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Estimating the economic benefits of avoiding food-borne risk: is 'willingness to pay' feasible?

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SUMMARY

In this paper, the results of a pilot study of willingness to pay (WTP) to avoid poultry-borne illness are reported. Through this, the problems of devising an economic measure of the 'intangible' benefits of prevention of food-borne risk are explored. The study is the first to allow those against a prevention policy (irradiation of poultry-meat) to register their WTP *not* to have the policy implemented. The study demonstrates that it is feasible to obtain answers to WTP questions from a self-selected sample. Future studies should ensure greater representativeness of respondents, that better information about benefits is provided to respondents and that an appropriate method of aggregation of benefits is used.

INTRODUCTION

It has been recognized that, in cost-benefit analyses (CBAs) of processes designed to reduce food-borne illness, it is important to estimate the magnitude of so-called 'intangible' benefits [1]. However, the difficulties of constructing an economic measure of such benefits have also been recognized [2]. In this paper we report the results and lessons from an exploratory study designed to provide such an estimate. The contexts are those of estimating the benefits of using either a hypothetical device or irradiation to eliminate the risk of poultry-borne illness. To estimate intangible benefits, those surveyed were asked about their willingness to pay (WTP), over and above current expenditure, for poultry-meat which had been treated by each of these methods. As this is one of the first attempts to use WTP in this field, the main focus is on whether even a self-selecting sample of respondents could complete the questions asked and, consequently, how the WTP method could be improved. The issue of how such results could be used in policy making is also addressed. However, because the respondents are not representative, it is not claimed that the results should actually be used. The study reported was developmental, and, in this respect, the paper is hypothesis generating rather than hypothesis testing.

In the following section, the background to the study is discussed. This covers issues such as the problem of food-borne illness and a description of irradiation. The study design, results and conclusions are introduced in subsequent sections of the paper.

BACKGROUND TO THE STUDY

The nature of food-borne illness

Food-borne illness is the term used to describe ill-health caused by eating food which contains harmful bacteria. It has been estimated that, in any year, 4 people in every 100 are likely to suffer from such illness [3]. In the UK, the number of recorded cases of food-borne illness has risen in recent years and is now considered to be at an all-time high [4]. However, it is likely that many cases are not reported and so the

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actual number of infections will be much greater. It is widely recognized that there are high financial costs involved with food-borne illnesses [5, 6]. These costs, together with the increase in the number of recorded cases, suggest that food-borne illnesses are a major public health problem.

In Scotland, the single most important vehicle of food-borne infection is poultry-meat [7]. Poultry-borne infection accounts for around 42% of all recorded outbreaks of food-borne illness where a specific food could be implicated [8]. The most common forms of poultry-borne infections are salmonella and campylobacter. The symptoms of these infections usually last for between 2 and 7 days, and include abdominal pain, diarrhoea, fever, chills and nausea [9]. The infective dose (the amount of bacteria required to cause ill-health) of salmonella is estimated to be between 1 and 100 million bacteria, although smaller doses would be sufficient for more vulnerable groups such as small children, the elderly, and hospital patients [10]. The risk, and severity, of illness is generally greater among these groups. Only in the most severe cases are food-borne illnesses life-threatening (the mortality rate is around 1 in 1000) which means that morbidity is the major issue. Because poultry-meat is the food about which most information is available, this study concentrated on that particular food.

Food irradiation

Food irradiation is a process in which food products are exposed to specified doses of ionizing radiation in order to preserve and maintain the quality of the food. An additional benefit is that irradiation kills food-borne pathogens such as salmonella and campylobacter, and is an effective method of controlling pathogenic organisms in food [11]. This means that the risk of morbidity is virtually eliminated.

The use of food irradiation was not permitted in the UK until January 1991, following the 1990 Food Safety Bill, although the process has been used in various countries since the 1960s. Irradiation is considered to be safe by the World Health Organisation (WHO) and the UK Government's Food Advisory Committee, who concluded that irradiation does not prejudice the safety and wholesomeness of food [11, 12].

There are other methods of preventing poultry-borne infections. The advantage of using irradiation is that it is the most effective method, reducing the risk of infection by virtually 100% [12]. There is evidence that, in Scotland at least, the benefits from irradiating all poultry-meat would exceed the costs involved [13, 14].

