Valuing Food Safety and Nutrition

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Julie A. Caswell

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PART THREE: A Closer Look at Performing Contingent Valuation

12. Using Contingent Valuation to Value Food Safety: A Case Study of Grapefruit and Pesticide Residues

Jean C. Buzby, Jerry R. Skees, and Richard C. Ready

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

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Jean C. Buzby

Jerry R. Skees

Richard C. Ready

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Using Contingent Valuation to Value Food Safety: A Case Study of Grapefruit and Pesticide Residues

Jean C. Buzby, Jerry R. Skees, and Richard C. Ready[1]

Putting a value on nonmarket goods is much more difficult than valuing market goods because no formal market exists to obtain price information. In the case of food safety, researchers must resort to nonmarket valuation techniques to measure consumers' willingness to pay (WTP) for reduced food risks when market data (such as market trials) and observed organic purchase data are not available. Although there are several economic tools to value nonmarket goods, such as hedonic pricing and the travel cost method, contingent valuation (CV) is generally considered by researchers as the most appropriate choice for measuring food safety. One primary advantage of CV is that it is a flexible tool which can be tailored to analyze specific food safety policies.

Contingent valuation methods encompass personal interviews, mail surveys, and telephone surveys which elicit consumers' WTP for nonmarket goods "contingent" on a given hypothetical scenario. For over 30 years, contingent valuation has been used to measure values associated with a wide variety of nonmarket goods including water quality, hunting, toxic waste dumps, recreation, and air quality. Carson et al.'s (1994) bibliography provides a list of over 1,600 CV studies and papers. Hence, collectively, CV researchers have a solid foundation for designing CV studies that are reliable (Randall 1993). CV surveys are becoming increasingly popular for food safety studies (e.g., Misra et al. 1991, van Ravenswaay 1990). Common applications of CV for food safety issues are to present respondents with a hypothetical scenario and ask them to name a price that is the most that they are willing to pay above the normal purchase price of a good to avoid or reduce a particular food safety risk.

Past research has shown that CV methods generate results that are comparable in terms of accuracy to analogous results from other approaches that value nonmarket goods (Anderson and Bishop 1986, Cummings et al. 1986, Mitchell and Carson 1989). Other strengths of CV surveys are that they tend to be less expensive than actual market experiments (Misra et al. 1991) and CV doesn't rely on secondary data sources originally developed for other needs (Anderson and Bishop 1986, Cummings et al. 1986).

However, CV's reliance on consumers' subjective responses make the results vulnerable to several potential biases.[2] One concern with CV is that elicited values inflate what consumers would actually pay because consumers take hypothetical scenarios less seriously than real-life situations. Additionally, CV surveys that value food safety typically include information on different levels of food risk. Studies have shown that consumers have difficulty understanding and processing risk information. For example, consumers often inflate small risks such as the risks from pesticide residues, while ignoring relatively larger risks, such as the risk of not wearing a seat belt while in a motor vehicle.

There has been increased concern among CV researchers about how CV methods and results are reported. Economics and other journals tend to limit complete reporting of methods due to space limitations. Standardized reporting of CV methods and results could help researchers learn from others' mistakes meaning improved efficiency in time and funding. Improved standardization in CV reporting could help researchers compare the results of previous CV studies and help them use the data to develop benefit estimates for different policy problems (this has been referred to as "benefit transfer"). This chapter shows how the CV method can be applied to value food safety. In particular, a CV survey is presented which elicited consumers' WTP for a specific pesticide-related food safety risk reduction from consuming fresh grapefruit.

Objectives

This chapter provides a thorough description of the bias-reducing techniques and design used in a major CV study on a particular pesticide-risk reduction.[3] It also provides the basic results from the study. This combination of bias-reducing techniques, design, and results is presented for other researchers to use the findings and insights gained in the study. At the same time, we try to overcome some of the problems from lack of standardized reporting. In particular, the details of the study are outlined to:

(1) Help other researchers interested in doing CV studies on food safety issues learn from our mistakes and benefit from our insights so that they can streamline their survey design efforts.
(2) Help researchers who want to use data from these surveys understand how the data were obtained.
(3) Allow researchers to apply the data to new situations.

The survey effort was unique in that it incorporated both the payment card (PC) and dichotomous choice (DC) elicitation methods as well as two different risk reduction levels for a particular food risk. This chapter does not give extensive detail about the results, nor does it dissect the differences due to elicitation method and level of risk reduction. Buzby et al. (1994) investigate these topics. The main focus is to illustrate how the CV method can be applied to value food safety.

Survey Design Procedures

This study uses data from a combination of national phone and mail surveys of U.S. grapefruit consumers.[4] Specifically, the study uses data from 3,228 completed phone interviews of U.S. consumers and data from 1,671 returned CV mail surveys of fresh grapefruit consumers. The survey effort consisted of two stages: (1) a national phone survey provided information on consumers' attitudes towards food safety, demographic information, and a sampling frame for the mail survey (for survey text see Appendix 12.A); and (2) four versions of a contingent valuation mail survey provided information on consumers' WTP for reduced food safety risk from a specific pesticide (for survey text see Appendix 12.B). The 99+ percent risk reduction represents the decrease in risk from switching from consuming fresh grapefruit treated with the widely-used postharvest pesticide, sodium ortho-phenylphenate (SOPP), which has a low food safety risk, to consuming grapefruit treated with a "safer" pesticide, thiabendazole (TBZ) (a 99+ percent risk reduction), over a lifetime.[5]

The four mail survey versions paired two different risk reductions with two types of payment vehicles. Specifically, to determine the sensitivity of consumers' WTP to the elicitation method, two versions used the payment card method and two versions used a dichotomous choice question followed by an open-ended question. Each elicitation method was used at two different risk reduction levels (50 and 99+ percent) to determine the sensitivity of WTP to the risk reduction level. For the 50 percent risk reduction, TBZ was replaced by a hypothetical pesticide which has a 50 percent lower food safety risk than SOPP. The four survey versions were:

VERSION PC50: A 50 percent decrease in risk and the PC method.
VERSION PC99: A 99+ percent decrease in risk and the PC method.
VERSION DC50: A 50 percent decrease in risk and the DC method.
VERSION DC99: A 99+ percent decrease in risk and the DC method.

The Survey Research Center (SRC) at the University of Kentucky used random digit dialing for the phone survey of U.S. households and obtained a sample of 2,197 grapefruit consumers who were willing to participate in the follow-up CV mail survey. The surveys targeted primary grocery shoppers in households that had consumed grapefruit in the past year. The phone survey included questions measuring demographics and attitudes about food safety (see Appendix 12.A). Specifically, the demographic section included questions on gender, race, age, income, household size, and education. Where possible, categories consistent with those of the U.S. Bureau of the Census were used to facilitate comparisons of survey samples with the U.S. population. Table 12.1 lists the actions taken to increase participation and reduce nonresponse bias.

For the contingent valuation market simulation surveys, the mail medium was chosen for its ability to control the development of the hypothetical scenario and its ability to present visual aids showing relative risk levels. The goal was to make the survey believable so that respondents would respond "as if" the scenario was actually taking place. Therefore, much attention was given to the mail survey's development and pretesting. Pretesting and focus groups for both surveys helped indicate unclear sections thus allowing modifications prior to survey implementation. For example, focus groups revealed the best way to design the payment card and pretesting revealed ambiguous questions. The mail surveys consisted of 12 page color booklets and the four versions were printed on four neutral paper colors, which simplified the sorting and physical handling of the large volume of surveys. (The full text of the mail surveys is included in Appendix 12.B).

All four versions presented grapefruit consumers with a hypothetical scenario to obtain their additional WTP over the normal purchase price of one SOPP-treated grapefruit to purchase a relatively "safer" grapefruit. The WTP section of the mail survey began with a verbal explanation of the hypothetical scenario supported by one of two risk ladders showing relative risk and one of the two elicitation methods.

