Title: Exploring biases in the double bounded dichotomous choice (DBDC) and DBDC with open ended follow-up methods.

Laura Ternent[1], Paul McNamee[1], David Newlands[2]

[1]Health Economics Research Unit, University of Aberdeen, UK

[2] Business School University of Aberdeen, UK

Aims: Empirical literature has found evidence of a number of biases in the DBDC method including incentive incompatibility and starting point bias. The aims of this paper are to examine the plausibility of responses, to test for incentive compatible responses and starting point bias in the DBDC method and the DBDC with an open ended follow up question.

Methods: 506 respondents resident in Nouna, Burkina Faso were asked their willingness to pay for risk reductions in the number of maternal deaths in the Nouna community. All respondents received the DBDC method and were also asked an open ended question to determine their maximum willingness to pay. Individuals received one of three starting bids for a 25% reduction in maternal deaths in the local community.

Data: 506 individuals were randomly sampled from a representative number of households from an on-going Demographic Surveillance Survey.

Results: Using interval regression analysis, we find evidence of both starting point bias and incentive incompatibility in both the DBDC method and the DBDC method with open ended follow up (DBDC-OE). We also find that estimates of willingness to pay from the open ended follow up are lower than those of the DBDC method. In terms of plausibility, estimated mean willingness to pay as a percentage of income in the base model was 1% in the DBDC method and 0.5% in the DBDC-OE method.

Conclusions: Results of this study add to the small body of literature on the DBDC method in health care including the advantage, in terms of the increased information on willingness to pay, of an additional open ended question. Results of this study confirm the results of previous studies of the importance of testing for both starting point bias and incentive incompatible responses to avoid biased estimates of willingness to pay.

Introduction

There are a number of methods to elicit willingness to pay, distinguished by whether they produce continuous data, for example the open ended method and the payment card method, or methods which result in discrete data, for example the single bound dichotomous choice method, the double bound dichotomous choice method, the bidding game method and the structured haggling method. Research has shown that WTP values elicited via open ended methods and those elicited via discrete choice methods are significantly different, with evidence that discrete methods produce higher willingness to pay estimates (Ready et al., 1996).

The single bound dichotomous choice (SBDC) method has been used extensively in environmental economics. Advantages of the SBDC method are that it is less cognitively challenging than other methods such as the open-ended method (Boyle et al, 1985) and it has been found to be incentive compatible – i.e. willingness to pay derived from the single bound is a true refection of an individual's willingness to pay. The disadvantages of the SBDC method are that it provides limited information on willingness to pay (Whitehead, 2002) and has been prone to criticism that it is inefficient due to the large sample sizes required to identify the distribution of willingness to pay values (Herriges and Shogren 1996). In response to some of the criticisms of the SBDC method, the double bounded dichotomous choice method (DBDC) was developed (Hanemann, 1984). This method is similar to the SBDC method with an additional follow-up question providing greater information on a respondent's willingness to pay. Empirical evidence suggests that willingness to pay estimates elicited via the DBDC method are statistically more efficient than those estimated via the SBDC method due to increased precision from the DBDC method (Hanemann, Loomis, & Kanninen, 1991).

However, a number of biases have been found in the DBDC method. One potential source of bias is **'**yea saying' which occurs if a respondent repeatedly says 'yes' to a bid value, regardless of whether their true willingness to pay value lies below that amount. Yea saying would lead to artificially high estimates of mean willingness to pay. Evidence of yea saying behaviour has been found in the DBDC method (Holmes and Kramer, 1995; Ready et al., 1996). Another form of bias is starting point bias which exists when individuals anchor their willingness to pay value to the initial bid used to begin the DBDC method. In this instance,

individuals who do not have well defined preferences may think that the initial bid is a clue to the value of the good or service in question. Starting point bias is a well documented problem in iterative methods to elicit willingness to pay, for example it has been found extensively in the bidding game method (Bhatia, 2005; Frew et al., 2004; McNamee et al., 2010; Phillips et al, 1997; Stalhammar, 1996). Evidence of starting point bias has also been found in the DBDC method (Herriges and Shogren, 1996; Ready et al., 1996)

