**National Centre for Epidemiology and Population Health
The Australian National University**

**VALUING THE BENEFITS OF MOBILE
MAMMOGRAPHIC SCREENING UNITS USING THE
CONTINGENT VALUATION METHOD ***

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ABSTRACT

This purpose of this study is to illustrate how the contingent valuation method can be used to estimate the monetary benefits of improving access to mammographic screening services in rural areas of NSW. It is based on a survey of 458 women in 19 rural towns. The survey provided women with information on mammographic screening and then asked them whether they are "willing to pay" one of eight pre-specified bids for the visit of a mobile screening unit. Estimates of the mean "willingness to pay" based on these data ranged from \$132 to \$151 per visit.

1. Introduction

In 1991 the most recent year for which data are available, 2513 women died from breast cancer in Australia (ABS, 1994). In an attempt to reduce this mortality the Commonwealth Government in consultation with the States established the National Program for the Early Detection of Breast Cancer (NPEDBC). The program provides mammograms "free of charge" to all women aged between 40 and 79 years, but is primarily targeted at women aged between 50-69 years for which screening has been shown to be the most effective. The NPEDBC supplements existing facilities through the introduction of an additional 100 screening facilities to provide mammograms for an estimated 550 000 to 860 000 women each year (NPEDBC Monitoring and Evaluation Reference Group 1994). One of principal aims of the NPEDBC is "[t]o ensure equitable access for all women aged 50-69 years to the Program"(p.ES1). In rural areas this can be achieved by adopting one of two modes of service delivery: (i) "service to the client"; and (ii) "client to the service". The first approach involves the use of mobile screening units in towns too small to have fixed screening units. The alternative approach is to place fixed units only in major regional centres and require women in smaller towns to travel to these centres in order to have a mammogram. One method of determining where to place mobile screening units is to undertake a cost-benefit analysis of using these services in different rural towns.

The purpose of this paper is to illustrate how the contingent valuation method can be used to estimate the welfare benefits of using mobile mammographic screening services in 19 towns in rural New South Wales. These estimates could be used in a cost-benefit analysis at a later stage. Section 2 contains a discussion of the methods that can be used to quantify the benefits of reducing the access cost of having a mammogram. An empirical application of this approach is then outlined in section 3 and the results are presented in section 4. Finally, the estimates of the benefits of using mobile screening units in rural towns are calculated in section 5 and the conclusions are summarised in the closing section.

2. Evaluating the Benefits of Mobile Screening Clinics

If a mobile unit visits a rural town without a permanent screening facility, women in the area benefit from having to travel a lesser distance to have a mammogram. Clarke (forthcoming) derives welfare measures for the reduction in the time and travel costs associated with the introduction of mobile screening units. The total cost of attending a screening unit is shown to be $c_1 = p_1 + wt_1$, where p_1 is "out-of-pocket" travel expenses (e.g. cost of petrol), w is the value of time, and t_1 the total time required to be screened. Both p_1 and t_1 are in turn functions of the distance women must travel to have a mammogram. It is useful at this point to briefly review the measures of welfare change associated with a decrease in access costs. The benefits can be divided into two parts: (i) use values; (ii) non-use values:

2.1 Use Values

Consider a town in which a woman must incur a cost of c_1^0 to have a mammogram at a permanent facility (fixed site) located outside her town. When a mobile screening unit visits the town her access cost is reduced to c_1^f . Given the binary nature of the screening decision (i.e. to have a single mammogram or remain unscreened) the population of women eligible for screening can be divided into three groups which are illustrated in figures 1(a) to 1(c).

Figure 1. The welfare benefits from a visit by a mobile screening unit

Figure 1. represents women with three different levels of "willingness to pay" for a mammogram (denoted by $c_1^{\#}$, c_1^- and c_1^*). Figure 1(a) represents a woman who is prepared to travel to a permanent facility, because her willingness to pay (WTP) is greater than the cost of travelling to that site ($c_1^0 < c_1^{\#}$). Her welfare gain, if a mobile unit visits her town of residence is the reduction in access costs (i.e. $c_1^f - c_1^0$). Figure 1(b) represents a woman who chooses not to have a mammogram at the permanent facility ($c_1^0 > c_1^-$), but has a mammogram at the mobile unit. For this woman, the welfare benefit associated with the reduction in access costs from c_1^0 to c_1^f is the difference between the final access cost and her WTP for a mammogram (i.e. $c_1^f - c_1^-$). The final figure (1(c)) represents a woman who chooses not to have a mammogram even when the access costs are reduced (i.e. $c_1^f > c_1^*$). She gains no benefit from the visit of a mobile screening unit.

2.2 Non use values

Individuals may also be concerned about the access of others and these altruistic values may be reflected in their WTP. Becker (1974) sets out the altruistic relationships that can exist within the family, showing that individuals not only maximize their monetary income, but also a social income which includes the monetary value of the relevant characteristics of others who are part of their social group. In this way, a woman who lives in the same town as her mother may place a higher value on screening since it reduces access costs for both of them. Altruism also extends beyond the family, when individuals have concern for the welfare of members outside their social group (Culyer, 1972). For example, a woman that has had a double mastectomy following the detection of breast cancer gains no *use* benefits from the visit of a mobile unit, but is likely to have strong preferences on whether others should have improved access to mammographic screening.