Perhaps the greatest disadvantage of using food irradiation is that, despite approval by the WHO and the UK Government's Advisory Committee, consumers are still not convinced of the safety of irradiated food [15, 16]. This concern has been echoed by the British Medical Association, which was also concerned about use of irradiation to cover up abuses in hygiene standards [17, 18]. Only one major food retailer in the UK has indicated it is in favour of irradiated products [19].

Given such differences of opinion as to whether or not food should be irradiated, it is, therefore, important that the costs and benefits of the process are evaluated.

The economics of preventing food-borne illnesses

In the evaluation of measures to prevent food-borne illnesses, two particular problems have been identified. First, the under-reporting of cases of salmonella infection (salmonellosis) makes it difficult to estimate the actual benefits from prevention [6], although this would render robust any findings in favour of prevention. This problem may be overcome either by improved reporting systems, or by using sensitivity analysis when valuing costs and benefits.

The second problem is that of placing a monetary value on 'intangibles' such as the pain and suffering experienced through illness. Although there have been several studies which have applied the methods of economic evaluation to the prevention of food-borne illness, most have tended to avoid the explicit measurement of pain and suffering. Current practice involves comparing averted costs, such as less time off work and treatment costs saved (which are viewed as benefits from prevention) with the costs of preventive policies. Such comparisons ignore the intangible benefits from reduced risks of illness and disease.

One way of gaining a more complete estimate of the benefits of preventing food-borne illness is to examine people's WTP for such prevention [20, 21]. In the survey reported in this paper, an estimate was made of consumers' valuations of 'intangible' benefits of irradiation by asking people how much extra they would be prepared to pay for poultry-meat treated by

this preventive measure. To test for the possibility that respondents' attitudes and WTP depend on the method of prevention, questions were also asked about WTP for a hypothetical preventive measure. Given prior expectations that some consumers would not be in favour of irradiated products, a further issue to consider when examining the costs and benefits of irradiation is consumers' WTP *not* to have their food treated with irradiation. An attempt was made to estimate this disbenefit. To our knowledge, estimates of such disbenefits have never been attempted before.

STUDY DESIGN

The questionnaire

Participants were asked about their consumption of poultry-meat (in terms of expenditure per week). Questions were also asked about factors which may affect the individual's WTP extra for safer food. It was thought that those who have previously suffered from a food-borne illness might be willing to pay more for preventive measures. Respondents were asked where they thought they were most at risk from contracting a food-borne illness (at home or in a restaurant/cafe) and where responsibility lay for food safety (with themselves, retailers, or producers). This was to test the idea that individuals might object to paying extra if they thought that responsibility for food safety lay with others. Participants were also asked what preventive measures they take when buying, handling and cooking poultry-meat. This was intended to give some sort of idea of how seriously respondents take the subject of food-borne illness.

To allow for preferences with regard to the method of treating poultry-meat, questions were asked about respondents' maximum WTP for poultry-meat treated by both a hypothetical device and irradiation. These questions, and the descriptions of poultry-meat and irradiation given to respondents, are contained in the Appendix. Participants were asked how much extra they would be willing to pay (as a percentage of what they currently spend on poultry-meat each week) for poultry-meat which had been treated by each of these methods to eliminate the risk of food-borne infection. Only those respondents who said they would eat irradiated poultry-meat were asked about their WTP for irradiation. Those who would not buy irradiated poultry-meat were asked how much they would be willing to pay for poultry-meat which has *not* been irradiated, again in percentage terms.

To facilitate analysis, participants were also asked demographic questions relating to sex, age, self-perceived health, education and income.

Sampling

A random sample of 500 names and addresses were drawn from the register of electors in Aberdeen North (a parliamentary constituency in Aberdeen, the main city in the north-east of Scotland). Systematic sampling was used, whereby every 120th name was selected from the register.

The survey was anonymous, precluding the sending of reminders. As a postal survey of members of the community, a low response rate was expected [22]. Therefore, because the study was exploratory, the sample size was chosen, not necessarily to ensure representativeness, but to guarantee enough responses for valid statistical analysis. However, 'representativeness' has been gauged by comparing data on sex and age of respondents with data on these variables (for the Grampian population) from the 1991 Annual Report of the Registrar General for Scotland and by comparing education levels of respondents with education levels from the 1991 Census data for Grampian. Furthermore, data on expenditure per head on poultry-meat of respondents will be compared with that of the UK population in general.