DBDC method has also been found to be prone to incentive incompatible responses. The assumption underlying the DBDC method is that a single willingness to pay value drives a respondent's answers to both willingness to pay questions (Alberini, 1995). Respondents who are incentive incompatible may not be basing their willingness to pay on one value; instead, willingness to pay might be informed/altered by the follow-up question. This is a general issue found in iterative methods of eliciting willingness to pay, where respondents behave strategically in the follow up questions, by either understating their true willingness to pay, expecting that others would pay on their behalf, or, alternatively, individuals may state that they are willing to pay more than they actually are if they feel that this would influence the decision to provide a good or service but they would not actually have to pay. Evidence of incentive incompatible responses have been found in the health economics literature in the DBDC method (Clarke, 2000; Kennedy, 2002; Watson & Ryan, 2007)

The NOAA report recommended the use of the single bound dichotomous choice method of eliciting willingness to pay as it was said to represent decision making in a real market context. However, the single bound method does not mimic market practice in some low income countries, where 'haggling' over price is a more common approach to buying goods and services. In this instance, iterative formats, such as the DBDC method, the bidding game method and the structured haggling method might better reflect decision making in low income country contexts.

There have been a small number of applications of the DBDC method in low income country contexts for example (Asfaw and von Braun, 2005; Liu et al., 2000b). Lu et al (2000) found weak evidence of starting point bias where individuals anchored their willingness to pay to the lowest starting bid but not to the intermediate or highest bid. Asfaw and von Braun (2005) found evidence of incentive incompatible responses, where the final willingness to pay value was not based on one value but was affected by the presence of follow up bids.

The authors also found evidence of starting point bias in that willingness to pay was sensitive to the initial bid values used in the DBDC method.

In a previous study we tested for starting point bias and incentive compatibility in the bidding game method (McNamee et al., 2010). We extend this previous work by testing for starting point bias and incentive compatibility in the DBDC method and DBDC-OE method, to determine the extent of such effects in the DBDC method, and to assess if there are any benefits with the addition of the open ended question. The rationale behind the addition of the open ended question was the potential for improvement in the precision of the willingness to pay estimates without inducing bias. As has been previously found (whitehead 2002, McNamee et al., 2010) failure to take account of incentive incompatible responses and anchoring results in biased estimates of mean willingness to pay.

We estimated four models using interval modelling for both the DBDC data and the DBDC-OE. These models are a base model, a shift model to test for incentive incompatible responses, an anchoring model to test for starting point bias and a shift and anchoring model to account for both effects.

Methods

Study site

This study was conducted in Nouna, Burkina Faso, West Africa. Burkina Faso is one of the world's poorest countries. It ranks 177 out of 182 on the 2009 United Nations Human Development Index. Life expectancy at birth is estimated to be 53 years, adult literacy 29% and GDP per capita (PPP) US$1124 (http://hdr.undp.org/en/statistics/). Nouna is located in the North West of Burkina Faso, about 300 km from the capital Ouagadougou and is a largely rural area with Nouna town being semi-urban. The majority of the population are subsistence farmers.

The Demographic Surveillance Survey (DSS) and an on-going Household Survey (HHS) in Nouna provided the sampling frames for this survey. The DSS is a census survey of the entire Nouna area which is undertaken every two years. The HHS is a subset of the DSS and is a panel survey conducted every year since 1999. In a previous study we randomly sampled two thirds of the households in the HHS (McNamee et al., 2010; Ternent et al., 2010). For

this survey we used the remaining households in the HHS who had not formed part of the sample in the previous survey. In total 506 male and female individuals resident in Nouna participated in the CV survey. To obtain community values, where possible, both male and female members of the same household participated.

Pre test and Pilot

Prior to the main survey a pre-test and pilot were undertaken in the Nouna community. In the pre-test and pilot phase we sought to examine the applicability of the questionnaire, including the hypothetical scenario and the bid values used to initiate the DBDC method.