The degree to which altruism should be taken into account when undertaking cost-benefit has been the subject of considerable recent debate. Milgrom (1993, p.420) argues altruistic benefits should be given a zero weight when undertaking cost-benefit analysis:

...the part of willingness-to-pay (WTP) that arises on account of altruistic feelings must be excluded from the benefit-cost calculation in order to identify correctly the projects that are potential Pareto improvements. {emphasis in original}.

However, Jones-Lee (1991, 1992) demonstrates that this only applies when altruism is *non-paternalistic* (i.e focused on all aspects of wellbeing). In contrast, if altruism is paternalistic in that it stems from concern about one aspect of wellbeing rather than general welfare (e.g. concern about the other people's access to health care) then it should be taken into account. Harberger (1984) illustrates how this form of altruism can be incorporated into cost-benefit calculations.

3. Methods

A contingent valuation experiment was performed on 458 women who were resident in 19 randomly selected rural New South Wales towns. These towns represented all but one of the towns involved in the *Cancer Action in Rural Towns* (CART) Project.¹ The CART project is a randomized control trial of a community-wide intervention to promote behavioral change relating to skin, breast, cervical and lung cancer. A matched pairs design was used, with one town from each pair randomly allocated to either the experimental or control group. Towns were matched to take account of demographic characteristics such as age, ethnicity, occupation and education levels, as well as geographic location, geographic isolation (estimated from population density) and average summer temperature (CART Project Team 1993).

In experimental towns a community action intervention was implemented over a three-year period with the aim of reducing the incidence of breast, cervical, skin and smoking-related cancers. This involved the formation of a community committee to initiate and maintain health promotion interventions over the life of the project. As part of the project, baseline (pre-intervention) data was collected using a random community survey of individuals between the ages of 18–70 years in all 20 towns (November 1993 to March 1994).

A follow-up survey on a sub-set of women who participated in the CART baseline survey was conducted as part of the CART project in order to examine the effects of the intervention on their cancer-related behavior. However, unlike two previous travel cost studies (Clarke 1995; Clarke forthcoming), the contingent valuation experiment was conducted separately. This was necessary, because the contingent valuation protocol (see below) involved sending subjects information on breast cancer and mammographic screening prior to the telephone interview. The distribution of this information sheet conflicted with one of the objectives of the CART project, which was to assess the subject's knowledge of mammographic screening. It was therefore decided to conduct a separate contingent valuation survey on a sample of women who were included in the baseline survey, but who were not going to be interviewed as part of the CART follow-up survey.²

¹ The valuation of mobile units was not directly related to the evaluation of the CART project. Instead it is an example of how joint production can lower the cost of conducting experimental research!

² The sample consisted of non-smokers aged more than 40 years at the time of the survey. The smokers were removed from the sample because they were required for other aspects of the CART project. Although removal of smokers was unfortunate, it was decided that the benefits of having a sample of women in the age group who had consented to participate in a follow-up survey, outweighed the disadvantage of having a sample that was not representative of the general population.

3.1 Description of the contingent valuation survey

The survey protocol was as follows. All women were initially sent a letter informing them of the study. Enclosed with this letter was an information sheet that included a question on their WTP for a mobile screening unit to visit their town. The letter also contained a reply paid card to enable subjects whose phone numbers had changed in the intervening three-year period to pass on this information. In all, 15 women returned these cards and were contacted on the new telephone numbers supplied. All subjects were telephoned in the evening by experienced telephone interviewers employed by a market research company (Purdon and Associates). The survey instrument and protocol was approved by the Ethics Committee of The Australian National University. Of the 595 women in the sample, 131 could not be contacted, 6 refused to participate or had died since the last survey, leaving a total of 458 completed interviews (a participation rate of 77%).

A hybrid mail–telephone survey was used to ascertain the WTP for mobile mammographic screening units. Initially women were contacted by mail and provided with an information sheet (reproduced in appendix B) which included two questions: (i) “Would you use a mobile unit to have a mammogram if it visited «Town Name»?”; and (ii) “Would you be prepared to pay «Bid1» in higher taxes to have a mobile breast cancer screening unit visit «Name»?”. Respondents were then informed that these questions would be asked again in the telephone survey and that they were included in the information sheet so as to provide them with an opportunity to think about the issue before being interviewed. The fields, «Name» and «Bid1» related to the respondent’s residential location and the randomly selected bid. Each of the information sheets and telephone surveys contained different information in the «Town» and the «Bid1» fields.