One unexpected difficulty of the survey was obtaining food safety risk estimates for SOPP and TBZ because there is no clear consensus on risk estimates. After a lengthy process of requesting risk information from the Freedom of Information Office of the Environmental Protection Agency and many phone discussions, risk estimates for SOPP and TBZ causing cancer in humans were eventually obtained. Essentially, if TBZ replaced SOPP on fresh grapefruit there would be a 99+ percent reduction in the food safety risk of consuming grapefruit over one's lifetime. These risk estimates for causing cancer were extrapolated to risks of causing an early death over a lifetime of exposure to the pesticides.[6] For the risk ladders, all risks were couched in terms of early death, as opposed to causing cancer. This decision was based on the extreme difficulty of obtaining cancer risk estimates for nonpesticide related causes that consumers might be familiar with (e.g., radon, x-rays) and on the lack of universal acceptance of such cancer risk estimates by the scientific community. Yet, this practice may potentially reduce respondents' acceptance of the hypothetical scenario. Throughout all four survey versions, the actual

TABLE 12.1 Techniques Followed in Study to Increase Participation and Reduce Nonresponse Bias

Survey	Technique
Phone Survey	(1) Survey length was minimized to encourage participation. (2) The survey identified the caller as representing the Survey Research Center at the University of Kentucky because past research has shown that identifying sponsors with noncommercial identities can promote higher response rates. (3) Confidentiality was assured. (4) Attitudinal questions were asked before demographical questions to put respondents at ease because past research shows that some demographic questions, such as income, can dissuade respondents from participating.
Mail Survey	(1) Survey length was minimized. (2) All mail surveys included cover letters which were printed on the University of Kentucky's Department of Agricultural Economics letterhead. (3) Confidentiality was assured. (4) Mail surveys were sent out in weekly batches so that households received them within a week of the phone interview. The timely mailing of surveys helped ensure that the respondents would remember that they agreed to fill out the mail survey. (5) A strategy for mailing the surveys was followed: (1) a reminder postcard was mailed to all participants one week after the initial mailing; (2) a replacement survey was mailed 3 weeks after the initial mailing; and (3) a second replacement survey was mailed 7 weeks after the initial mailing. (6) All postcards and replacement surveys were hand-signed to convey sincerity. (7) Postcards invited respondents to call collect if they had any questions or if they needed a replacement survey. (This practice is recommended; 15 people called collect to obtain replacement surveys.) (8) Each survey included its own self-addressed, postage-paid return envelope.

names of the two pesticides were never used to avoid any bias due to the names and to prevent any panic or "scares" over any particular product. Instead, consumers were presented with the baseline "Grapefruit A" which was treated with "Pesticide A" (SOPP). "Grapefruit B" was treated with "Pesticide B."

Respondents were told only the risks associated with "Pesticide A" and "Pesticide B."

Loomis and Duvair (1993) found the risk ladder to be an effective tool for helping respondents answer contingent valuation questions involving risk changes. All four of our survey versions used risk ladders to portray the risk reductions (see risk ladders in Appendix 12.B) and all ladders were identical except for the two levels of risk reduction (99+ or 50 percent). Other risk estimates were placed alongside the pesticide risk levels to give respondents a frame of reference (e.g., accidental death due to fire). There may be some bias due to the selection of the nonpesticide risks used on the ladder. However, it was necessary to use risk ladders to communicate relative risk because there was a specific actual risk reduction being studied for the larger research effort, and because, in general, consumers cannot accurately estimate risk levels.

In order to implement the CV market simulation approach, it was necessary to select an elicitation procedure for the survey. The payment card method was selected for its simplicity, its ability to obtain precise WTP estimates, and to minimize the possibility of starting point bias found in interactive bidding techniques. The PC method asks respondents to select the amount that they are willing to pay from a checklist of payment amounts. Although the payment card can be tailored to different income levels and can use "anchors" representing certain household expenditures, neither of these practices were implemented here because consumers can relate to the values in the range ($.01 to $.50) (see Question 15, Version 1, in Appendix 12.B).

Prior to the elicitation question in all four scenarios, participants were informed that the original purchase price of one "Grapefruit A" was fifty cents per grapefruit. The starting price could not be varied due to limitations in sample size. The payment card consisted of one column of values ranging from zero to fifty cents above the original purchase price of one "Grapefruit A." Specifically, respondents were asked to circle the one amount (WTP) that indicates the *most* that they would pay above the purchase price of one "Grapefruit A" to buy one "Grapefruit B." Respondents were provided with space below the payment card to allow them to answer with WTP values not shown in the column of numbers. The relatively low starting price for an individual grapefruit indicated that the range of WTP premiums could be reasonably covered with the PC method.

However, the payment card can also be biased by the highest number for the column. Here, the upper limit of 50 cents was selected because it generously doubled the starting price of one grapefruit. Focus groups considered what they would pay for one "Grapefruit B" and then helped define the payment card. In the three focus groups, averaging ten people per group, there was heated debate about the upper column limit and the choice between one or two penny increments.[7] It was felt that too many numbers on the payment card might distract respondents from circling one number and that more than one column might entice some respondents to circle one number in each column. Respondents were informed that circling zero means that they would not pay more to buy "Grapefruit B." The last question in all the mail surveys asked respondents with zero bids why they would not pay more for "Grapefruit B" to help distinguish protest bids from those who would honestly not pay more for the increase in food safety.

The dichotomous choice question followed by an open-ended question was selected for the second elicitation method because it mimics a normal market where consumers either buy a product at a given price or they do not (see Question 15, Version 2, in Appendix 12.B). Our DC surveys asked respondents which grapefruit they would buy, "Grapefruit A" or "Grapefruit B," given prices and the food safety risk reduction. For each DC questionnaire, 1 of 10 starting prices (bids) was randomly assigned to "Grapefruit B."[8] The ten starting bids were obtained from a distribution of WTP values from a subsample of returned PC surveys and each was assigned an equal number of surveys. To provide further insight on WTP, the DC question was followed by a question asking respondents what was the most that they would pay to buy the food safety improvement.

Survey Results

The phone survey provided a sample of 2,831 grapefruit consuming households, and of these 2,197 were willing to participate in the follow-up mail survey (77.6 percent).[9] The sample tracked fairly well with the general population with the exception that there were more women and fewer adolescents in the surveys. These differences were expected because the samples represent a population of "grocery shoppers" whereas the census represents the overall population. Therefore, the higher proportion of women and the lower proportion of adolescents in the sample does not mean that the samples are not representative of the population of shoppers.

In addition to providing a mail survey sample, the phone survey also provided information on consumers' attitudes about food safety. Out of 3,228 completed interviews, 33 percent of the respondents believe the current levels of pesticides in fresh fruits and vegetables are safe. This result corresponds to Weaver et al.'s (1992) survey result that 71 percent of consumers were "concerned about the danger posed to consumers of pesticide-treated produce." Meanwhile, van Ravenswaay and Hoehn (1991) found that 67.3 percent were confident that "food" consumed in their household is safe.

In this study, 7 percent felt strongly that the government should ban all pesticides while 25.9 percent moderately agreed. Whereas, Misra et al. (1991) found that 11 percent of their survey respondents wanted all pesticides banned from fresh produce production. Additionally, in this study, 88.6 percent felt that all produce should be clearly labeled with pesticide use information. Fifty-seven percent preferred to buy organic produce and 47 percent were wary of buying imported fresh produce. These responses indicate a strong concern about labeling requirements and current pesticide residue levels.

The phone survey provided a sample of 2,197 grapefruit consumers who were willing to participate in the follow-up mail survey and of these, 66 gave addresses that were undeliverable. The mail survey's overall response rate was 76 percent before removing undeliverable addresses and 78.4 percent after removing undeliverable addresses. Table 12.2 presents the response rates for the four mail survey versions.