Statistical analysis

Information from the questionnaires was compiled for analysis using the Data-Ease 4.2 database package, then transferred onto LIMDEP for statistical analysis.

Regression analyses were performed to examine relationships between WTP and the following variables: previous experience of food-borne illness, whether the respondent feels responsible for food safety, gender, health, age, education and income. In Table 1 the definitions of the variables used in the regression analyses are given. The variable PREF was used to test whether there was a statistically significant difference in WTP between those who were willing to pay for irradiated poultry-meat and those who were willing to pay *not* to have irradiated poultry-meat. There are two possible dependent variables (WTPHYP% and WTPIRR%), representing percentage additional WTP for a hypothetical device and irradiation respectively.

The technique used in the multiple regressions was Tobit analysis. Tobit analysis is a hybrid of probit

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Table 1. *Variable definitions for regression analyses*

WTPHYP%	Respondent's maximum additional WTP, as a percentage of the amount already spent each
Mean = 9·2%	week, for poultry-meat treated with a hypothetical device which carried no risk of illness
WTPIRR%	Respondent's maximum additional WTP, as a percentage of the amount already spent each
Mean = 10·3% for (i) = 5·0% for (ii)	week, for (i) irradiated poultry-meat and (ii) poultry-meat which had not been irradiated
Pref 61% would eat	Used to measure strength for preference for either irradiated or non-irradiated poultry-meat (0 = would not eat irradiated poultry-meat; 1 = would eat irradiated poultry-meat)
Resp 92% said yes	Respondent's view of whether they are responsible for food safety (0 = no; 1 = yes)
Previll 42% said yes	Have you ever suffered from a food-borne illness? (0 = no; 1 = yes)
Sex 43% male	Respondent's sex (0 = female; 1 = male)
Health	How do you describe your general health? (0 = fair/poor for your age; 1 = excellent/good
80% excellent/good	for your age)
Age	Continuous variable in years
Mean = 46 years	
Education	Respondent's highest educational qualification (0 = CSE/O level/ vocational; 1 =
35% in higher group	highers/A level/degree/higher degree)
Income	Annual income before tax adjusted for the number of persons in the household (OECD
Mean = £11266	weights: 1 for the first adult; 0·7 for additional adults; 0·5 for each child. Income was taken as the midpoint of intervals in bands of £10000 from zero to £60000+)

analysis and ordinary least squares (OLS) multiple regression [23]. The model was developed for use in situations in which the dependent variable has a number of values clustered around a limiting value, usually zero, and the remaining values have an approximate Normal distribution. Using this technique, coefficients, which are obtained by maximum likelihood estimation, are adjusted by a fraction, denoted F(z), which is the cumulative standard normal distribution function [24]. This is carried out to make such coefficients comparable with OLS coefficients in the way they are interpreted.

The results reported here are those obtained through the technique of backward elimination whereby the variable which contributed least to the full regression equation, in terms of its level of statistical significance, was eliminated. The model was rerun and, again, the least statistically significant variable was eliminated. This procedure continued until the only remaining variables were those which were statistically significant at the five per cent level [25].

The goodness of fit of the regression is estimated by use of an 'asymptotic F' test – the standard test for models in which the degrees of freedom are less than 100 [26]. The statistic computed is approximately distributed $F_{K-1,N-K}$, where N is the number of observations and $K-1$ is the number of independent variables. The statistic is compared to a critical 'asymptotic F' value at whatever level of statistical significance is deemed appropriate. If the computed 'asymptotic F' statistic is greater than this critical value, the null hypothesis, that all coefficients except the constant are zero, is rejected.

RESULTS

Background data, preferences and WTP values

The questionnaires were sent out in January 1994. Respondents were given 4 weeks to complete and return the questionnaire. Thirty percent (144) of the questionnaires sent out were completed and returned. This response rate may have been due to the length of the questionnaire (eight pages), a lack of interest in the issue or some combination of the two. The data presented in Table 2 show that, relative to the Grampian population, a higher proportion of respondents were female (as would be expected with such a questionnaire) and that respondents tended to be older and more highly educated.

Ninety-four percent (135) of the respondents ate poultry-meat. Of these, 35% said that they had previously suffered from a food-borne illness. Over three quarters of respondents (76%) thought that they would be most at risk from food-borne infection in a restaurant or cafe, 13% thought their greatest risk was at home, and 8% mentioned foreign holidays.