The telephone survey was then conducted between one and three weeks after the women received the information by mail. The survey was divided into three sections (see appendix B). The first section collected background information on the respondent, such as their date of birth, occupation and whether she had known anyone who had been diagnosed as having breast cancer in the last five years. The second section contained questions relating to screening behavior over the previous five years and formed the basis of a separate travel cost study (Clarke 1997). The third section contains the contingent valuation scenario and asked respondents their WTP for a visit by a mobile unit.

Currently, mobile screening units are provided as part of the NPEDBC and are funded out of general tax revenue. Phrasing the WTP questions in terms of changes in taxes is a natural payment mechanism that captures both use and altruistic values. One difficulty with using taxation as a payment mechanism in this survey is that a significant minority of the relevant population (women aged over 40 years) do not pay income tax. To overcome this problem the respondent was asked if she paid income tax. For the 36 per cent of the respondents who did not pay income tax, the WTP question was changed to: “Think of the payment as a levy paid to the local council to provide the service.” The WTP questions were then phrased in terms of paying higher local government rates: “Would you be willing to pay «Bid1» in a council levy to have a mobile unit visit «Town name»? ”

A double-bounded dichotomous choice format is used in the telephone survey in which each respondent was offered a randomly selected bid and then offered a higher or lower follow-up bid depending on their answer to the initial question (see figure 2). The bid amount in the initial WTP question matched that provided on the information sheet. If the respondent refused the initial bid she was offered approximately half the amount («Bid2»). Alternatively if she accepted the initial bid she was offered approximately double the amount («Bid3»). Respondents were also given the option of stating they “didn’t know” whether they would accept the initial bid. In this case they were offered half the amount of the initial bid in a follow-up question to determine

whether their “don’t know” response was due to being indifferent to the initial amount offered or as a result of having difficulty expressing their preferences.

Figure 2. Flow diagram of the WTP questions

The adoption of a double-bounded format requires the researcher to select a bid vector. In line with the literature on optimal design (eg. Nyquist, 1992), the survey was conducted in two batches. The first batch consisted of 400 women randomly selected from the sample with the initial bids amounts ranging from \$5–\$200 (i.e. \$5, \$20, \$50, \$100, \$150, \$200) and the follow-up bids ranging from \$2–\$400 (see table 3). After 150 interviews had been conducted a non-parametric method was applied (Kriström, 1990) and two additional initial bids of \$75 and \$300 were added to the bid vector. The former was added because it was close to the median WTP and the latter because it assisted in the estimation of the right-hand tail of the distribution. A second batch of 195 surveys was then dispatched.

Another important feature of the survey is that respondents who rejected both the initial and follow-up bids were asked an additional question on whether they were willing to pay anything for the service. This allowed the respondent to be classified as either having a zero WTP or a WTP that is less than the lower bid. Women who refused to pay anything for the service were asked to provide a reason.

4. Descriptive statistics

Table 1 lists the characteristics of respondents. The average age of the respondents was 58 years. More than 39 per cent of respondents had a gross household income of less than \$15 000 (many of these were recipients of the aged pension). For most respondents (69%), the highest level of education attained was junior high school, which means that they received 10 years or less of education.

Table 1. Personal characteristics of the survey respondents (n = 458)

Variable	Values	Numbers (%)
Age	40-49	132 (29%)
	50-59	138 (30%)
	60+	189 (41%)
	NR	(0%)
Education	Junior high school	318 (69%)
	Senior high school	48 (11%)
	Technical college	40 (9%)
	University	44 (9%)
	Other/NR	8 (2%)
Employment status	Employed	189 (41%)
	Unemployed	1 (0%)
	Out of the labour force	169 (37%)
	Retired	97 (21%)
	NR	2 (0%)
Household Income (Gross)	<\$15 000	180 (39%)
	\$15 000-30 000	109 (24%)
	\$30 000-45 000	66 (14%)
	\$45 000-60 000	42 (9%)
	\$60 000-75 000	15 (3%)
	\$75 000-90 000	6 (1%)
	\$90 000 +	10 (2%)
	NR	29 (6%)

NR = Non response.

Questions were also asked on the respondent's knowledge and experience of breast cancer and mammographic screening. These responses are reported in table 2. In all, 61 per cent of respondents knew someone who had suffered from breast cancer and 76 per cent had had at least one mammogram in the last five years. A majority of respondents stated that they would use a mobile unit if it visited their town, and 92 per cent could remember receiving the letter and information sheet.

Table 2. Knowledge and experience of breast cancer and mammographic screening

Variable	Value	Number (%)
Knew someone with breast cancer	Yes	278 (61%)
	No	171 (37%)
	NR	9 (2%)
Number of mammograms in last five years	One	110 (24%)
	Two	158 (34%)
	Three or more	80 (17%)
	None	109 (24%)
	NR	1 (0%)
Would use a mobile screening unit if it visited their town	Yes	364 (79%)
	No	78 (17%)
	DK	14 (3%)
	NR	2 (1%)
Received the information sheet	Yes	415 (92%)
	No	34 (6%)
	DK	6 (1%)
	NR	3 (1%)

NR = Non response ; DK = "Don't know"

Table 3 lists the responses to the different bid amounts offered in the initial and follow-up WTP questions. The left-hand side of the table lists the responses to the initial WTP question for each bid. The right hand side lists the responses to the higher or lower follow-up bids. The responses for the lowest bid of \$5 can be interpreted as follows: in total 60 women were offered this bid. Of these, 51 accepted, six refused and three expressed no preference. The 51 women who accepted were then offered a bid of \$10. Of these, 44 accepted, six refused and one woman expressed no preference. The six women who declined and the three women who expressed no preference to the initial bid of \$5 were offered the lower bid of \$2. Of these, only two women accepted, five women declined and two women expressed no preference. The responses for the other bids can be interpreted in a similar manner.