When consumers were asked to rate their top three food safety concerns "high saturated fats and cholesterol" was rated as the number-one concern (33.7 percent of those who answered this question), food poisoning (e.g., botulism and *Salmonella*) was rated second (30 percent), and pesticide residues were rated third (18.4 percent). This question and its responses were basically the same as that in Misra et al.'s (1991) survey; the top three concerns found here (out of

TABLE 12.2 Response Rates for Four Versions of the Consumer Mail Survey

	Total # Mailed	# Undeliv-erable	Net Usable Addresses[a]	Number Surveys Returned[b]	Raw Response Rate[c] (%)	Corrected Response Rate[d] (%)
Version PC50	400	8	392	294	73.5	75.0
Version PC99	700	33	667	548	78.3	82.2
Version DC50	396	8	388	296	74.7	76.3
Version DC99	701	17	684	533	76.0	77.9
Total	2,197	66	2,131	1,671	76.0	78.4

[a]Usable addresses = total number mailed - undeliverable addresses.
[b]Not including six that were returned unmarked.
[c]Raw response rate before removing undeliverable addresses.
[d]Corrected response rate calculated after removing undeliverable addresses.

7 concerns) were among their top four concerns (out of 10). By comparison, van Ravenswaay and Hoehn (1991) had a similar question which asked respondents to indicate the most serious potential food safety problem in terms of the health of their household. Their results indicated the same top three food safety problems and also a concern over additives and preservatives.

This survey found that consumers commonly take several preventative actions to reduce their exposure to pesticide residues in fresh produce. The three most common actions are to: (1) rinse with water (89.8 percent did this action), (2) grow their own produce (35.6 percent), and (3) avoid imported produce (26.2 percent). These results are similar to those found by van Ravenswaay and Hoehn (1991).

Consumers' Willingness to Pay for a Reduced Food Safety Risk

The mean WTP for the DC survey versions was more difficult to calculate than the PC means because the DC approach provides limited information about each consumer's preferences. In this study, WTP values are the price differences between the original starting price for one SOPP-treated grapefruit and the price that a consumer is willing to pay for the grapefruit with the reduced food safety risk. The mean WTP for the PC versions was obtained by a simple three step procedure: (1) undeliverable surveys were dropped from the sample; (2) all unit and WTP item nonresponses were assumed to have a zero WTP to conservatively correct for nonresponse bias; and (3) a simple mean was taken of all WTP values.[10] Calculation of the DC means was more complicated because the DC calculation requires integration instead of a simple average for the third step.

In essence, the WTP distribution for the DC responses can be plotted on a graph with the x-axis representing the DC bid levels ($.03 to $2.00—after subtracting the starting price of one grapefruit, $.50) and the y-axis representing the probability that a respondent will purchase "Grapefruit B" at the various bid levels. The DC mean WTP is the area found by integrating under the DC distribution's downward-sloping curve. Ideally, DC surveys would have a bid high enough that no one would buy the amenity at that bid level. This would help researchers understand the shape of the distribution and its intersection with the x-axis (the area under the distribution varies depending on where the distribution intersects the x-axis). Recall that in this study, some respondents indicated that they would pay the highest bid level. This study followed the conservative practice used by Bishop and Heberlein (1979) which truncates the distribution at the highest bid level. The DC means were obtained by integrating below the DC distributions up to the truncation point. The truncation cut off some of the area under each DC distribution, making the DC means conservative estimates. DC means were obtained using a logistic functional form.

This study chose ten DC bid levels based on early returns of the PC versions. The highest DC bid level ($2.50 for one "Grapefruit B") was set equal to the highest WTP amount entered on all the early returned payment cards. This highest DC level was reasonable because 95 percent of the early returned payment cards indicated WTP that were equal to or less than one-fourth of the highest bid.[11] However, there were still DC respondents willing to pay the highest bid level. Of those given the highest DC bid to consider, 12 percent of the DC50 respondents and 17 percent of the DC99 respondents indicated that they would pay this bid amount. Our experience suggests that future researchers should not rely too heavily on open-ended or payment card surveys to choose DC bid levels.

When looking at the means of all four survey versions, the DC means were much higher than the PC means. This result occurs with both the raw data and the data corrected for the nonresponse bias. The large difference between the means of the PC and DC data is supported by the theory that the DC method pushes respondents harder in evaluating potential purchasing behavior. The corrected mean WTPs were 15 cents for the PC50 version, 19 cents for the PC99 version, 67 cents for the DC50 version, and 69 cents for the DC99 version. The corrected median WTPs were 10 cents for the PC50 version, 10 cents for the PC99 version, 17 cents for the DC50 version, and 22 cents for the DC99 version. To some extent, respondents' behavior reflected the level of risk reduction. The dichotomous choice mean and median WTP and the payment card mean WTP were higher at the 99+ percent risk reduction than for the 50 percent risk reduction. Whereas, the payment card median WTP remained constant between the two risk reduction scenarios.

Regression Analysis of Consumers' WTP

We also used regression procedures to determine the influence of demographic and attitudinal factors on consumers' WTP for improved food safety and the sensitivity of consumers' WTP to the risk reduction level (50 or 99+ percent). Two regressions used WTP information obtained in the mail surveys as the dependent variable. The first regression used WTP values from the two PC versions of the mail survey and the second regression used WTP information from the two DC versions.

Both regressions used the same demographic and attitudinal independent variables. The demographic variables were gender, age, race, education, household income, and household size. The GENDER variable was equal to "0" for females and "1" for males. INCOME was discrete (1 to 7) with "1" representing those participants whose total 1991 before-tax household income was less than $10,000 and "7" representing those households that had income greater than $75,000. (The other income categories are described in the phone survey which is included in Appendix 12.A). AGE represents values for differences between

1993 (year survey was implemented) and the respondent's birth year. ATTITUDE 1 was equal to "1" if the respondent strongly agreed with the statement that "the current levels of pesticides in fresh fruits and vegetables are safe" and was equal to "5" if the respondent strongly disagreed with this statement. ATTITUDE 2 was equal to "1" if the respondent strongly agreed with the statement that "the government should ban all pesticides" and was equal to "5" if the respondent strongly disagreed with this statement. EDUCATION was the number of completed school years. HOUSEHOLD was the number of people the respondent normally bought groceries for (including herself/himself). Two attitudinal factors represent consumers' attitudes towards food safety. VERSION equals "0" for the survey versions with the 50 percent risk reduction and equals "1" for the 99+ percent risk reduction surveys. RACE was equal to "0" for whites and "1" for nonwhites. Table 12.3 lists the two regressions and indicates the significant variables.

For regression 1, on the PC data, the dependent variable is the log of consumers' stated WTP values for one grapefruit treated with the relatively safer pesticide. The OLS regression had a R^2 of 10 percent with several statistically significant variables. Cross-sectional data, like that used here, typically result in a low R^2 (Kmenta 1971: 234). There were four significant variables at the 1 percent level: AGE, EDUCATION, and both attitudinal variables. In general, results showed that WTP is greater for younger, less educated respondents. Many of the older respondents commented that they were on a fixed budget and couldn't pay more even if they wanted to. Also, many older people commented that at their age, food safety risks would not affect their life expectancy. Perhaps, those who are older are less worried about cancer risks from pesticides because of the long lag times between exposure and disease. The attitudinal variables showed that WTP increased with consumers' concerns over pesticide risk and the strength of the belief that the government should ban all pesticides. VERSION was significant at the 10 percent level and this may suggest that consumers, as a group, paid attention to the degree of risk and were willing to pay more for the larger risk reduction.

Regression 2 was more complicated because the DC method provides less information than the PC method. Therefore, a logistic regression was run instead of a regression with a continuous WTP dependent variable. The new dependent variable for the binary WTP values was equal to "0" if the respondent chose to buy "Grapefruit A" and "1" if the respondent chose to buy "Grapefruit B." Regression 2 included a new independent variable, DC BID, which represents the ten discrete starting prices used for "Grapefruit B" in the DC surveys. DC BID equaled the starting bid amount.

