease Control, to F. E. Young, Commissioner, Food and Drug Administration.
- van Ravenswaay, E. O. and J. P. Hoehn. 1991a. Consumer Willingness to Pay for Reducing Pesticide Residues in Food: Results of a Nationwide Survey. East Lansing, MI: Michigan State University, Department of Agricultural Economics Staff Paper No. 91-18.
- van Ravenswaay, E. O. and J. P. Hoehn. 1991b. Contingent Valuation and Food Safety. East Lansing, MI: Michigan State University, Department of Agricultural Economics Staff Paper No. 91-13.
- Zellner, James A. and Robert L. Degner. 1989. Consumer Willingness to Pay for Food Safety. Paper presented at the 1989 Annual Meetings for the Southern Agricultural Economics Association, Nashville, TN.

Appendix 5.A

SHELLFISH RISK TELEPHONE SURVEY

Telephone No. (____) _____ Interviewer No. _____

Time Started _____ Time Ended _____

Date _____

INTRODUCTION

Hello, my name is _____. I'm with _____, a national consumer opinion research organization based in _____. We are conducting a survey about food safety. I'm not selling any product and I'm not asking for contributions. Your telephone number was randomly selected by a computer to participate in this study. All your answers are confidential since we don't know who you are. My questions will take only about 10 minutes.

First, I'd like to know if you are 18 or older?

(IF "YES," CONTINUE WITH INTRODUCTION. IF "NO" TO QUESTION, ASK TO SPEAK TO SOMEONE AT THAT NUMBER WHO MEETS CRITERION—REPEAT INTRODUCTION FOR NEW RESPONDENT. IF NO ONE ELSE AT THAT NUMBER, CONCLUDE INTERVIEW.)

1. Is your age ... (READ LIST)

18 to 34	01
35 to 64	02
Over 65	03
Refused to answer (DON'T READ)	04

2. (INTERVIEWER: WHAT IS THE GENDER OF THE INTERVIEWEE?)

Male	01
Female	02

SECTION 1. CONSUMPTION BEHAVIOR

3. How many days a week do you eat both a noon and evening meal?

4. Now, I'd like you to think about 3 foods: chicken, shrimp and oysters. Have you eaten chicken at-home or in a restaurant within the past 2 months?

No 01 — (GO TO 5.)

Yes 02 — 4.a. About how many times do you usually eat chicken in a month?

5. Have you eaten oysters at-home or in a restaurant within the past 2 months?

No 01 — 5.a. Have you eaten oysters within the past year?

No 01 — (TERMINATE INTERVIEW IF NON-USER QUOTA IS MET.)

Yes 02 — (GO TO 5.b.)

5.b. About how often do you eat oysters?
(LET RESPONDENT ANSWER, THEN CODE.)

Once or twice every 6 months	01
Once or twice a year	02
Only tried once	03—(GOTO 5.d.)

Yes 02 — 5.c. About how many times do you usually eat oysters in a month?

_____ — (GO TO 5.d.)

5.d. How many of the following ways do you usually eat oysters? ... (READ LIST)

Raw	01
Cooked	02
Canned	03

6. Have you eaten shrimp at-home or in a restaurant within the past 2 months?

No 01 — (GO TO SECTION 2)

Yes 02 — 6.a. About how many times do you usually eat shrimp in a month?

SECTION 2. CHARACTERISTIC RATINGS

Next, I'd like you to rate some of the characteristics of these same 3 foods. Please think about each food in a general way and not as a specific brand or style of preparation. Please give me some rating for each food even if you don't usually eat that food.

(IF RESPONDENT IS UNCERTAIN OR RELUCTANT TO ANSWER FOR

ANY FOOD, RESTATE THAT THERE ARE NO RIGHT OR WRONG ANSWERS AND WE ARE ONLY INTERESTED IN THEIR OPINIONS. IF RESPONDENT REFUSES TO ANSWER, CODE AS "99.")