Ninety individuals in total were interviewed for the pre-test, divided equally among three formats of the questionnaire. All individuals were interviewed separately so as to avoid any bias in responses from respondents living in the same household. fifty-two percent of the pre test sample was male.

Data from the pre test were analysed with regard to two key areas: acceptance of the initial starting bid and the number of non-responses. Analysis showed that the initial starting bids of 2000, 4000 and 8000 CFA (at 2006 prices, 1000CFA = £1) were accepted 53%, 37% and 17% of the time, respectively. The number of zero willingness to pay values was used as a measure of the acceptability of the hypothetical scenario. In the pre-test there were two individuals who were unwilling to pay.

Ninety additional individuals were interviewed for the pilot, with equal numbers of male and female respondents. Minor adjustments to the wording and layout of the questionnaire were made between the pre-test and pilot phases. All starting bids remained unchanged. Acceptance rates for the 2000, 4000 and 8000 bid were 63%, 40% and 10%, respectively.

The most substantial change to the questionnaire following the pre-test and pilot was to lower the initial stating bid of 2000CFA to 1000CFA due to relatively low numbers of respondents accepting this initial bid in both the pre-test and pilot.

Main survey

Respondents were assigned to one of three starting bids (1000CFA, 4000CFA and 8000CFA) and asked their willingness to pay for a 25% (15/60) reduction in the number of maternal deaths in the Nouna area in the next year. Ethical approval to contact participants and to conduct the study was obtained following independent review of study procedures. In addition, using verbal description of study procedures, written informed consent was obtained from all study participants by trained interviewers prior to completing the questionnaire. Five hundred and six respondents were randomly identified, from approximately 300 households remaining in the HHS.

The data used in this paper were drawn from two sources. First, data relating to previous experience of maternal mortality and morbidity within the household, knowledge of previous maternal deaths within the community, and monetary valuations were collected within the CV survey. Second, we obtained demographic and income data from the HHS that was conducted prior to the CV survey. All adults within the HHS were asked to state, during the previous month and the five months preceding that, the size of cash income generated from sales of agricultural products, the amount of any money transfers from friends, relatives or others, and money income earned from any other sources, such as salary, pensions or sale of non-agricultural products. The sum of the one month and five months figures was then converted to an annual value by doubling. Whilst this is the most appropriate way to generate an annual income figure given the data available, we also recognise that there could be seasonal variations in income which are not captured by simply doubling the six month income figure.

The questionnaire was translated from English into French and then back translated. In addition to this, the questionnaire was also translated into the local African language, Dioula. Translation into Dioula was agreed during the enumerator training. The Dioula language is widely and commonly spoken, thereby permitting communication between the different ethnic groups. All interviewers received three days training in survey design and questionnaire administration by members of the Nouna research group. Enumerators were instructed to interview members of the household who had decision making responsibilities, usually this consisted of the head of the household and his/her spouse. All interviews were conducted separately to minimise the opportunity for one respondents answers to influence another. Common initial bids were used for members of the same household.

Hypothetical scenario

The hypothetical scenario was a service re-organisation that would lead to a 'one-time', 25% reduction in the number of maternal deaths in the Nouna area. The payment vehicle was a one off out-of-pocket payment for this service re-organisation.

Respondents were randomly assigned to one of three starting bids (1000, 4000, 8000 CFA) determined on the basis of previous work conducted in Nouna (McNamee et al., 2010) and analysis of the pre-test and pilot data.

Elicitation method and Data Analysis

The DBDC method is a truncated version of the biding game method. All respondents received an initial binary Yes/No question (DC_1) followed by an additional follow-up question (DC_2). DC_2 is dependent on the response to DC_1. If a respondent answers 'yes' to DC_1, DC_2 is a higher, predetermined amount. If a respondent answered 'no' to DC_1, DC_2 is a lower predetermined amount. There are four possible response patterns using the DBDC method: (1) Yes/Yes; (2) Yes/No; (3) No/Yes; (4) No/No. The DBDC method can be followed by an open ended willingness to pay question, the double bounded dichotomous choice method with open ended follow up (DBDC-OE). The elicitation algorithm for format 1 (starting bid=1000CFA) and the willingness to pay scenario can be found in appendix 1.