Once again, both attitudinal variables were statistically significant at the 1 percent level. The risk reduction level (VERSION) in the DC data was statistically significant at the 5 percent level. In essence, the probability of obtaining a "yes" to the Grapefruit B purchasing scenario increased with the

TABLE 12.3 Results from the Two Regressions Using WTP as the Dependent Variable

Variable	Regression 1 (OLS, 2 PC versions)	Regression 2 (Logistic, 2 DC versions)
GENDER	-.19 (-.70)	.18 (.67)
INCOME	-.01 (-.09)	-.08 (-1.06)
AGE	-.02 (-2.66)*	-.01 (-1.37)***
ATTITUDE 1	.30 (2.61)*	.50 (4.27)*
ATTITUDE 2	-.34 (-3.06)*	-.44 (-3.69)*
EDUCATION	-.11 (-2.56)*	.02 (.52)
HOUSEHOLD	.08 (1.01)	.01 (.19)
VERSION	.36 (1.56)***	.40 (1.81)**
RACE	.38 (.91)	.17 (.33)
DC BID	–	-.01 (-8.97)*
R^2	10%	22%[a]

Note: Numbers in parentheses are t-statistics. The superscripts *, **, and*** correspond to levels of statistical significance of 1 percent, 5 percent, and 10 percent, respectively.

[a] McFadden's R^2.

level of risk reduction. Age was the only statistically significant demographic variable (at the 10 percent significance level). As in the PC regression, WTP tended to decrease with age. The DC bid level was significant at the 1 percent level showing that the higher the bid level, the lower the probability of obtaining a "yes" response to the "Grapefruit B" purchasing question. Respondents assigned the 99+ percent risk reduction scenario were willing to pay more for the risk reduction than those assigned the 50 percent risk reduction.

Comparison of WTP with Other Food Safety Studies

Previous food safety studies showed that consumers will pay a small percentage above the traditional purchase price to avoid some perceived food risks. They attempted to explain the diversity in consumers' perceptions of food safety risks with demographic characteristics. In particular, previous research showed that WTP increases with higher levels of income and education (Elnagheeb and Jordon 1990, van Ravenswaay and Hoehn 1991) and older people and females are willing to pay more for pesticide residue free produce (Misra et al. 1991). Unlike previous studies, we found that WTP was inversely related to education level and age and that attitude about pesticide residue was an important indicator of consumers' WTP for food safety for both the DC and PC methods.

In general, comparisons of WTP values between studies are difficult because of the variability between surveys in terms of units of measurement, demographic categories of consumers, and areas surveyed. To the authors' knowledge, no other WTP study estimated consumers' WTP for safer fresh grapefruit. The most comparable study is that of van Ravenswaay and Hoehn (1991) that found that consumers were willing to pay around 17 percent in excess of the purchase price (per pound), annually, to avoid Alar in fresh apples. For our 50 percent risk reduction scenario, PC respondents were willing to pay, on average, 31 percent more for each grapefruit to reduce their risk and DC respondents were willing to pay 134 percent more. For the 99 percent risk scenario, PC respondents were willing to pay, on average, 38 percent more and DC respondents were willing to pay 138 percent more. However, this comparison is limited due to the differences in the scenarios.

Conclusions

Overall, the combined survey effort provided a wealth of information. This study supports the results of previous food safety studies that showed that consumers will pay a small percentage above the traditional purchase price to avoid some perceived food risks. Here, many respondents were willing to pay a significant amount over the purchase price and this may indicate some strong consumer concerns about pesticide residues. Some of the written comments on the surveys reinforced earlier evidence that pesticide use labeling was important and most felt that they were uninformed about pesticide-related risks and food safety in general.

Interestingly, for both the DC and PC versions, the level of risk reduction was statistically significant in explaining WTP values. The respondents' sensitivity to the level of risk reduction may indicate that consumers felt that there was a difference between the two risk reductions or that they paid close attention to the scenario. Differences between the two elicitation methods will be analyzed more fully by the authors in future studies. The major consideration in applying this study's WTP values is that the WTP elicited is very specific to the ban of a postharvest pesticide from use on fresh grapefruit. Therefore, the mean WTP is not for an improvement in overall food safety.

Design and Standardization Suggestions for Future Research

Future research using the payment card elicitation method can make use of some of the insights gained here. Specifically, the selection of the range of values for the payment card is critical; the range used here could have been improved by covering a relatively larger range of values. However, focus group participants strongly objected to going above 50 cents for the largest value on the payment card. This may be one prime example of where focus groups can lead researchers astray. Additionally, the payment card might have been clearer if the original starting price of one grapefruit did not equal the highest payment card value. This study found that the difference between one and two penny increments was not important.

In this study, all DC bids were allocated an equal number of mail surveys. However, many respondents who received surveys with the highest bid levels rebelled against the scenario by skipping over the question. Other respondents indicated that they would pay the highest bid level for "Grapefruit B." CV researchers who plan to use the DC approach could allocate a few surveys to some extremely high bids to increase the likelihood of getting more data to help elicit the full range of responses and to more precisely identify the shape of the DC distribution and its intersection with the x-axis.

Additionally, it may be more cost effective to purchase a sample of consumer addresses for the mail survey instead of hiring a survey research center to develop a sample from a phone survey. Here, the SRC was subcontracted to perform the phone survey because the target sample frame was U.S. fresh grapefruit consumers and, to our knowledge, no mailing list existed for this population.

If this study was reproduced, some mail surveys could be sent to nongrapefruit consumers to avoid possible sample selection bias. However, it is doubtful that if nongrapefruit consumers were presented with the hypothetical scenario, they would begin consuming grapefruit and pay more for it. Nongrapefruit consumers already have the option of purchasing organic and consequently more expensive grapefruit at health stores, yet they choose not to. A few nongrapefruit consumers filled out the mail survey but left all the grapefruit questions blank including the WTP question. Therefore, the additional expense of sending surveys to nongrapefruit consumers does not appear to be cost effective.

One difficulty in determining and interpreting consumers' WTP for food safety is that little is known about how consumers perceive food safety risks. Originally, the phone survey included a question asking respondents to indicate the probability that someone in their family would become sick because of the current level of pesticide residues in fresh fruits and vegetables. However, several focus group participants strongly argued that responses would be too subjective and inexact to be of any use other than an indication of the relative intensity of emotional reaction among survey respondents. Therefore, the question was excluded from this survey. Future research could probe into consumer perceptions about food safety risks.

CV researchers can benefit from standardization of both survey design and reporting of results. In particular, standardization of CV design can help researchers improve the overall usefulness and efficiency of CV studies by allowing researchers to learn from others' mistakes. Some potential areas of CV design that could benefit from standardization are acceptable sample size, calculation of response rates, and protocol in determining the number and dispersion of starting points for DC surveys. Demographic categories could potentially be standardized because almost all surveys ask demographic questions to determine the representativeness of the sample. If the categories within a demographic variable (e.g., age 25-35 years old) are not standardized, then comparing results across surveys is more difficult. One way to overcome this problem would be for CV researchers to universally agree to implement demographic categories consistent with those of the U.S. Census. This practice would allow easy comparison between survey samples and the U.S. population.

CV researchers could benefit from a more standardized reporting method, particularly those researchers interested in comparing CV studies or using CV data for benefit transfer. In particular, a list of information vital to researchers could be developed over time by general consensus which itemizes those statistics and design details that are expected to be reported. There may be disagreements on the best way to report certain items and hence that item may need to be reported in more than one way. For example, this list of items could specify the type of acceptable response rate calculation. Mitchell and Carson (1989) indicate that the correct response rate is obtained by removing undeliverable addresses. However, those studies that do not report the response rate after removing known undeliverable addresses overlook important information. In this study, response rates were calculated both before and after removing undeliverable addresses because it was felt that including undeliverable addresses distorts understanding the number of respondents that were willing to participate when given the chance.

Research is needed to determine the extent of the biases typically found in CV studies and to determine the best strategies to minimize their impact. Research is also needed to determine if, and to what extent, different elicitation methods entice consumers to pay different amounts of attention to the hypothetical scenario. Most importantly, CV researchers could benefit from working to build a general consensus about what is acceptable in terms of CV research and about what is expected in CV reports. Improving the understanding of the biases affecting CV research and the strengths of different elicitation methods and survey design can help widen the acceptance of CV research, while standardized design and reporting can increase the usefulness and efficiency of CV studies.