7. First, let's talk about taste.
 - a. On a scale of 1 to 7 where 7 is an excellent taste and 1 is a terrible taste, how would you rate the taste of chicken? _____
 - b. How about the taste of shrimp? _____
 - c. And, how would you rate the taste of oysters? _____

8. Now consider the nutritional value of these same foods.
 - a. On a scale of 1 to 7 where 7 is the highest rating and 1 is the lowest rating, how would you rate the nutritional value of shrimp?

 - b. What about the nutritional value of chicken? _____
 - c. And, what's your rating of the nutritional value of oysters?

9. Let's talk about the freshness of these foods that you might purchase in a store or restaurant. On a scale of 1 to 7 where 7 is the highest rating and 1 is the lowest rating.
 - a. How would you rate the freshness of oysters? _____
 - b. And how about shrimp? _____
 - c. And, how would you rate the freshness of chicken? _____

10. Now think about the cost of these foods.
 - a. Again using a scale of 1 to 7 where 7 is very expensive and 1 is very inexpensive, how would you rate the cost of shrimp?

 - b. And how do you rate the cost of oysters? _____
 - c. And, chicken? _____

11. Finally, think about food safety. On a scale of 1 to 7 where 7 is perfectly safe and 1 is not safe at all.
- How would you rate the safety of chicken? _____
 - What about the safety of oysters? _____
 - And how do you rate the safety of shrimp? _____

SECTION 3. FOOD SAFETY BACKGROUND AND PERCEPTION

12. Sometimes foods are not safe because of bacterial contamination. Have you ever heard or read about illnesses or diseases caused by ... (READ LIST)

	<u>No</u>	<u>Yes</u>
a. Unsafe chicken	01	02
b. Unsafe shrimp	01	02
c. Unsafe oysters	01	02

13. Have you ever gotten sick from eating any kind of food that you believed was unsafe?

No 01 — (GO TO 14.)

Yes 02 — 13.a. What foods have made you sick?
(DO NOT READ LIST. CODE ALL TYPES OF RESPONSE BELOW.)

Chicken	01
Shrimp	02
Oysters	03
Other shellfish (crabs, clams, mussels, etc.)	04
Fish (red snapper, flounder, etc.)	05
Red meat (beef, pork, lamb)	06
Dairy products (cheese, milk, etc.)	07
Salad dressing (mayonnaise)	08
Vegetables	09
Others	10

14. Suppose you were to eat one serving each of chicken, shrimp, and oysters at home or in a restaurant.

14.a. Would you say the chance of getting sick from the serving of chicken is ... (READ LIST)

Very likely	01
Somewhat likely	02
Not too likely	03
Not at all likely	04
Don't know (DON'T READ)	05

14.b. Would you say the chance of getting sick from the serving of shrimp is ... (READ LIST)

Very likely	01
Somewhat likely	02
Not too likely	03
Not at all likely	04
Don't know (DON'T READ)	05

14.c. Would you say the chance of getting sick from the serving of oysters is ... (READ LIST)

Very likely	01
Somewhat likely	02
Not too likely	03
Not at all likely	04
Don't know (DON'T READ)	05

15.a. If an illness did occur from eating unsafe chicken, do you think the illness would be ... (READ LIST)

Very severe	01
Somewhat severe	02
Not too severe	03
Not at all severe	04
Don't know (DON'T READ)	05

15.b. If an illness did occur from eating unsafe shrimp, do you think the illness would be ... (READ LIST)

Very severe	01
Somewhat severe	02
Not too severe	03
Not at all severe	04
Don't know (DON'T READ)	05

- 15.c. If an illness did occur from eating unsafe oysters, do you think the illness would be ... (READ LIST)

Very severe	01
Somewhat severe	02
Not too severe	03
Not at all severe	04
Don't know (DON'T READ)	05

16. Have you ever gotten sick from eating bad or unsafe oysters?

No 01 — (GO TO 17.)