Of those who ate poultry-meat, average weekly spending ranged from between £1 and £30 (mean = £6·65 per household and £2·83 per head). The median amount spent was £5 per household each week.

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Table 2. *Representativeness of respondents compared with 1991 Registrar General data and 1991 Census data*

	Study respondents: number (and %)	Grampian data (percentages only)
Sex		
Male	60 (41·7)	49·33
Female	84 (58·3)	50·67
Age		
18–24	12 (8·3)	15·31
25–33	21 (14·6)	18·96
34–42	16 (11·1)	18·03
43–51	29 (20·1)	14·95
52–60	18 (12·5)	12·72
61–65	21 (14·6)	6·57
65+	26 (18·1)	13·46
Missing	1 (0·7)	
Highest level of education		
O-level	59 (41·0)	Percent of people
Vocational	14 (9·7)	in Grampian with
A-level	15 (10·4)	degree or higher
Degree	15 (10·4)	degree = 6%
Higher degree	7 (4·9)	
Missing	34 (23·6)	

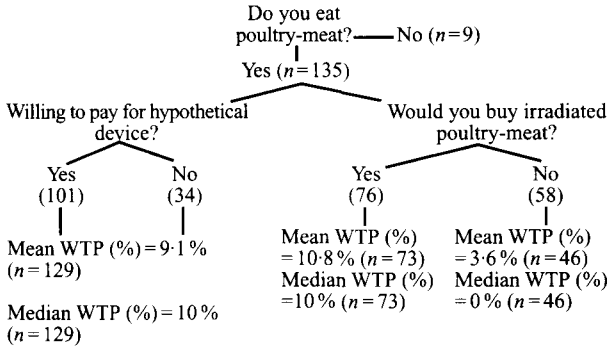

Fig. 1. Summary of WTP results. NB: As one moves down the tree, numbers diminish as people simply do not answer the relevant question.

The most common preventive measure taken to avoid food-borne infection was to buy only fresh produce (64% of respondents). Other measures were eating straight away (34%), eating within 3 days (52%) and never reheating (46%). Only one person admitted to taking no precautions. Eighty-eight percent of respondents thought that responsibility for food safety lay with themselves. However, substantial numbers also thought that responsibility lay with food producers (76%), caterers (68%), retailers (67%) and government (38%).

A summary of the results of the questions asking about WTP for poultry treated with the unspecified hypothetical device or by irradiation is provided in Figure 1.

Of the 135 respondents who ate poultry-meat, 101 (75%) were prepared to pay more for poultry-meat treated with a hypothetical device which would eliminate poultry-borne illnesses. If the 34 respondents who were not willing to pay are classified as having zero WTP and are included, mean WTP is 9·1% and median WTP is 10%.

When asked if they would be willing to pay extra for poultry-meat which had been irradiated, 68 (50%) said that they would. A further eight respondents (6%) would buy irradiated poultry-meat if there was no additional cost. If those who were not willing to pay are classified as having zero WTP and are included, mean WTP is 10·8% and median WTP is 10%. Fewer respondents were willing to pay extra for poultry-meat treated by irradiation than by the unspecified hypothetical device.

Of the 135 respondents who said they ate poultry-meat, 58 (43%) said that they would not buy poultry-meat processed by irradiation. When asked why they would not buy it, a number of reasons were put forward. Thirty-four percent expressed concern about safety. It was thought that irradiated food may be harmful, and that not enough was known about the possible long-term effects. Thirty-three percent of respondents stated a preference for fresh food which had not been tampered with. Seventeen percent thought irradiation to be unnecessary.

The 58 respondents who said they would not buy irradiated products were asked their WTP for poultry-meat which had not been treated with irradiation. Twenty respondents (35%) said that they would be prepared to pay extra for untreated poultry-meat, with a mean of 11·1% and a median of 10% (range = 1–25%). If the 26 respondents (12 gave no answer) who were not willing to pay are classified as having zero WTP and are included, mean WTP is 3·6% and median WTP is zero.