Notes

1. This research was financially supported by the Economic Research Service, U.S. Department of Agriculture as part of a cooperative agreement (43-3AEK-2-80072) with the University of Kentucky (1992-93). Special thanks to Eileen van Ravenswaay of Michigan State University for her valuable contribution on the survey design of the questions on grapefruit purchasing behavior and to Sukant Misra of Texas Tech University for his help on the pesticide questions.

2. See Mitchell and Carson (1989) for a good reference on the different types of biases.

3. The surveys provided data on consumers' WTP for reduced pesticide risk on fresh grapefruit. These data were later aggregated and used in a formal cost-benefit analysis of banning a specific postharvest pesticide from use in fresh grapefruit packinghouses.

4. The phone survey used Dillman's Total Design Method (1978) while the CV mail survey followed techniques outlined by Dillman, and Mitchell and Carson (1989).

5. The Economic Research Services's (USDA) 1992 postharvest handlers survey indicated that Florida's fresh grapefruit packinghouses would switch to TBZ if SOPP was no longer available (Buzby 1993).

6. Ralph Christenson, of the Radiation Sciences Department at the University of Kentucky, said that rough estimates of death can be obtained by halving the risk estimates of cancer.

7. Penny increments were used between zero and ten cents. Two cent increments were used for values between 10 and 50 cents.

8. The starting prices for one "Grapefruit B" were: $.53, $.55, $.60, $.70, $.80, $1.00, $1.25, $1.50, $2.00, and $2.50. "Grapefruit A" costs $.50 each.

9. The sample for the national phone survey was statistically representative of U.S. consumers. The phone survey concluded with 10,153 completed calls and of these, there were: (1) 3,228 usable interviews, (2) 3,402 ineligible interviews, and (3) 3,523 refusals. The ineligible interviews represent those respondents who began to participate in the

phone survey but the SRC truncated the interview when the respondent indicated that he/she did not purchase fresh grapefruit in the last year. SRC also performed complete phone interviews of 397 nongrapefruit consuming households (ineligible). These households were not used in the mail survey and are not analyzed here. The final phone survey response rate was 65.3 percent which is the sum of the completed and ineligible surveys divided by the sum of the completed, ineligible, and refusal surveys.

10. For the PC99 version, one $10.00 bid was identified as an outlier and discarded.

11. In the end, only 2 out of 842 returned PC version surveys had WTP greater than $2.00.

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Appendix 12.A

TELEPHONE SURVEY

*** QUESTION # 1 ***
Hello. My name is [I]##. I'm calling from the Survey Research Center at the University of Kentucky. We're conducting a study of households all over the United States. The survey deals with food safety. Your participation is voluntary and will only take about five minutes. My instructions are to speak with someone who buys most of the groceries for the household. Would that be you or should I speak to someone else?
.
(ONCE YOU HAVE APPROPRIATE RESPONDENT, ENTER (.) & HIT ENTER TWICE)
GO TO Q. # 2 ====> < 1 > OPEN END
-- MULTI-PUNCH --
-- ANSWER REQUIRED --

*** QUESTION # 2 ***
Some of the questions I will be asking are your opinions about food safety. Others are specific questions about you. Please remember that if you feel any question is too personal and you do not wish to answer it, let me know and we can move on to the next section.
.
(ENTER (.) AND HIT ENTER TWICE)
GO TO Q. # 3 ====> < 1 > OPEN END
-- MULTI-PUNCH --
-- ANSWER REQUIRED --

*** QUESTION # 3 ***
If I have your permission, let me begin by asking how many people, including yourself, do you usually shop for when you buy groceries?
.
(ENTER NUMERIC VALUE ONLY. 98 = DK 99 = REF)
GO TO Q. # 4 ====> < 1 > OPEN END
-- NUMERIC OPEN END - RANGE IS 1. THRU 99.--
-- ANSWER REQUIRED --

** QUESTION # 4 ***
These next statements ask your opinion about various food safety issues. For each statement, please tell me whether you strongly agree, agree, feel neutral, disagree, or strongly disagree.

(ENTER (.) AND HIT ENTER TWICE)
GO TO Q. # 5 ====> < 1 > OPEN END
-- ANSWER REQUIRED --

*** QUESTION # 5 ***
I think that the current levels of pesticides in fresh fruits and vegetables are safe.
.
GO TO Q. # 6 ====> < 1 > Strongly agree
GO TO Q. # 6 ====> < 2 > Agree
GO TO Q. # 6 ====> < 3 > Neutral
GO TO Q. # 6 ====> < 4 > Disagree
GO TO Q. # 6 ====> < 5 > Strongly disagree
GO TO Q. # 6 ====> < 6 > #
GO TO Q. # 6 ====> < 7 > #
GO TO Q. # 6 ====> < 8 > DK
GO TO Q. # 6 ====> < 9 > REF
-- SPECIAL FEATURE * SHUFFLING QUESTIONS (3) --
BEGINNING WITH QUESTION 5 AND
ENDING WITH QUESTION 10 --

*** QUESTION # 6 ***
I think that the government should ban all pesticides.
.
GO TO Q. # 7 ====> < 1 > Strongly agree
GO TO Q. # 7 ====> < 2 > Agree
GO TO Q. # 7 ====> < 3 > Neutral
GO TO Q. # 7 ====> < 4 > Disagree
GO TO Q. # 7 ====> < 5 > Strongly disagree
GO TO Q. # 7 ====> < 6 > #

GO TO Q. # 7 ====> < 7 > #
GO TO Q. # 7 ====> < 8 > DK
GO TO Q. # 7 ====> < 9 > REF

*** QUESTION # 7 ***
I prefer to buy organically grown fresh fruits and vegetables.
.
GO TO Q. # 8 ====> < 1 > Strongly agree
GO TO Q. # 8 ====> < 2 > Agree
GO TO Q. # 8 ====> < 3 > Neutral
GO TO Q. # 8 ====> < 4 > Disagree
GO TO Q. # 8 ====> < 5 > Strongly disagree
GO TO Q. # 8 ====> < 6 > #
GO TO Q. # 8 ====> < 7 > #
GO TO Q. # 8 ====> < 8 > DK
GO TO Q. # 8 ====> < 9 > REF

*** QUESTION # 8 ***
I don't like to buy imported fresh produce.
.
GO TO Q. # 9 ====> < 1 > Strongly agree
GO TO Q. # 9 ====> < 2 > Agree
GO TO Q. # 9 ====> < 3 > Neutral
GO TO Q. # 9 ====> < 4 > Disagree
GO TO Q. # 9 ====> < 5 > Strongly disagree
GO TO Q. # 9 ====> < 6 > #
GO TO Q. # 9 ====> < 7 > #
GO TO Q. # 9 ====> < 8 > DK
GO TO Q. # 9 ====> < 9 > REF

*** QUESTION # 9 ***
I prefer to buy produce that is shiny.
.
GO TO Q. # 10 ====> < 1 > Strongly agree
GO TO Q. # 10 ====> < 2 > Agree
GO TO Q. # 10 ====> < 3 > Neutral
GO TO Q. # 10 ====> < 4 > Disagree
GO TO Q. # 10 ====> < 5 > Strongly disagree
GO TO Q. # 10 ====> < 6 > #
GO TO Q. # 10 ====> < 7 > #
GO TO Q. # 10 ====> < 8 > DK
GO TO Q. # 10 ====> < 9 > REF

*** QUESTION # 10 ***
I think all produce should be clearly labeled to tell what pesticides have been used on the produce.
.
GO TO Q. # 11 ====> < 1 > Strongly agree
GO TO Q. # 11 ====> < 2 > Agree
GO TO Q. # 11 ====> < 3 > Neutral
GO TO Q. # 11 ====> < 4 > Disagree
GO TO Q. # 11 ====> < 5 > Strongly disagree
GO TO Q. # 11 ====> < 6 > #
GO TO Q. # 11 ====> < 7 > #
GO TO Q. # 11 ====> < 8 > DK
GO TO Q. # 11 ====> < 9 > REF