The DBDC data and the DBDC-OE data were analysed using interval regression. Interval regression models are an alternative to random utility models, such as the bivariate probit model. Interval regression estimates willingness to pay directly from the willingness to pay distribution. Using interval regression modelling we assume that an individual's response to DC_1 and DC_2 are driven by a single willingness to pay value. Following (Alberini, Kanninen, & Carson, 1997):

$$WTP_i = x_i \beta + \varepsilon_i$$

Where WTP_i is the ith individual's WTP, $x_i \beta$ are vectors of variables related to individuals and their parameters, respectively and ε_i is an error term with mean zero and variance σ^2

The log Likelihood function of the double bound method is estimated as:

$$\text{Log}L_{DB} = \sum_{i=1}^{n} \log [F(c^{U}_{i}; x_i, B, \sigma) - F(c^{L}_{i}; x_i, B, \sigma)]$$

Where F is the cumulative density function (cdf) of WTP. $c^{U}_{i \text{ and } C}{}^{L}_{i}$ are the upper and lower bounds around WTP.

In the DBDC method each WTP observation was classified as interval data, left-censored data or right censored data, determined by respondents' answers to DC_1 and DC_2. For the DBDC-OE method the data were either left censored or interval observations, based on respondents answers to DC_2 and their final open ended willingness to pay value. For example, if a respondent received the 1000CFA starting bid and subsequently answered 'yes' to DC_1 and 'yes' to DC_2 and gave a final open ended willingness to pay value of 2,500CFA, then in the DBDC method the lower bound would be 1000 and the upper bound would be 2000, whilst in the DBDC-OE method the lower bound would be 2000 and the upper bound would be 2500.

Alberini et al (1997) tests whether there is a systematic shift in respondents' answers when asked two willingness to pay questions, with the inclusion of a shift parameter (δ). The shift parameter tests whether the presence of a follow up question gives respondents incentive to behave strategically. In Burkina Faso haggling over the price of goods is usual market practice. The usual haggling process would be for the seller to post a high initial price as a signal for the buyer to engage in the haggling or bargaining process. Given this market behaviour, we would expect to see a large proportion of 'no' responses to the initial DBDC question, followed by a 'no' response to the follow up question. For those individuals who say 'yes' to the initial bid we would expect them to say 'no' to the follow up bid as they may perceive that a price has already been agreed.

To test this assumption we estimated δ by specifying a dummy variable D. D = 0 if respondent answered Y/N or N/Y and D=1 if respondent answered Y/Y or N/N. If the coefficient estimate of D is negative, this suggests 'nay' saying behaviour and if positive suggests 'yea' saying behaviour (Whitehead, 2002). We expect the shift parameter to have a

negative sign as it is hypothesised that in this setting follow up questions provide incentives to say ‘no’ rather than ‘yes’ - causing a downward shift in mean WTP.

In addition we also test for starting point bias – that is whether respondents anchor their willingness to pay value to the bid value used to begin the DBDC method. Given the evidence of starting point bias from iterative methods of eliciting willingness to pay, we test for this effect by including the initial bid value as an explanatory variable in the base regression model. In addition, following (Whitehead, 2002) we also specified an interaction term between the initial bid value and D which measures the weight attached to the initial and follow up bid.

The final model specified is a shift and anchoring model which combines both tests for the effects of strategic behaviour and starting point bias.

Given the widespread recognition that willingness to pay responses are likely to be affected by observable individual characteristics all regression models included additional explanatory variables. It is expected that individuals with higher income would to be willing to pay more, on the basis of their greater ability to pay. Individuals with higher education would also be expected, all other things being equal, to be willing to pay more, as they may be more aware of the adverse consequences of ill health or death. Experience of ill-health or death related to pregnancy may also affect responses. Through greater knowledge of the consequences, individuals with previous experience of health complications or deaths in their household due to pregnancy may pay more to avoid such events in the future. On the other hand, through adjustment and coping, responses may not be affected amongst some respondents.