Regression analysis

In Table 3, the fractions of each group providing values above zero are shown. Over 60% of those who would not buy irradiated poultry-meat gave a WTP

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Table 3. *Fractions of groups providing zero responses and adjustment factors for Tobit estimations*

	Fraction of group providing zero response	Adjustment factor
WTP for meat treated with hypothetical device ($n = 94$)	0·26	0·77
WTP for meat treated with irradiation ($n = 56$)	0·13	0·74
WTP for meat not treated with irradiation ($n = 36$)	0·61	0·74

Table 4. *Results of 'backward elimination' Tobit regressions of percentage WTP for poultry-meat treated with a hypothetical device (WTPHYP%) and with irradiation (WTPIRR%)*

Statistically significant independent variables	Estimated coefficient	Adjusted coefficient	*P*-value
WTPHYP%			
Constant	2·66	2·05	0·189
Previll	4·90	3·77	0·034
Pref	4·79	3·69	0·041
WTPIRR%			
Constant	0·89	0·66	0·73
Pref	12·09	8·95	0·00015

value of zero for a non-irradiated product. Results of the 'backward elimination' Tobit regressions are displayed in Table 4.

For the hypothetical device, those who had experienced a food-borne illness were willing to pay 3·8% more for poultry-meat treated with the hypothetical device than were those who had not experienced such illness. Those who would eat poultry-meat were willing to pay 3·7% more for a hypothetical device than those who would not eat such meat. From Table 4, for irradiation, it can also be seen that the WTP of those who would eat irradiated poultry-meat was 9% more than the WTP of those who would not eat irradiated poultry-meat.

For the regression model for the hypothetical device, the 'asymptotic F' statistic was significant at the 1% level. For the model for irradiation, the 'asymptotic F' statistic was significant at the 0·1% level. Thus, generally, the models are good fits.

Finally, of those who would buy the irradiated product ($n = 76$), 76·3% said they would continue to buy the same amount of poultry-meat, with 6·6% buying less and 5·3% more.

Using the results in a CBA

For individual WTP values to be usable in CBA, they must be extrapolated to the appropriate population [22]. The investigate the implications of these results for aggregate WTP, figures derived from the study were applied to total annual expenditures on poultry-meat in Scotland. Calculations using these data give a net value (i.e. benefits minus disbenefits) of £6·5 million per year using mean percentage WTP. Figure 2 shows how this value was calculated. Using median percentage WTP, the value would be £8·5 million per year.

These are estimates of the aggregate value that consumers of poultry-meat in Scotland place on eliminating the risks of contracting poultry-borne illness. They can be compared with the cost of irradiating poultry-meat in Scotland, estimated to be £2·46 million per year [14]. This would imply that the benefits in terms of reduced pain and suffering alone could be sufficient to justify the irradiation of poultry-meat. However, given the opposition to its use referred to above, it is widely recognized that ongoing consumer education will be needed to convince the public of the benefits and safety of irradiated food [14, 27]. The costs of such education programmes will therefore have to be included in the CBA. Furthermore, three items are omitted from the above calculations: first, averted costs have not been included; secondly, if the cost of irradiation is to be paid by consumers, another exclusion is the reduction in aggregate benefits which would occur because of the small number have said they would stop buying at the new price which would reduce aggregate benefits; and thirdly, as those with a negative WTP would probably stop buying poultry-meat if all such meat were irradiated, they would also incur a negative benefit.

There is a further issue in calculating benefits at a societal level when only 30% of the sample responded; that is, how to treat the 70% who did not respond. In Figure 2, the 30% who responded are treated as though they are representative of the total sample approached. However, this is unlikely to be the case.