*** QUESTION # 11 ***
I would like to finish with a few questions about you. If there is a certain question that you don't want to answer, just let me know.
.
In what year were you born?
.
(ENTER FULL FOUR DIGITS   9998 = DK   9999 = REF)
GO TO Q. # 12 ====> < 1 > OPEN END
-- NUMERIC OPEN END - RANGE IS   1880. THRU   9999.--
-- ANSWER REQUIRED --

*** QUESTION # 12 ***
How many years of school have you completed?
.
(ENTER NUMERIC VALUE ONLY   98 = DK   99 = REF)
GO TO Q. # 13 ====> < 1 > OPEN END
-- NUMERIC OPEN END - RANGE IS   0. THRU   99.--
-- ANSWER REQUIRED --

*** QUESTION # 13 ***
Which of the following best describes your racial or ethnic identification:
.
GO TO Q. # 15 ====> < 1 > Afro-American (Black)
GO TO Q. # 15 ====> < 2 > White (Caucasian)
GO TO Q. # 15 ====> < 3 > Hispanic
GO TO Q. # 15 ====> < 4 > Asian (Oriental) or
GO TO Q. # 14 ====> < 5 > some other racial/ethnic group
GO TO Q. # 14 ====> < 6 > #
GO TO Q. # 14 ====> < 7 > #

GO TO Q. # 15 ====> < 8 > DK
GO TO Q. # 15 ====> < 9 > REF

*** QUESTION # 14 ***
What other racial or ethnic group would that be?
.
(ENTER VERBATIM RESPONSE)
GO TO Q. # 15 ====> < 1 > OPEN END
-- MULTI-PUNCH --
-- ANSWER REQUIRED --

*** QUESTION # 15 ***
Could you please tell me approximately what was your annual household income before taxes in 1991? Was it:
.
GO TO Q. # 16 ====> < 1 > Under $10,000
GO TO Q. # 16 ====> < 2 > $10,000 to $14,999
GO TO Q. # 16 ====> < 3 > $15,000 to $24,999
GO TO Q. # 16 ====> < 4 > $25,000 to $34,999
GO TO Q. # 16 ====> < 5 > $35,000 to $49,999
GO TO Q. # 16 ====> < 6 > $50,000 to $74,999
GO TO Q. # 16 ====> < 7 > $75,000 or above
GO TO Q. # 16 ====> < 8 > DK
GO TO Q. # 16 ====> < 9 > REF

*** QUESTION # 16 ***
And finally, have you purchased fresh grapefruit for yourself or for anyone in your household in the past year?
GO TO Q. # 18 ====> < 1 > Yes
GO TO Q. # 17 ====> < 2 > No
GO TO Q. # 17 ====> < 3 > #
GO TO Q. # 17 ====> < 4 > #
GO TO Q. # 17 ====> < 5 > #
GO TO Q. # 17 ====> < 6 > #
GO TO Q. # 17 ====> < 7 > #
GO TO Q. # 18 ====> < 8 > DK
GO TO Q. # 17 ====> < 9 > REF

*** QUESTION # 17 ***
Those are all the questions I have. Thank you very much for your cooperation.
(ENTER (.) AND HIT ENTER TWICE)
GO TO Q. # 22 ====> < 1 > OPEN END
-- MULTI-PUNCH --

-- ANSWER REQUIRED --

*** QUESTION # 18 ***
As I mentioned earlier, one of the goals of this study is to learn more about consumer's attitudes regarding food safety. As a follow-up to this phone interview, we are mailing short questionnaires to individuals to get more details on their food buying habits and food safety concerns. We would provide you with a self-addressed, stamped envelope to return your questionnaire and all your answers will be held in strictest confidence. Would you be willing to participate in this follow-up phase?
 GO TO Q. # 20 ====> < 1 > Yes
 GO TO Q. # 19 ====> < 2 > No

*** QUESTION # 19 ***
Thank you again for your help.
(ENTER (.) AND HIT ENTER TWICE)
 GO TO Q. # 22 ====> < 1 > OPEN END
-- MULTI-PUNCH --
-- ANSWER REQUIRED --

*** QUESTION # 20 ***
May I please have your name and mailing address?

.
INCLUDE COMPLETE NAME, MAILING ADDRESS AND ZIP CODE.
USE A SEPARATE LINE FOR EACH LINE OF ADDRESS.
--VERIFY ALL INFORMATION--

.
NAME
STREET
CITY, STATE ZIP CODE

.
 GO TO Q. # 21 ====> < 1 > OPEN END
-- MULTI-PUNCH --
-- ANSWER REQUIRED --

*** QUESTION # 21 ***
Those are all the questions I have. Thank you for your cooperation. You should be receiving the follow-up mail questionnaire in about a week.
(ENTER (.) AND HIT ENTER TWICE)
 GO TO Q. # 22 ====> < 1 > OPEN END
-- MULTI-PUNCH --
-- ANSWER REQUIRED --

*** QUESTION # 22 ***

Respondent's gender

GO TO Q. # 23 ====> < 1 > Male
GO TO Q. # 23 ====> < 2 > Female

*** QUESTION # 23 ***

In general, the respondent's understanding of the questions was:

.

GO TO Q. # 24 ====> < 1 > Excellent
GO TO Q. # 24 ====> < 2 > Good
GO TO Q. # 24 ====> < 3 > Fair
GO TO Q. # 24 ====> < 4 > Poor
GO TO Q. # 24 ====> < 5 > #
GO TO Q. # 24 ====> < 6 > #
GO TO Q. # 24 ====> < 7 > #
GO TO Q. # 24 ====> < 8 > DK
GO TO Q. # 24 ====> < 9 > REF

Appendix 12.B

MAIL SURVEY

CONSUMER FOOD SAFETY CONCERNS:

YOUR VIEWS

Please return questionnaire to:

J. C. Buzby
Department of Agricultural Economics
Room 330 Agr. Engineering Building
University of Kentucky
Lexington, KY 20546-0276

Thank you for agreeing to participate in this study. Please fill out this survey and return it in the enclosed postage-paid envelope to the Department of Agricultural Economics at the University of Kentucky. Do not put your name anywhere on the survey. Your answers will be strictly confidential. This study is for a university research project and is not an attempt to sell you anything. Your help is critical to the success of this study and is appreciated very much.

UNIVERSITY OF KENTUCKY

This study is designed to help us learn how consumers think about food safety issues. Your input can help us achieve this goal. Policy makers can make more informed decisions on food safety issues if they have better information. Please fill out your answers as completely and accurately as you can. Feel free to add comments in the margins.

SECTION 1: Your Feelings About Food Safety

Q-1 What are your most important food safety concerns? Please rank your three most important concerns with "1" for your most important concern and "2" for your second most important concern and "3" for your third important concern. The rest should remain blank.

_______HIGH SATURATED FATS AND CHOLESTEROL
_______HIGH SUGAR CONTENT
_______HIGH SALT CONTENT
_______PESTICIDE RESIDUES
_______PRESERVATIVES AND ADDITIVES (example: coloring)
_______HORMONE AND ANTIBIOTIC RESIDUES
_______FOOD POISONING OTHER THAN FROM PESTICIDES
(examples: Botulism, Salmonella)

Q-2 Please indicate which of the following factors are important to you when deciding which fresh fruits and vegetables you will buy (circle one number for each row).

	Very Important		Moderately Important		Not Important	No Opinion
PRICE	1	2	3	4	5	☐
FRESHNESS/QUALITY	1	2	3	4	5	☐
PRODUCT SELECTION	1	2	3	4	5	☐
PRODUCT APPEARANCE	1	2	3	4	5	☐
NUTRITIONAL VALUE	1	2	3	4	5	☐
IN SEASON	1	2	3	4	5	☐
ORGANICALLY GROWN	1	2	3	4	5	☐
Labeled "CERTIFIED PESTICIDE RESIDUE FREE"	1	2	3	4	5	☐
OTHER	1	2	3	4	5	☐

(Please Specify)____

Q-3 For each of the following statements, please indicate whether you: (1) strongly agree, (2) agree, (3) disagree, or (4) strongly disagree (circle one number for each row).