Yes 02 — 16.a. Was the last time this occurred ... (READ LIST)

Within the last year	01
Or, more than a year ago	02

16.b. Did this illness last ... (READ LIST)

About a day or two	01
About a week	02
Over a week	03
Don't remember (DON'T READ)	04

16.c. Did you see a doctor because of this illness?

No	01
Yes	02

16.d. Were you hospitalized because of this illness?

No	01
Yes	02

(IF RESPONSES TO QUESTIONS 5 AND 5.a. WERE "No," GO TO 18. OTHERWISE, GO TO 17.)

17. Have you changed your consumption of oysters within the past year?

No 01 — (GO TO 18.)

Yes 02 —

- 17.a. Would you say that you are now ... (READ LIST)
- 01 Eating oysters more often than you used to — (GO TO 18.)
 - 02 Eating oysters less often than you used to — (GO TO 17.b.)
 - 03 Not eating oysters at all any more — (GO TO 17.b.)

- 17.b. What was the primary reason why you ate oysters less often? (DO NOT READ LIST. CODE TYPE OF RESPONSE BELOW. PROBE FOR PRIMARY REASON. EXAMPLE: "I've become a lot more concerned about getting sick from eating oysters." PROBE: "Why have you become more concerned?")

Press reports about illnesses	01
Increases in the price	02
Personal illness from eating oysters	03
Relative's or friend's illness	04
Doctor's warning about eating oysters	05
Other reasons	06

18. Oysters are harvested from the ocean and then handled by processors, retailers and restaurants before they are sold to the public. Suppose there were food safety problems with oysters. Do you think the primary source of such problems is ... (READ LIST)

In the water where oysters grow	01
In the processing and transportation of oysters	02
In the stores and restaurants that sell oysters	03
In the home when consumers prepare oysters	04
Don't know (DON'T READ)	05

SECTION 4. WILLINGNESS TO PAY FOR INSPECTION

(Note: There are 3 separate formats for questions 19 to 19.d.)

(Format 1—Relative Risk)

19. Currently oysters are not inspected by the federal government in the same way that meat products like chicken are inspected. The U.S. Food and Drug Administration reported recently that the risk of illness

from a serving of oysters is higher than the risk from an equivalent serving of chicken. Suppose oysters could be inspected so that the risk of illness from oysters was about the same as the risk from eating chicken.

(IF RESPONSE TO 5. AND 5.a. WERE "No," GO TO 19.a.)

(IF RESPONSE TO 5. OR 5.a. WAS "Yes," GO TO 19.b.)

19.a. If inspection reduced the risk of illness from oysters and did not change the taste or price, would you eat oysters?

No 01 — (GO TO 19.e.)

Yes 02 — (GO TO 19.c.)

19.b. If inspection reduced the risk of illness from oysters and did not change the taste or price, would you eat oysters? ...
(READ LIST)

More often than now 01 — (GO TO 19.c.)

About the same as now 02 — (GO TO 19.c.)

19.c. Would you be willing to pay more than the current price for oysters if the risk of illness was reduced to the same as the risk from chicken?

No 01 — (GO TO 19.f.)

Yes 02 — (GO TO 19.d.)

19.d. Let's say the average price of oysters in your state is currently about \$4.00 per dozen. How much more than \$4.00 per dozen would you be willing to pay for oysters with this lower risk of illness?

_____ (RECORD AS INCREMENT OVER \$4.00 [e.g., \$0.25, \$1.50] AND NOT AS RESPONSE INCLUDING \$4.00 [e.g., \$4.25, \$5.50]) — (GO TO 20.)

(Format 2—Absolute Risk—1/10,000)

19. Currently oysters are not inspected for safety by the federal government in the same way that meat products like chicken are inspected. The U.S. Food and Drug Administration reported recently that each

year about 1 out of every 250 servings of oysters causes an illness. This means that each year over 60,000 people get sick from oysters. Suppose a federally administered inspection program could be set up that would reduce the risk of illness from 1 out of every 250 servings to 1 out of every 10,000 servings so that only about 1,500 people would get sick from eating oysters each year.