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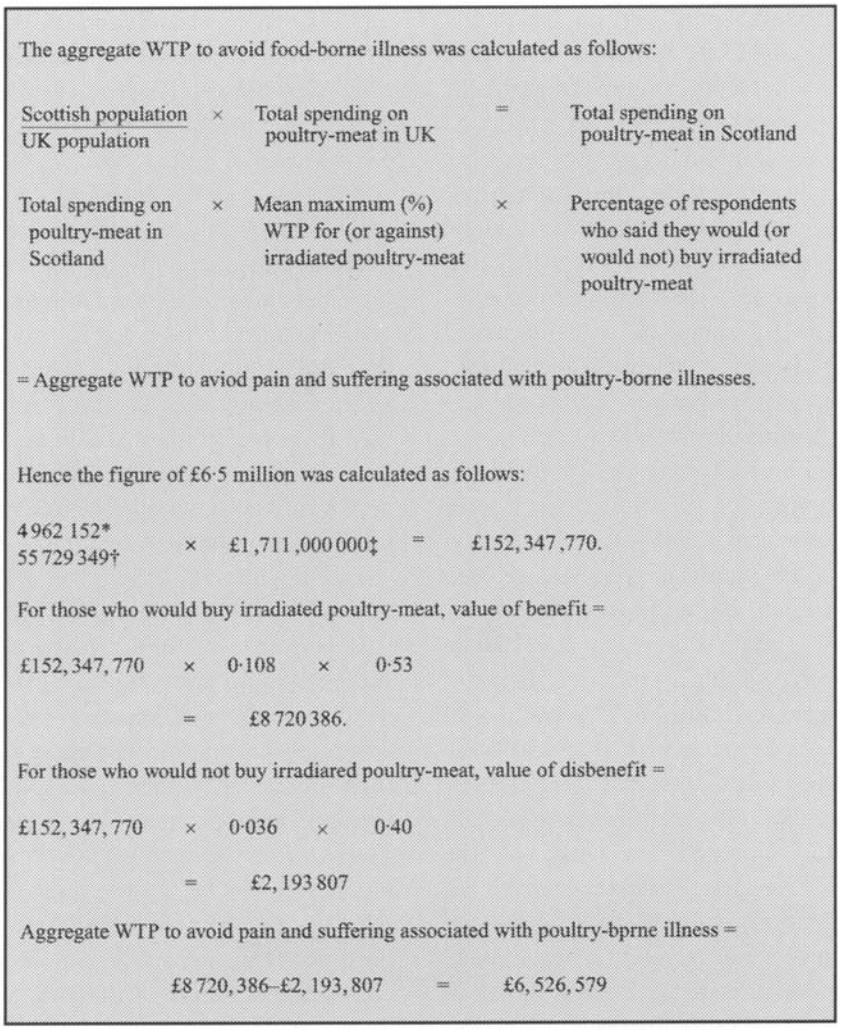

Fig. 2. Calculations of aggregate WTP, using mean percentage WTP: *, Source: 1991 Census Report for Great Britain; †, Source: 1991 Census Report for Great Britain; ‡, Source: Meat demand trends, 2/94. 1992 figure not used [28].

Indeed, it is likely that responders will be those either most in favour or against irradiation. Therefore, assuming the 30% who responded to represent the whole sample could be construed as rather extreme. As a result, we have also gone to the other extreme of assuming that the results from the responders represent that group only and that the value attached to a vote for or against irradiation by each member of the remaining 70% is zero. This results in an aggregate WTP of £1 784 103. This is less than the cost of irradiation in Scotland.

DISCUSSION

This is the first time that members of the general public in the UK have been asked their WTP for poultry-meat treated with irradiation. The results, therefore, are more relevant to further development of the method of WTP in this field than to policy.

One policy-relevant point which can be made is that respondents were found to be sensitive to the method of prevention. Seventy-five percent of respondents who buy poultry-meat were prepared to pay extra for poultry-meat treated with the hypothetical device, compared with 50% for irradiation. Also, 35% of those who would not buy irradiated poultry-meat were prepared to pay extra for a non-irradiated product. These results, even in this self-selected sample, suggest that food irradiation has still not gained full public acceptance.

The results of the Tobit analysis seem to suggest that there is a greater strength of preference among those who would buy irradiated poultry-meat than

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among those who would not buy an irradiated product. It is possible that the 'disbenefit' may have been underestimated as a result of the wording of the relevant question. Of those who prefer non-irradiated poultry-meat, a substantially higher proportion were not willing to pay for their preferred option, compared with the group who would eat irradiated poultry-meat. This may be a result of confusion over being asked about WTP to maintain the status quo (i.e. non-irradiated poultry-meat) as opposed to being asked one's WTP for a new policy. It could be argued that such confusion is likely to lead to zero responses and could be ameliorated using an alternative design.

The format of the questions may have some effect on non-response. Open-ended valuation questions, in which respondents are asked to state their maximum WTP, were used in the questionnaire. It has been found that discrete valuation questions, where individuals are presented with an amount and asked whether or not they are willing to pay that amount, may work better than open-ended WTP questions in mail surveys [29]. Likewise, use of a payment scale may also work better than open-ended responses. However, more recently, the open-ended approach has been shown to be 'valid' in terms of the relationship of WTP to prior preferences and to factors indicative of ability to pay, such as income [30]. The use of closed-ended payment formats have also been recommended in a recent, and influential, review of the use of contingent valuation methods in the field of valuing environmental benefits [31].