Table 3. Summary of responses to the initial and follow-up WTP questions

Initial Bid			Follow-up bid		
	Response	No.		Response	No.
\$5	Y	51	\$10	Y	44
	N	6		N	6
	DK/NR	3	\$2	Y	2
\$20				N	5
				DK/NR [#]	3
	Y	37	\$40	Y	20
	N	14		N	12
	DK/NR	4	\$10	Y	2
\$50				N	11
				DK/NR	10
	Y	28	\$100	Y	13
	N	28		N	14
	DK/NR	2	\$25	Y	9
\$75				N	20
				DK/NR	2
	Y	26	\$150	Y	14
	N	27		N	9
	DK/NR	3	\$40	Y	9
\$100				N	20
				DK/NR	4
	Y	31	\$200	Y	11
	N	29		N	16
	DK/NR	3	\$50	Y	13
\$150				N	18
				DK/NR	5
	Y	16	\$300	Y	3
	N	38		N	12
	DK/NR	3	\$75	Y	9
\$200				N	27
				DK/NR	6
	Y	14	\$400	Y	4
	N	53		N	8
	DK/NR	1	\$100	Y	14
\$300				N	34
				DK/NR	8
	Y	6	\$500	Y	0
	N	34		N	5
	DK/NR	3	\$150	Y	8
				N	28
				DK/NR	2

DK = "Don't know"; NR = Non response; Y = Yes; N = No.

[#]DK and NR from both follow-up questions have been combined

Based on these data the proportion of respondents accepting each bid is calculated and is graphed in figure 3.

Figure 3. The proportion of respondents accepting the initial willingness to pay question (n = 438)*

*20 DK/NR responses have been removed

The final table in this section examines the relationship between having a WTP that is greater than zero and the intention to use the mobile screening unit. This is based on two separate questions asked in the course of the survey. A contingency table classifying each respondent according to her response to these questions is presented in table 4. On the basis of the responses to both questions, it is possible to gain some insight into the motivations of the respondents. If they were willing to pay something and intended to use the unit they can be classified as “users” (296 women). On the other hand if they intended to use the unit, but were not willing to pay anything, they were “free-riders” (64 women). Similarly, if they did not intend to use the unit, but were willing to pay something, they can be classified as “altruists” (36 women). Finally, if they did not intend to use or pay for the unit they are “non-users” (41 women).

Table 4. The association between intended use and a positive WTP (n = 458)

Would you be willing to pay anything? (Q21)	Would you use the unit if it visited «Town Name»? (Q17)		
	Yes	No	Don't Know
Yes	296(users)	36 (altruists)	7
No	64 (free-riders)	41 (non-users)	1
Don't know	4	1	7

NR = 1.

4.1 Zero willingness to pay and protest responses

A total of 106 women (23 per cent of the sample) declined to pay anything for the good (see table 4). These respondents along with the 12 respondents that stated they "didn't know" were asked why they had answered in this way. This question prompted a wide variety of responses which are reproduced in Appendix A. On the basis of these responses, women with a zero WTP were classified into six categories (the number of respondents in each category are given in parentheses): (i) problems with the payment vehicle—"I already pay too much tax" (36 women); (ii) not be able to afford to make a payment—"I can't afford it" (16 women); (iii) having previously made a payment to a charity to provide a mobile screening service (7 women); (iv) prefer to use the substitute site (26 women); (v) felt it was just as easy to travel to the substitute site (25 women); (vi) not intending to have a mammogram (5 women). As Mitchell and Carson (1989) have noted it is important to distinguish between respondents who have a genuine zero WTP and protest zero responses. The later being respondents who state a zero WTP because they "reject the evaluation process itself for one reason or another" (p.267). Under this definition responses that are classified in either categories (i) or (iii) can be regarded as protest zero response. Women in category (i) are rejecting the payment mechanism rather than valuing the good and women in category (iii) are protesting at being asked to pay for the good after voluntarily contributing to a charity to provide the service. Responses that fall into the other categories are more difficult to classify as protest zeros.

Figure 4. graphs the number of women in each of the six categories who stated that they would or would not use the mobile unit. All categories except the last (i.e. those women not intending to have a mammogram) contained women who stated that they had a zero WTP, but intended to use the mobile unit (i.e. free-riders). The estimate of the number of free-riders should be regarded as conservative, because some women who stated they did not intend to use the unit may change their mind if it visited their town.