Finally, willingness to pay was computed using the results of the interval regression analysis and analysed as a percentage of annual income to test the plausibility of estimated willingness to pay from both the BDDC method and the DBDC method with open ended follow up.

Results

In total 506 individuals were allocated to receive one of three formats of the questionnaire. The formats differed only by the initial starting bid (1000CFA, 4000CFA or 8000CFA) used to begin the DBDC method. In total, 174 respondents received format 1, 155 format 2 and 177 format 3. Individual income data were missing for 78 (15.4%) respondents. Twenty-two respondents (4.3%) stated that they were not willing to pay anything. Only one individual did not give a reason why they were unwilling to pay. The most common reason why an individual was not willing to pay was due to being unable to work either through ill health or old age (16/22). Two individuals stated that they were unwilling to pay due to a lack of income. Three people did not value the programme or were unwilling to pay to help others.

Table 1 summarises the respondent characteristics for the whole sample and by questionnaire format. No statistically significant differences were found between respondents with regard to income, education, knowledge or previous experiences of maternal complications or maternal deaths suggesting that the sample was well balanced across all three formats of the questionnaire.

Table 2 summarises response patterns for the sample as a whole and by format in response to DC_1 and DC_2. As expected the percentage of respondents saying 'yes' to DC_1 followed by a 'yes' to DC_2 decreased as the starting bid increased. For example 29% of respondents in format 1 said yes/yes, decreasing to 4.5% of respondents in format 2 and 1.7% of respondents in format 3. Likewise, 9.8% of respondents in format 1 said 'no' to DC_1 and 'no' to DC_2, whereas 54.8% of respondents in format 2 and 72.9% of respondents in format 3 had this response pattern.

Table 3 and 4 present the results of the interval regression models of the DBDC data and the DBDC-OE data for those individuals with non-zero willingness to pay values. After accounting for missing income data and other missing socioeconomic data, 401 individuals were included in the regression models.

The base model included only socioeconomic and demographic explanatory variables and the bid value used to begin the DBDC method. In the base model for the DBDC data, bid value was positive but not statistically significant. Income (log) was as expected positive and statistically significant (p=0.001), education (measured in years) was also positive and

statistically significant, but only at the 10% level (p=0.095). In addition, whether the respondent had a death related to pregnancy in their household in the previous five years also had a significant positive effect on willingness to pay (p=0.014). Sex was negatively correlated with willingness to pay, suggesting that men are willing to pay more than women, all else being equal, but this was not statistically significant in model 1. In the base model for the DBDC-OE, a similar pattern of results was observed, with the exception of the bid value coefficient which was negative, but not statistically significant.

When δ is included in the shift model (model 2) to account for the response patterns in follow up questions, the coefficient on bid increased and is statistically significant (p=0.000) in the DBDC model, suggesting that respondents are anchoring their willingness to pay to the initial bid value. The shift parameter is negative and statistically significant (p=0.000), suggesting that the presence of follow up questions shifts willingness to pay downwards. The inclusion of the shift parameter also has an effect on explanatory variables. Income, whist still significant is less so (p=0.02), education is no longer significant at the 10% level, sex is statically significant in this model (p=0.02) in comparison to model 1, and the coefficient on a household death increased.

A similar pattern of results is observed in the DBDC-OE data, with the exception of bid value, which is not statistically significant.

In the anchoring model the anchor parameter (bid*D) is negative and significant whilst the coefficient on bid is positive and significant. This suggests that respondents do anchor their willingness to pay to the initial bid (DC_1) but do not anchor their willingness to a weighted average of the initial and follow up bid (DC_1 and DC_2). This is observed in both the DBDC data and the DBDC-OE data.

When we include both shift and anchoring effects in the shift and anchoring model (model 4) we find that the anchoring coefficient increases in magnitude relative to the anchor model (model 3) but the shift coefficient changes sign. It is now positive and significant. This occurs in the DBDC-OE data also.