Your Opinion on Food Safety

	Strongly Agree	Agree	Disagree	Strongly Disagree	No Opinion
I am concerned about food safety.	1	2	3	4	☐
I prefer to buy organically grown fresh fruits and vegetables.	1	2	3	4	☐
I would not pay more money to buy "certified pesticide residue-free" fresh produce.	1	2	3	4	☐
In the past, I didn't buy certain fresh fruits and vegetables because of information presented on T.V. and in newspapers regarding harmful pesticide residues.	1	2	3	4	☐

Q-4 Which, if any, of the following things do you do regularly to avoid pesticide residues in the fresh produce you buy? (Check all that apply.)

_______DO NOTHING
_______RINSE FRESH PRODUCE WITH WATER
_______WASH PRODUCE WITH SOAP AND WATER
_______BUY ORGANIC PRODUCE
_______BUY FRESH PRODUCE TESTED FOR PESTICIDE RESIDUE
_______AVOID IMPORTED PRODUCE
_______GROW MY OWN FRESH PRODUCE
_______OTHER, Specify ______________________________

SECTION 2: Information on Your Household

This section asks questions about your family's consumption of fresh grapefruit (not juice, canned or jarred grapefruit). Fresh grapefruit was chosen for this study as a representative type of produce.

Q-5 How many people including yourself do you buy groceries for? (Fill in number of adults and children.)

ADULTS	
CHILDREN	

Q-6 Of those people for whom you buy groceries (your answer in question 5), how many eat fresh grapefruit? (Fill in number of adults and children.)

ADULTS	
CHILDREN	

Q-7 When buying grapefruit, do you normally select individual grapefruit from a store display or do you buy them in prepackaged bags or other containers? (Circle one number.)

1. INDIVIDUAL GRAPEFRUIT
2. PACKAGED GRAPEFRUIT
3. BOTH INDIVIDUAL AND PACKAGED GRAPEFRUIT
4. NO OPINION

Q-8 If you buy packaged grapefruit, how many individual grapefruit are in one package on the average? (Fill in number.)

The next few questions discuss information on the number of <u>individual</u> grapefruit that you purchase. Therefore, if you buy packaged grapefruit, please consider the number of grapefruit you said were in each package for the next few questions (your answer to question Q-8).

Q-9 About how <u>often</u> does your household buy fresh grapefruit in the Fall, Winter, Spring, and Summer? (For each column, check one row with an "X.")

How often do you buy grapefruit in the:

	FALL ? "X" one box	WINTER ? "X" one box	SPRING ? "X" one box	SUMMER ? "X" one box
Every day				
Three days a week				
Two days a week				
Once a week				
Once a month				
Once every two months				
Once a season				
Never				
Other (Please specify)				

Q-10 When you buy fresh grapefruit, how many <u>individual</u> grapefruit do you usually get <u>each</u> time? Write in a number for FALL, WINTER, SPRING, and SUMMER.

Number bought <u>each</u> time in FALL (If none, write in a "0.")	
Number bought <u>each</u> time in WINTER (If none, write in a "0.")	
Number bought <u>each</u> time in SPRING (If none, write in a "0.")	
Number bought <u>each</u> time in SUMMER (If none, write in a "0.")	

Q-11 What kind of fresh grapefruit do you buy? (Circle all numbers that apply.)

1. WHITE SEEDY GRAPEFRUIT
2. WHITE SEEDLESS GRAPEFRUIT
3. RED/PINK SEEDY GRAPEFRUIT
4. RED/PINK SEEDLESS GRAPEFRUIT
5. DOES NOT MATTER (any kind)
6. OTHER (Please specify) ___________________________________

Q-12 Where do you usually buy fresh grapefruit? (Circle all numbers that apply.)

1. GROCERY STORE OR SUPERMARKET
2. ROADSIDE STAND OR FARM
3. FARMER'S MARKET
4. MAIL ORDER
5. ORGANIC FOOD STORE
6. WHOLESALE OR COOPERATIVE FOOD MARKET
7. I DON'T BUY GRAPEFRUIT, IT IS A GIFT
8. OTHER (Please specify) ______________________________________

Q-13 During which meal do you and your family normally eat fresh grapefruit? (Circle all numbers that apply.)

1. BREAKFAST
2. LUNCH
3. SNACK
4. DINNER
5. OTHER, please specify ____

Q-14 Are you male or female? (Circle one number.)

1. FEMALE
2. MALE

VERSION 1: 50% RISK REDUCTION

SECTION 3: Reducing Pesticide Residues

PURPOSE: To learn what you think about health risks.

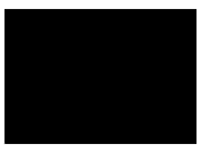
The following example has been made up for this study and does not represent a real life situation. But, your help is really important. Please read all of this section before answering any questions. This section has only 3 quick and easy steps.

STEP 1: UNDERSTAND THE SCENARIO

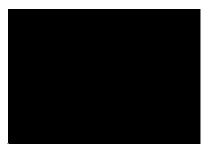
* You walk into a store and want to buy grapefruit. There are two types of grapefruit: "A" and "B." Both types look and taste the same and have the same nutritional value.

* In order to preserve quality, suppose that all grapefruit must be treated with either "Pesticide A" or "Pesticide B." Most of these pesticides stay on the peel and do not affect the appearance or taste of the grapefruit.

"GRAPEFRUIT A"



"GRAPEFRUIT B"



* "Grapefruit A" is treated with "Pesticide A," which has a very low chance of causing an early death of someone in your family.

* "Grapefruit B" is treated with "Pesticide B," which is twice as safe as the pesticide used on "Grapefruit A."

* "Grapefruit A" normally costs about 50 cents each.

* "Grapefruit B" costs more than "Grapefruit A."

STEP 2: LOOK AT RISK LADDER (SEE NEXT PAGE)

* Level 1 is the risk exposure over a lifetime by eating "Grapefruit A," the one treated with "Pesticide A." It is estimated that Pesticide A causes 5 deaths in every 100,000 people who consume "Grapefruit A" over a lifetime.

* Level 2 is the risk exposure over a lifetime by eating "Grapefruit B," the one treated with "Pesticide B." It is estimated that Pesticide B causes only 2.5 deaths in every 100,000 people who consume "Grapefruit B" over a lifetime.

* If you choose to buy Grapefruit B instead of Grapefruit A, it would reduce your risk from Level 1 to Level 2 on the risk ladder.

<u>RISK LADDER</u>
<u>COMPARING RISKS OF DEATH</u>

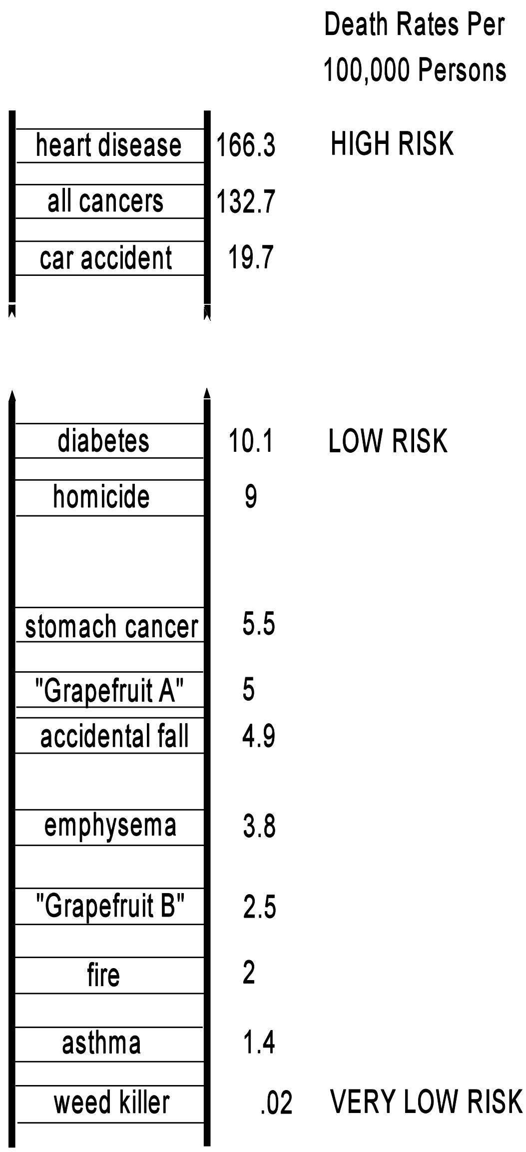
This picture is a "risk ladder" which indicates the relative chance of dying from different causes.