Figure 4. Reasons for a zero willingness to pay by intended use

4.2 Non-users WTP responses

Some insight into the nature of altruism can be gained by examining the responses of the 77 women who stated that they did not intend to use the mobile unit. Figure 5. shows their responses to the initial WTP question. Interestingly, the proportion of respondents accepting the amounts offered is roughly constant across the entire range of «Bid1». ³ While all respondents who rejected the first three bids (\$5, \$20 and \$50) stated they had a zero WTP. This is in contrast to response of women who intended to use the unit the proportion accepting the bid decreased as the size of the bid increased (see figure 3 above).

Figure 5. The responses of non-users to the initial WTP question

5. Estimates of the WTP for a mobile screening unit

The WTP for a visit by a mobile screening unit is estimated in several ways. In the next subsection a single-bounded (SB) model is developed based on the responses to the *initial* Bid. In section 5.3 a double-bounded (DB) model is introduced. This is a more statistically efficient technique, because it uses data from the *initial* and *follow-up* WTP questions (Hanemann, Loomis and Kanninen 1991).

5.1 Single bounded model

The SB approach involves specifying a utility function to represent a woman's decision on whether to accept the initial bid:

$$V_j = (z_j, y, S) = W_j(z_j, y, S) + \varepsilon_j \quad (1.)$$

where W_j is a "universal" utility function, z_j denotes whether the individual accepts the bid (i.e. $z_1 = 1$ represents acceptance and $z_0 = 0$ represents rejection), y is income and S is a vector of

³ Such behavior is consistent with the view of Diamond and Hausman (1993) that charitable payments do not decline as the bid increases.

other characteristics of the consumer and ε_j are errors of observation. The respondent accepts a given bid amount (B) when:

$$W_1(1, y - B, S) + \varepsilon_1 \geq W_0(0, y, S) + \varepsilon_0 \quad (2.)$$

Equ. (2.) can be rewritten as $W_0(1, y - B, S) - W_1(0, y, S) \leq \varepsilon_1 - \varepsilon_0$ which emphasizes that it is the difference in utility that determines choice. To make the model operational, the researcher must specify a utility function and a particular cdf for the error term.

Previous research has shown that the specification adopted has considerable influence on the estimates of the welfare benefit (Sellar, Chavas and Stoll 1986). Following, Hanemann (1984) most empirical studies adopt one of two specifications. The simplest is the linear:

$$\begin{aligned} \Delta W_1(B, S) &= (\alpha_1 - \alpha_0) - \beta B + (\gamma_1 - \gamma_0)S + \varepsilon_1 - \varepsilon_0 \\ &= \alpha - \beta B + \gamma S + \eta \end{aligned} \quad (3.)$$

where $\alpha = \alpha_1 - \alpha_0$ is a constant term; β is the coefficient on the bid B ; $\gamma = \gamma_1 - \gamma_0$ is a vector of coefficients on any other characteristics and $\eta = \varepsilon_1 - \varepsilon_0$ is an error term. An alternative is the "income share" specification:

$$\begin{aligned} \Delta W_{in}(B, S) &= (\alpha_1 - \alpha_0) + \beta \log(1 - \frac{B}{y}) + (\gamma_1 - \gamma_0)S + \varepsilon_1 - \varepsilon_0 \\ &\approx \alpha - \beta \frac{B}{y} + \gamma S + \eta \end{aligned} \quad (4.)$$

As Hanemann and Kanninen (1996) note the functional form determines the relationship between income and WTP.⁴ The linear model (Equ. 3) imposes a zero income elasticity while the "income share" specification (Equ. 4.) imposes an elasticity of one.

In this study the error term η is assumed to distributed standard normal and so the probability that the individual accepts the bid becomes:

$$\Pr(WTP \geq B) = \pi_1 = \Phi(\Delta W(B, S)) \quad (5.)$$

The probability of acceptance can be estimated using the probit model.

Linear and income share models

In the linear specification, the initial bid was included as an independent variable. In the income share specification, the bid was divided by household income ($\frac{B}{y}$). The household income variable (y) was based on a question which asked the respondent to choose one of seven income categories ranging from \$0-\$15 000 p.a. to \$75 000-\$90 000 p.a. An open

⁴ It is important to recognize that these two models are simply special cases of the more general Box-Cox utility function $w_j = \alpha_j + \beta_j \left[\frac{y^{\lambda} - 1}{\lambda} \right] + \gamma_j S$. The linear model arises when $\lambda = 1$ and "income share" model when $\lambda = 0$. A possible extension of this study is to apply the more flexible functional form. See McFadden and Leonard (1993) for an illustration of this approach.

ended category for households with incomes above \$90 000 p.a. was also included. The mid-points of these categories were used to form the income variable.⁵ The signs on both the "bid" and "income share" variables should be negative.

Distance to the nearest facility

The distance to the closest permanent screening facility was included, because the WTP (for those who would use this unit) should rise as this distance increases.