Willingness to pay estimates from the DBDC method range from 2428CFA in the base model to 1883CFA in the shift and anchoring model. This equates to 1.1% of annual income in the base model and 0.9% of annual income in the shift and anchoring model, respectively. In the DBDC-OE these estimates are lower, ranging from 1036CFA in the base model to 589CFA

in the shift and anchoring model. This represents 0.5% of income in the base model and 0.3% of income in the shift and anchoring model .

Discussion

In line with previous research we find that willingness to pay in the DBDC-OE method are lower than those obtained in the DBDC method (DeShazo, 2002), with the addition of an open ended question in the DBDC method reducing mean willingness to pay by approximately 69%. The rationale behind the addition of the open ended question is the potential improvement in the precision of the willingness to pay estimates gained from the open ended question. It is expected that if starting bids do not cover the lower and upper end of the WTP distribution then there is potential for efficiency gains from the addition of an open ended question. However, it must be noted that 202/506 respondents (40%) gave an open ended willingness to pay value which was the same as the last DBDC question that they had agreed to pay. The addition of an open ended question therefore elicited no additional information in 40% of the sample.

All four models for both the DBDC data and the DBDC-OE provide evidence of a significant shift in respondents willingness to pay between DC_1 and DC_2, supporting previous findings of incentive incompatible responses in the DBDC method. This evidence of a shift effect is however mixed. In the model 2, we find evidence of a negative shift, suggestive of 'nay' saying behaviour. This is not unexpected given that 45% of respondents say No/No to DC_1 and DC_2, however in model 4, when anchoring effects are controlled for we find evidence of a positive shift, suggestive of 'yea' saying behaviour. This change in sign of the shift variable has been found in previous research we have conducted in the Nouna area, using the bidding game method (McNamee et al., 2010). This finding emphasises the need to test for both the effects of starting point bias and incentive compatibility in iterative methods.

We also find evidence of starting point bias when shift/anchoring or shift and anchoring effects were included in the regression models (models 2, 3 and 4), however this was only in relation to the first bid (DC_1), where we observe a positive significant coefficient on the bid value. This is positive and significant in models 2, 3 and 4 in the DBDC data and significant in models 3 and 4 in the DBDC-OE data. In addition to testing for whether individuals anchor their willingness to pay to the initial bid, we also tested whether respondents were

anchoring their willingness to pay to a weighted average of the first and second bid. The anchor parameter in models 3 and 4 was negative and statistically significant. This suggests that whilst individuals do anchor their willingness to pay to the initial bid (DC1), as evidenced by the positive and significant coefficient on bid value, they do not anchor their willingness to pay to a weighted average of the first and second bid (DC_1 and DC_2). Again, this is intuitive given the response patterns outlined in Table 3. This No/No pattern was expected as it was hypothesised that in this setting follow up questions provide greater incentive to say 'no' rather than 'yes'.

In terms of the differences between the DBDC method and the DBDC-OE method whilst we find evidence of anchoring and incentive incompatibility in both methods, the magnitude of the bias is less in the DBDC-OE method. For example looking at model 4, the coefficient on the bid parameter and anchoring parameter is 23% and 14% lower in the DBDC-OE method, respectively. In addition, the coefficient on the shift parameter is 45% lower in the DBDC-OE method. Whilst both methods are susceptible to bias, the trend suggests that the magnitude of the bias is lower in the DBDC-OE method

Conclusion

The DBDC method was designed to overcome some of the short comings of the single bound method, primarily the efficiency of the estimates of willingness to pay. However, there are well documented biases within the DBDC method in the form of starting point bias and incentive incompatibility. In this paper we have built upon previous research in this context to test for these effects using the DBDC method and the DBDC-OE method. We show that if shift and anchoring effects are not controlled for biased willingness to pay estimates will result. In addition, we show that willingness to pay derived from the addition of an open ended follow up to the DBDC method results similar biases in the form of starting point bias and incentive incompatibility. However, the magnitude of the bias is lower in the DBDC-OE method.