Please take a few moments to carefully consider the seriousness of the different risks.

After you are familiar with the risk associated with eating Grapefruit A and Grapefruit B over a lifetime, please answer the final question Q-15.

LEVEL 1 →

LEVEL 2 →



The ladder is not drawn exactly to scale. These are the best available estimates.

VERSIONS 2 and 3: 99+% RISK REDUCTION

SECTION 3: Reducing Pesticide Residues

PURPOSE: To learn what you think about health risks.

The following example has been made up for this study and does not represent a real life situation. But, your help is really important. Please read all of this section before answering any questions. This section has only 3 quick and easy steps.

STEP 1: UNDERSTAND THE SCENARIO

* You walk into a store and want to buy grapefruit. There are two types of grapefruit: "A" and "B." Both types look and taste the same and have the same nutritional value.

* In order to preserve quality, suppose that all grapefruit must be treated with either "Pesticide A" or "Pesticide B." Most of these pesticides stay on the peel and do not affect the appearance or taste of the grapefruit.

"GRAPEFRUIT A"

"GRAPEFRUIT B"

* "Grapefruit A" is treated with "Pesticide A," which has a very low chance of causing an early death of someone in your family.

* "Grapefruit A" normally costs about 50 cents each.

*"Grapefruit B" is treated with "Pesticide B," which is relatively safer yet more expensive than the pesticide used on "Grapefruit A."

*"Grapefruit B" costs more than "Grapefruit A."

STEP 2: LOOK AT RISK LADDER (SEE NEXT PAGE)

* Level 1 is the risk exposure over a lifetime by eating "Grapefruit A," the one treated with "Pesticide A." It is estimated that Pesticide A causes 5 deaths in every 100,000 people who consume "Grapefruit A" over a lifetime.

* Level 2 is the risk exposure over a lifetime by eating "Grapefruit B," the one treated with "Pesticide B." It is estimated that Pesticide B causes only .0005 deaths in every 100,000 people (almost a 100% reduction) who consume "Grapefruit B" over a lifetime.

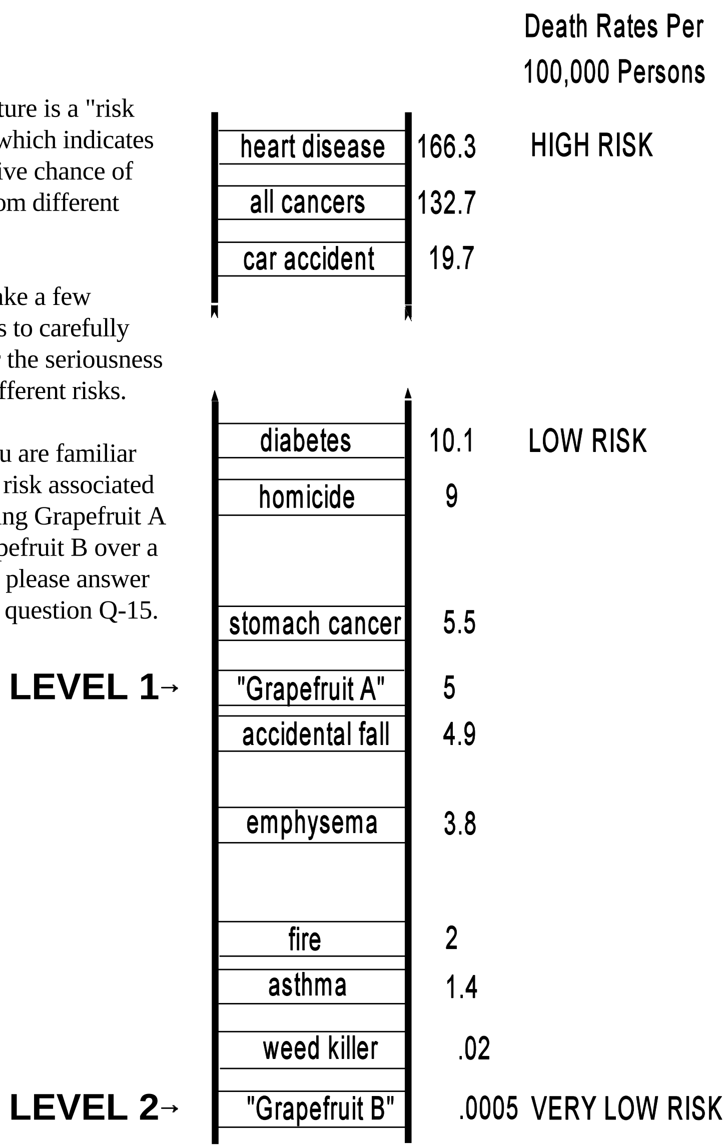
* If you choose to buy Grapefruit B instead of Grapefruit A, it would reduce your risk from Level 1 to Level 2 on the risk ladder.

RISK LADDER
COMPARING RISKS OF DEATH

This picture is a "risk ladder" which indicates the relative chance of dying from different causes.

Please take a few moments to carefully consider the seriousness of the different risks.

After you are familiar with the risk associated with eating Grapefruit A and Grapefruit B over a lifetime, please answer the final question Q-15.



The ladder is not drawn exactly to scale. These are the best available estimates.

VERSIONS 1 and 2: PAYMENT CARD

Q-15 <u>STEP 3: DETERMINE HOW MUCH YOU WOULD PAY TO AVOID THIS PESTICIDE</u>

Please circle the one amount that indicates the <u>most</u> that you would pay above the purchase price of one "Grapefruit A" to buy each "Grapefruit B."

* If you circle $0.00 this indicates that you would not pay more to buy the safer yet more expensive "Grapefruit B" and that you would buy "Grapefruit A" instead.

<u>Cents</u>
$0.00
$0.01
$0.02
$0.03
$0.04
$0.05
$0.06
$0.07
$0.08
$0.09
$0.10
$0.12
$0.14
$0.16
$0.18
$0.20
$0.22
$0.24
$0.26
$0.28
$0.30
$0.32
$0.34
$0.36
$0.38
$0.40
$0.42
$0.44
$0.46
$0.48
$0.50

If greater than $.50 or if you would pay some number not shown above, please fill in number in box.

VERSIONS 3 and 4: DICHOTOMOUS CHOICE

<u>STEP 3: DETERMINE HOW MUCH YOU WOULD PAY TO AVOID "PESTICIDE A"</u>

Suppose you walk into the store and you want to buy grapefruit. Both "Grapefruit A" and "Grapefruit B" are available.

* "Grapefruit A" costs $0.50 per grapefruit.

* "Grapefruit B" is treated with the relatively safer pesticide and costs $_________ per grapefruit.

Q-15 Which kind of grapefruit would you buy? (Circle one number.)

1. Grapefruit A
2. Grapefruit B

If we assume that "Grapefruit A" is still available for $0.50, what is the <u>most</u> that you would pay to buy each "Grapefruit B"? (Please fill in amount in box.)

Q-16 If you would not pay more to buy "Grapefruit B" instead of "Grapefruit A," please use this space to tell us why you chose this answer.

Please use this page to write in any additional comments that you have.

THANK YOU FOR YOUR TIME.
YOUR OPINIONS AND CONCERNS ARE VERY IMPORTANT TO US.

If you would like to receive a copy of the results of this survey, please write your name and address on the return envelope. Do not write your name on this survey.

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