Familiarity with breast cancer and mammographic screening

The WTP may also depend on the familiarity of the respondent with breast cancer and mammographic screening. A dummy variable "knowledge" was included in the initial specification to examine how responses were affected by the respondent knowing someone who had breast cancer. A dummy variable "received information" was included in order to test whether receiving the information sheet prior to answering the telephone survey affected the WTP.

Other variables

To control for age and education, potential effects of the CART intervention and intended use several other dummy variables were included in the initial specification.

The variables are defined and summary statistics provided in table 5. In line with other contingent valuation studies such as Desvousges et. al. (1993) protest responses were eliminated leaving 372 women in the sample.

Results

The results of multivariate probit models are presented in table 6, models 1 and 2 represent the initial specification of the linear and income share models respectively. The only variables significant at the five per cent level in both specifications were "intended use" and "bid" and "income share". However, there is always a danger in applying an arbitrary cut-off point for significance, because several other variables were also reasonably significant, but not at the five percent level. In model 1 these included Distance ($p = 0.12$), and Age ($p = 0.15$) and Marriage ($p = 0.06$). In model 2 "distance" was significant ($p = 0.07$). For this reason all these variables were retained in the final specifications (models 3 and 4).

⁵ The final category was open ended (income >\$90,000 p.a.). For the 2% of the sample in this category it was assumed they had a combined income of \$100,000.

Variable	Description	Mean(S.D.)
Bid	The initial bid offered	105.88(87.09)
Income share	Bid divided by respondent's household income	0.004(0.005)
Distance	The distance to the nearest fixed site	125.99(72.62)
Intended use	Equals one if the respondent stated she would use a mobile unit if it visited, 0 else	0.81
Education		
Senior high school	Equals one if respondents highest level of education was senior high school, 0 else	0.11
Technical college	Equals one if respondents highest level of education was technical college, 0 else	0.09
University	Equals one if respondents highest level of education was university, 0 else	0.09
Other variables		
Age	Respondent's age	56.58(9.44)
Married	Equals one if respondent is married, 0 else	0.72
Knowledge	Equals one if respondent knows someone who has had breast cancer in the last five years.	0.61
CART	Equals one if the respondent lives in a CART intervention town, 0 else	0.63
Received information	Equals one if the respondent stated that they had received the information sheet, 0 else	0.91

*The variance is not reported for dummy variables.

Table 5. Variable descriptions and summary statistics (n=372) *

Variable	Initial Specification		Final Specification	
	Model 1 Linear model	Model 2 Income share	Model 3 Linear	Model 4 Income share
Constant	0.549 (0.883)	-0.232 (0.377)	0.909 (1.660)	-0.0258(0.124)
Bid	-0.008 (8.307) ^b	-143.54(6.702) ^b	-0.008 (8.286) ^b	-148.14(7.467) ^b
Income share				
ln(Bid)				
Distance	0.002 (1.563)	0.002 (1.840) ^d	0.002 (1.916) ^d	0.00211(2.155) ^e
Intended use	0.500 (2.708) ^b	0.530 (2.869) ^b	0.466 (2.598) ^b	0.4975(2.788) ^b
Married	0.315 (1.855) ^d	0.106 (0.621)	0.277 (1.666) ^d	
Senior high school	0.156 (0.673)	0.136 (0.608)		
Technical College	0.464 (1.678) ^d	0.301 (1.151)		
University	0.292 (1.102)	0.172 (0.677)		
Age	-0.012 (1.449)	0.0003(0.041)	-0.015 (1.875) ^d	
Knowledge	0.161 (1.085)	0.049 (0.318)		
CART	0.185 (1.112)	0.101 (0.624)		
Received information	-0.138 (0.544)	0.082 (0.331)		
No. Observations	372	372	372	372
LLF(β) Full model	-201.12	-211.56	-204.21	-212.85
LLF(0) Intercept only	-256.94	-256.94	-256.94	-256.94
LRI	0.22	0.18	0.21	0.18
Mean WTP	-	-	\$132.03	\$141.75

Table 6: Estimation results for the single-bounded model

5.2 Evaluating the welfare benefits of screening

The welfare benefits gained by introducing mobile screening units can be estimated from the cumulative distribution function (cdf) associated with each of these specifications. Since the welfare benefits in the multivariate model are a function of SB and S they vary across individuals. In what follows, the welfare benefits for an individual with a given set of characteristics are derived

Calculating welfare measures.

In order to calculate the benefits of a visit by a mobile screening unit, the cdf for each model must be integrated over the positive range of WTP (i.e. from zero to infinite). If numerical integration is applied, the usual practice is to truncate the distribution at a finite value. In this study, the cdf is truncated at \$500, because no individual accepted the highest follow-up bid of \$500. It is clear from the final specifications in table 5 that the estimated mean WTP depends on the covariates and therefore varies across individuals in the sample. It can be computationally burdensome to calculate the WTP for each individual in the sample, especially when calculating confidence intervals (see below). One way of reducing the amount of computation required is to calculate the WTP of a "representative" group of individuals, in particular, to set the (continuous) covariates to their mean values and determine the WTP for each combination of dummy variables.