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Table 1 Respondent characteristics

	All respondents	**By starting bid (n):**			***p***
		1000 (174)	**4000 (155)**	**8000 (177)**	
Mean annual income	211,900	175,327	227,886	233,393	0.2
% male	49	49.4%	47.1%	50.3%	0.84
% with woman currently pregnant in HH	11	10.9%	14.2%	8.5%	0.25
% with a maternal complication in HH	22.2%	20.1%	23.2%	23.3%	0.57
% with a maternal death in HH	2.4%	0.6%	2.6%	4.0%	0.11
% who know of maternal death in community	81%	83.9%	80.0%	79.1%	0.48
Mean years of schooling	0.82	0.46	0.90	1.12	.018

Table 2 Responses to DC1 and DC2

Initial bid	**1000 (% within format/total)**	**4000 (%within format/total)**	**8000 (%within format/total)**	**All respondents (Total %)**
Yes, Yes	50 (28.7/9.9)	7 (4.5/1.4)	3 (1.7/0.6)	60 (11.9)
Yes, No	73 (42/14.4)	42 (27.1/8.3)	16 (9/3.2)	131 (25.9)
No, Yes	34 (19.5/6.7)	21 (13.5/4.2)	29 (16.4/5.7)	84 (16.6)
No, No	17 (9.8/3.4)	85 (54.8/16.8)	129 (72.9/25.5)	231 (45.7)

Table 3 Interval regression results of DBDC data

Variable	**Model 1 Base**	**Model 2 Shift**	**Model 3 Anchoring**	**Model 4 Shift and anchoring**
Constant	-2303.28 (0.104)	-231.18 (0.864)	-237.76 (0.846)	-1175.96 (0.343)
Bid	0.08 (0.219)	0.248 (0.000)	0.697 (0.000)	0.839 (0.000)
D (shift)		-2761.5 (0.000)		2701.44 (0.000)
Bid*D (anchor)			-0.906 (0.000)	-1.401 (0.000)
Income	401.08 (0.001)	275.62 (0.017)	177.49 (0.093)	189.80 (0.073)
Education	107.48 (0.095)	82.93 (0.172)	34.01 (0.554)	20.104 (0.729)
Sex	-589.56 (0.11)	-818.66 (0.019)	-868.75 (0.008)	-790.52 (0.016)
Pregnancy	347.42 (0.53)	872.02 (0.093)	652.03 (0.174)	292.77 (0.554)
Complication	-349.51 (0.39)	-201.29 (0.598)	-40.59 (0.729)	-41.013 (0.666)
Household death	2531.52 (0.014)	2616.60 (0.007)	3282.95 (0.000)	3765.23 (0.000)
Community death	153.40 (0.74)	65.49 (0.88)	100.27 (0.812)	156.11 (0.710)
Observations	401	401	401	401
Log likelihood	-501.17	-468.45	-411.84	-399.63
Predicted mean WTP	2428.437	2147.158	1925.41	1882.736

Note: interaction terms were analysed but not included due to being non-significant. These were income*sex and education*sex

() = P values

Bid= bid value in 000's

D = 0 if respondent answered Y/N or N/Y

D=1 if respondent answered Y/Y or N/N

Bid*D = Bid value x D

Table 4 Interval regression results of OE data

Variable	**Model 1 Base**	**Model 2 Shift**	**Model 3 Anchoring**	**Model 4 Shift and anchoring**
Constant	-2879.72 (0.038)	-274.98 (0.835)	-446.48 (0.694)	-959.94 (0.390)
Bid	-0.07 (0.238)	0.087 (0.131)	0.548 (0.000)	0.642 (0.000)
D (shift)		-3401.39 (0.000)		1487.06 (0.001)
Bid*D (anchor)			-0.949 (0.000)	-1.202 (0.000)
Income	386.428 (0.001)	250.82 (0.025)	144.41 (0.139)	141.46 (0.136)
Education	103.52 (0.092)	77.55 (0.177)	26.68 (0.599)	17.676 (0.723)
Sex	-521.86 (0.146)	-842.018 (0.013)	-813.54 (0.006)	-740.60 (0.01)
Pregnancy	12.65 (0.981)	767.78 (0.123)	370.87 (0.391)	118.464 (0.783)
Complication	-390.47 (0.323)	-205.91 (0.580)	-41.91 (0.81)	-41.16 (0.781)
Household death	2032.299 (0.04)	2227.78 (0.015)	2605.51 (0.001)	2673.27 (0.001)
Community death	188.87 (0.678)	82.78 (0.85)	145.001 (0.71)	181.42 (0.63)
Observations	401	401	401	401
Log likelihood	-1771.49	-1716.89	-1655.77	-1650.66
Predicted mean WTP	1035.511	734.1204	583.0225	589.0709353