This raises the more general issue of the relationship between what people say they will do in response to hypothetical questions and what they will do in reality (i.e. in this case, when faced with a higher price of poultry-meat). In the WTP literature, there have been 10 studies comparing hypothetical values with those based on real behaviour [32]. Of the 10, 5 are favourable to the WTP approach, in that values obtained were similar to those revealed by real behaviour, whilst 5 are not. Although it is difficult to think of other methods of estimating such benefits, it is important to examine more closely what lies behind respondents' answers and at least to be careful in interpreting results.

The greatest problems in aggregating the data from this survey to that of the Scottish population are the number of missing responses and the method of aggregation. Thirty percent of the questionnaires sent out were completed and returned and clearly the respondents are not representative. Further evidence on the unrepresentativeness of responders is provided by the information on how much these people spend on poultry-meat relative to the population in general. It can be calculated from Figure 2 that spending per head on poultry-meat in the UK in 1992 was £0·59 per week. Spending per head in those responding to the questionnaire was £2·83 per week; a fivefold difference. Ways of improving representativeness may be to use reminders and to shorten the questionnaire. However, it should be remembered that higher non-response levels are found in WTP surveys where random samples of the public are used [22]. Even so, it should still be possible to collect data from convenience samples of, say, supermarket shoppers in order to enhance representativeness. It is our intention to interview such convenience samples and to include different formats of WTP questions in such a study.

Researchers planning to use the WTP method to survey random samples of the general public will need to look at ways of improving response rates and of accurately calculating aggregate WTP. The findings of such studies may then give some indication of the possible range of values for the benefits of irradiation. The fact that the magnitude of benefit calculated from this survey is, by some methods of calculation, so close to the cost of irradiation, increases the importance of further work to develop a valid method of eliciting preferences of the public with regard to this issue.

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APPENDIX. DESCRIPTIONS GIVEN TO RESPONDENTS AND WTP QUESTIONS ASKED

In any year, 4 people in every 100 are likely to suffer from a food-borne illness. Poultry-meat (chicken, turkey, etc) accounts for around 44% of such cases. Elderly people and the very young are most likely to be seriously affected. Around 1 in every 200 sufferers is admitted to hospital, and 1 in 1000 die as a result of their illness.

7. Imagine that there was a device for processing poultry-meat which would stop poultry-borne illnesses. Would you be willing to pay extra for poultry-meat treated by this device? (*Please tick one box*).
   Yes ☐
   No ☐
   If you answered Yes, please complete the next question and carry on
   If you answered No, please go to question 9
8. What is the maximum **additional** amount you would be willing to pay, **as a percentage of the amount you already spend each week**, for poultry-meat which had been treated with the device, and carried no risk of illness?
   Approximately per cent extra each week.
9. The next section refers to a specific preventive measure: food irradiation.

Food irradiation is currently used in 34 countries, including the United States, Canada and France. It is a method of processing food with low levels of irradiation to kill harmful bacteria, and to keep food fresh for longer periods of time. The World Health Organisation recently concluded that food irradiation does not alter the food in any way that could harm people, nor is its nutritional value or taste altered significantly.

If poultry-meat was irradiated, would you buy it? (*Please tick one box*)
Yes ☐
No ☐
If you answered Yes, please complete the next question and carry on
If you answered No, please go to question 15

For those who would buy irradiated poultry-meat:

10. Would you be willing to pay extra for irradiated poultry-meat, knowing that there would be no risk of getting a food-borne illness? (*Please tick one box*)
    Yes ☐
    No ☐
    If you answered Yes, please complete questions 11–13
    If you answered No, please go to question 14
11. What is the maximum **additional** amount you would be willing to pay, **as a percentage of the amount you already spend each week**, for poultry-meat which had been irradiated and carried no risk of illness?
    Approximately per cent extra each week.

For those who would not buy irradiated poultry-meat:

16. If irradiation was used more often by food producers, would you be willing to pay extra for poultry-meat which had NOT been irradiated?
    Yes ☐
    No ☐
    If you answered Yes, please complete the next question and carry on
    If you answered No, please go to question 18
17. What is the maximum **additional** amount you would be willing to pay, **as a percentage of the amount you already spend each week**, for poultry-meat which had NOT been irradiated?
    Approximately per cent extra each week.

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