For example, consider the linear specification (model 3). The continuous variables are "bid", "distance" and "age". If "distance" and "age" are set to their mean values, the cdf can be integrated over SB for each combination of dummy variables. The overall mean WTP can be approximated by estimating the weighted average of these four "representative" individuals (see. table 6). For example, if a woman of average age (56.6 years) lives at an average distance (105.9km) from a permanent screening site, is married and intends to use the mobile unit, her estimated WTP is \$149.26. If a woman of the same age and distance to substitute site is not married, her WTP declines to \$119.38. The overall sample mean is based on a weighted average of all four combinations.

Table 6. The estimated WTP based on the characteristics of four "representative" individuals

For an individual aged 56.6 years and living 105.9 km from a fixed site	Use mobile Unit	Married	Proportion of the sample	WTP
1	1	1	0.58	\$149.26
2	0	1	0.14	\$100.60
3	1	0	0.23	\$119.38
4	0	0	0.05	\$75.99
Weighted average			1	\$132.03

Thus, the estimated mean WTP for the linear specification reported in table 5. of \$132.03 is based on the weighted average reported in table 6.

There is a need to determine the statistical precision of the welfare benefit estimates based on the estimated equations. As Bockstael, McConnell and Strand (1991) have noted, the parameter estimates

used to calculate welfare measures are themselves random variables, and so the confidence intervals should be calculated for estimates of WTP. One method of calculating confidence intervals is the Duffield and Patterson (1991) approach which is based on bootstrapping. Their method can be broken down into a series of stages. Firstly, the predicted probabilities of a positive response are calculated using any of the RUMs. Secondly, a new dependent variable is created by randomly drawing from a binomial distribution for each individual using their predicted probability of a positive response. The model is then re-estimated with the new dependent variable. The procedure is repeated a large number of times and the welfare estimates are calculated at each replication. A $(1-\phi)$ confidence interval is then obtained by ranking the calculated WTPs and dropping the $\phi/2$ values from each tail.

The calculation of confidence intervals facilitates comparison between different specifications and is necessary if estimates of the WTP are to be compared with the welfare benefits estimated using other methods such as the travel cost model. The mean WTP and C.I. (based on 500 replications) for the linear specification was \$132.03 (95 % C.I.: \$112.4–\$151.1). In comparison the mean WTP of \$141.75 based on the income share specification had a wider confidence interval (95% C.I.: \$115.0–\$176.47).

5.3 Double-bounded dichotomous choice model

The SB dichotomous choice model is statistically much less efficient than the open-ended WTP questions and so it requires larger samples to achieve the same level of precision. One way of improving efficiency is to add a follow-up question in which the respondent is asked if she would pay a higher or lower amount depending on the response to the first question. For example, if the subject rejects \$B then she is asked a lower amount in a follow-up question, say \$B_{min}, while a subject who accepts \$B is asked if she is willing to pay a higher amount (\$B_{max}). Using the response to both questions, the respondent's WTP can be assigned to one of four intervals:

0 – \$B _{min}	(no/no)
\$B _{min} – \$B	(no/yes)
\$B – \$B _{max}	(yes/no)
\$B _{max} – ∞	(yes/yes)

The probabilities are as follows:

$$\begin{aligned}
 \Pr\{\text{yes} / \text{yes}\} &\equiv \pi_{11} = \Phi(\Delta W(B_{\max}, S)) \\
 \Pr\{\text{yes} / \text{no}\} &\equiv \pi_{10} = \Phi(\Delta W(B, S)) - \Phi(\Delta W(B_{\max}, S)) \\
 \Pr\{\text{no} / \text{yes}\} &\equiv \pi_{01} = \Phi(\Delta W(B_{\min}, S)) - \Phi(\Delta W(B, S)) \\
 \Pr\{\text{no} / \text{no}\} &\equiv \pi_{00} = 1 - \Phi(\Delta W(B_{\min}, S))
 \end{aligned} \tag{6.}$$

Given these probabilities and sample of n individual the log-likelihood function for the double-bounded model is:

$$\ln L = \sum_{i=1}^n [I_{YY}^i \ln \pi_{11} + I_{YN}^i \ln \pi_{10} + I_{NY}^i \ln \pi_{01} + I_{NN}^i \ln \pi_{00}] \tag{7.}$$

where $I_{YY}^i, I_{YN}^i, I_{NY}^i, I_{NN}^i$ are binary indicator variables (e.g. if the individual accepted the

initial and follow-up bid $I_{YY}^i = 1$ and the rest of the indicator variables ($I_{YN}^i, I_{NY}^i, I_{NN}^i$) are zero) This has been termed an "interval data" probit model by Alberini (1995). The merits of using this approach have been the subject of recent debate. At issue is how the follow-up question affects the individual's expressed WTP. An implicit assumption is that the same stochastic process underlies the respondent's answer to the initial and follow-up question. This assumption needs to be tested, because the DB model is similar to the bidding game which has been shown to suffer from "starting point" bias (Mitchell and Carson, 1989).