Appendix 1

I would like to ask you some questions concerning your feelings about deaths amongst women who are pregnant. I'm going to do this by asking you to think about a hypothetical situation where the number of deaths and complications is reduced.

To give you a little background, health services aim to prevent illness and disease. However, in many cases, they can be re-organised in order to prevent more illness and disease from occurring. For example, different types of training could be provided for midwives.

I'm going to describe the benefits of a re-organisation of health services. This re-organisation is expected to save the lives of some mothers through the prevention of serious complications. In addition to this, the re-organisation is expected to reduce the number of other complications.

I'd like to know how important this improvement is to you.

At the moment, it's estimated that there are around **60** deaths in Nouna District every year amongst pregnant women. These women die during pregnancy, childbirth, or at a time shortly after, because of complications.

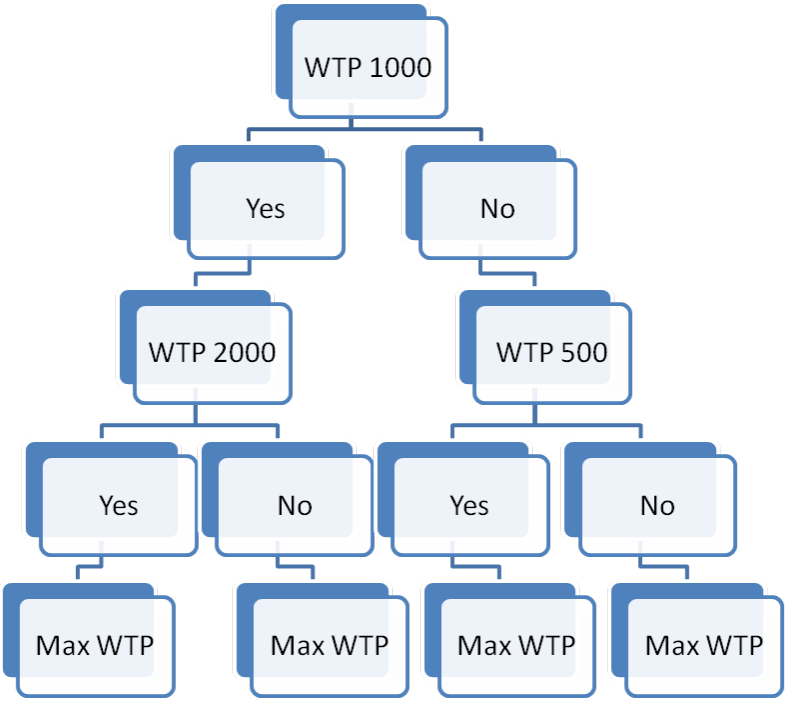
Imagine now, that if a re-organisation was to occur this year, there would be fewer deaths. I'd like you to think about a situation where **45** women would now die next year.

So, what this means is that **15** women next year will be saved as a result of this re-organisation.

If enough individuals make a contribution, the Government and other agencies will also contribute. With enough funds from individuals, the re-organisation can take place, and the lives of **15** women will definitely be saved next year in your District.

What I want to do now is present you with different sums of money and ask which amount of money you will be prepared to pay so that this re-organisation takes place.

In answering these questions, please think about how much you can afford to pay. Think about the things that would have to be given up if you were to pay that particular amount.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Yes
No
WTP 2000
WTP 500
Yes
No
Yes
No
Max WTP
Max WTP
Max WTP
Max WTP