(IF RESPONSE TO 5. AND 5.a. WERE "No," GO TO 19.a.)

(IF RESPONSE TO 5. OR 5.a. WAS "Yes," GO TO 19.b.)

19.a. If inspection reduced the risk of illness from oysters and did not change the taste or price, would you eat oysters?

No 01 — (GO TO 19.e.)

Yes 02 — (GO TO 19.c.)

19.b. If inspection reduced the risk of illness from oysters and did not change the taste or price, would you eat oysters? ...
(READ LIST)

More often than now 01 — (GO TO 19.c.)

About the same as now 02 — (GO TO 19.c.)

19.c. Would you be willing to pay more than the current price for oysters if the risk of illness was reduced to the lower level?

No 01 — (GO TO 19.f.)

Yes 02 — (GO TO 19.d.)

19.d. Let's say the average price of oysters in your state is currently about \$4.00 per dozen. How much more than \$4.00 per dozen would you be willing to pay for oysters with this lower risk of illness?

_____ (RECORD AS INCREMENT OVER \$4.00 [e.g., \$0.25, \$1.50] AND NOT AS RESPONSE INCLUDING \$4.00 [e.g., \$4.25, \$5.50]) — (GO TO 20.)

(Format 3—Absolute Risk—1/25,000)

19. Currently oysters are not inspected for safety by the federal government in the same way that meat products like chicken are

inspected. The U.S. Food and Drug Administration reported recently that each year about 1 out of every 250 servings of oysters causes an illness. This means that each year over 60,000 people get sick from oysters. Suppose a federally administered inspection program could be set up that would reduce the risk of illness from 1 out of every 250 servings to 1 out of every 25,000 servings so that only about 600 people would get sick from eating oysters each year.

(IF RESPONSE TO 5. AND 5.a. WERE "No," GO TO 19.a.)

(IF RESPONSE TO 5. OR 5.a. WAS "Yes," GO TO 19.b.)

19.a. If inspection reduced the risk of illness from oysters and did not change the taste or price, would you eat oysters?

No 01 — (GO TO 19.e.)

Yes 02 — (GO TO 19.c.)

19.b. If inspection reduced the risk of illness from oysters and did not change the taste or price, would you eat oysters? ... (READ LIST)

More often than now 01 — (GO TO 19.c.)

About the same as now 02 — (GO TO 19.c.)

19.c. Would you be willing to pay more than the current price for oysters if the risk of illness was reduced to the lower level?

No 01 — (GO TO 19.f.)

Yes 02 — (GO TO 19.d.)

19.d. Let's say the average price of oysters in your state is currently about \$4.00 per dozen. How much more than \$4.00 per dozen would you be willing to pay for oysters with this lower risk of illness?

_____ (RECORD AS INCREMENT OVER \$4.00 [e.g., \$0.25, \$1.50] AND NOT AS RESPONSE INCLUDING \$4.00 [e.g., \$4.25, \$5.50]) — (GO TO 20.)

(Note: End of separate formats.)

19.e. Would you say the reason why you would not eat oysters inspected under this new program is because ... (READ LIST)

- | | |
|-----------------------------------|----------------|
| Oysters would still not be safe | 01 |
| Oysters are already too expensive | 02 |
| You just don't like oysters | 03—(GO TO 20.) |

19.f. Would you say the reason why you would not pay more is because ... (READ LIST)

- | | |
|----|--|
| 01 | The current price is all I can afford |
| 02 | The new inspection program would not be effective in reducing risk |
| 03 | The government should pay for food inspection |
| 04 | Other (DON'T READ) |

20. Some people think: "There isn't much the average person can do to avoid food safety problems from shellfish products." Do you ... (READ LIST)

- | | |
|---|----|
| Strongly agree | 01 |
| Somewhat agree | 02 |
| Somewhat disagree | 03 |
| Or, strongly disagree with this statement | 04 |
| Refused to answer (DON'T READ) | 05 |

21. Some people also think: "The federal government should try to eliminate all food safety problems due to shellfish products regardless of the cost." Do you ... (READ LIST)

- | | |
|---|----|
| Strongly agree | 01 |
| Somewhat agree | 02 |
| Somewhat disagree | 03 |
| Or, strongly disagree with this statement | 04 |
| Refused to answer (DON'T READ) | 05 |

(IF RESPONSE TO 12.C. WAS "Yes," GO TO 22. IF "No," GO TO 24.)

(Note: Questions 22 and 23 were included in the second wave of the survey only.)

22. You said earlier that you had heard or read about illnesses or diseases caused by unsafe oysters. Was this information from ... (READ LIST AND CHECK ALL THAT APPLY)

- | | |
|------------|----|
| Newspapers | 01 |
| Magazines | 02 |

Radio	03
TV	04
Friends and acquaintances	05
A doctor	06
Someone in your household	07
Other	08
Don't know (DON'T READ)	09
Refused to answer (DON'T READ)	10

23. Did you or anyone in your household see the ABC News program 20/20 in mid-February that focused on shellfish safety?

Yes	01
No	02
Don't know (DON'T READ)	03
Refused to answer (DON'T READ)	04

SECTION 5. SOCIOECONOMIC AND HEALTH BACKGROUND

24. Finally, I have a few questions about you and your household so that we know if this survey covered a broad cross-section of the population. What is the zip code in your home address?

25. For someone your age would you say your health is ... (READ LIST)

Excellent	01
Good	02
Fair	03
Poor	04
Refused to answer (DON'T READ)	05

26. Please tell me if you now have or if you have ever had any of the following health problems ... (READ LIST)

	<u>No</u>	<u>Yes</u>	<u>Refused to answer</u>
Allergic reaction to shellfish	01	02	03
Diabetes	01	02	03
Liver trouble	01	02	03

27. What was the last grade of school that you completed ... (READ LIST)
- | | |
|--------------------------------|----|
| Grade school (1-8 only) | 01 |
| Some high school | 02 |
| High school graduate | 03 |
| Some college | 04 |
| College graduate | 05 |
| Postgraduate | 06 |
| Refused to answer (DON'T READ) | 07 |
28. Would you describe your racial or ethnic background as ... (READ LIST)
- | | |
|--------------------------------|----|
| White | 01 |
| Black | 02 |
| Hispanic | 03 |
| Asian | 04 |
| American Indian | 05 |
| Other | 06 |
| Refused to answer (DON'T READ) | 07 |
29. Did anyone in your household eat oysters when you were growing up?
- | | |
|--------------------------------|----|
| No | 01 |
| Yes | 02 |
| Refused to answer (DON'T READ) | 03 |
30. Would you describe your current religious preferences as ... (READ LIST)
- | | |
|--------------------------------|----|
| Protestant | 01 |
| Catholic | 02 |
| Jewish | 03 |
| Other | 04 |
| None | 05 |
| Refused to answer (DON'T READ) | 06 |
31. Are there any children under the age of 12 in your household?
- | | |
|--------------------------------|----|
| No | 01 |
| Yes | 02 |
| Refused to answer (DON'T READ) | 03 |

32. Finally, I have one last question about the total annual income you and other members of your household earned last year. Was your total household income more than or less than \$35,000?

(IF "Less than," ASK: "Was it more or less than \$20,000?")

(IF "More than," ASK: "Was it more or less than \$50,000?")

Less than \$20,000	01
\$20,000 to \$35,000	02
\$35,000 to \$50,000	03
More than \$50,000	04
Refused to answer (DON'T READ)	05

(READ: "Thank you very much for your cooperation.")