Hanemann and Kanninen (1996) suggest that a simple non-parametric test of consistency of the responses to the initial and follow-up questions that can be applied whenever the bid vector contains a separate, but overlapping sets of bids. The test is based on a comparison of the conditional probability of the subject accepting a bid if it is offered in the follow-up question with the unconditional probability of it being offered in the initial WTP question. For example, if the first bid vector consisted of ($\$B = B_1, \$B_{\max} = B_2, \$B_{\min} = B_3$) and in the second ($\$B = B_2, \$B_{\max} = B_4, \$B_{\min} = B_1$) then a standard result in probability theory that:

$$\Pr\{\text{"yes" to } B_2\} = \Pr\{\text{"yes" to } B_2 | \text{"yes" to } B_1\} \cdot \Pr\{\text{"yes" to } B_1\} \quad (8.)$$

This test can be applied to the current data since several bid vectors overlap. For example, the consistency of responses to ($\$B = 100, \$B_{\max} = 200, \$B_{\min} = 50$) can be compared with responses to a higher bid vector ($\$B = 200, \$B_{\max} = 400, \$B_{\min} = 100$). The proportion of positive responses can be calculated using table 3. For example, 31 women accepted and 29 women rejected the initial bid of \$100 so the $\Pr\{\text{"yes" to } \$100\} = 0.52$. While 13 women accepted and 14 women rejected a bid of \$100 if offered to them as a follow-up bid once they have agreed to pay \$50 so $\Pr\{\text{"yes" to } \$100 | \text{"yes" to } \$50\} = 0.48$. Finally half the women offered the initial bid of \$50 agreed to pay it so $\Pr\{\text{"yes" to } \$50\} = 0.50$. Hence, $\Pr\{\text{"yes" to } \$100 | \text{"yes" to } \$50\} \cdot \Pr\{\text{"yes" to } \$50\} = 0.48 \times 0.50 = 0.24$. The results for each pair of overlapping bid vectors are presented in table 7.

Table 7. Results of a non-parametric test of consistency of responses to the WTP questions

Bids	$\Pr\{\text{"yes" to } B_2\}$	$\Pr\{\text{yes to } B_2 \text{"yes" to } B_1\}$	$\Pr\{\text{"yes" to } B_1\}$	$\Pr\{\text{yes to } B_2 \text{"yes" to } B_1\} \times \Pr\{\text{"yes" to } B_1\}$
$B_1=50; B_2=100$	0.52	0.48	0.49	0.24
$B_1=75; B_2=150$	0.30	0.61	0.49	0.30
$B_1=100; B_2=200$	0.21	0.41	0.51	0.20
$B_1=150; B_2=300$	0.17	0.25	0.30	0.08

The results listed in table 7 are inconclusive. In the second and third rows Equ. (8.) holds, suggesting that the first and second bids come from the same stochastic generating process, but in the first and last cases the result does not hold.

To explore this issue further, a parametric test of consistency developed by Cameron and Quiggin (1994) is applied. Their approach involves treating responses to the first and follow-up bid as if they were valuing separate, but related, goods. Instead of modeling the response to

the initial and follow-up bids separately a bivariate probit model allows for linkages between the responses to both bid values.

Table 8 lists the results for two bivariate probit models. The first (model 5) is simply an extension of model 3 with the same specification applied to the follow-up question. The two equations are estimated jointly to allow for correlation in the error terms. The mean WTP based on the initial WTP question is \$130.59, while the mean WTP for the second question is \$123.47. To test if these responses are drawn from the same distribution, cross equation restrictions on the coefficients are applied. Model 6 constrains the coefficients to be equal across both models (i.e. so that they have the same mean WTP). A likelihood ratio test is used to compare model 5 with model 6. The test statistic for this asymptotic test is 51.42, well above the critical value at a five per cent level of significance ($\chi^2_{6,95\%} = 11.07$), so the null hypothesis that the mean of the underlying distribution is identical is therefore rejected.

Why might a respondent's WTP decline when she is asked a follow-up question? One explanation is that the follow-up question comes as something of a surprise. In this study, 92 per cent of respondents received the information sheet that contained the initial WTP question. The information sheet did not foreshadow a follow-up question. The surprise at being asked if they would be WTP a different amount in the follow-up question might induce a negative reaction. If this occurs it is inappropriate to apply the probabilities in Equ. (6.), because the probabilities depend on whether the respondent is asked the initial and follow-up question. One way of incorporating a change in probability is to introduce a background disposition to say "no" that applies only to the second question. This changes the probabilities to:

$$\begin{aligned}\bar{\pi}_{11} &= (1 - \theta_u)\pi_{11} \\ \bar{\pi}_{10} &= \theta_u\pi_{11} + (1 - \theta_u)\pi_{10} \\ \bar{\pi}_{01} &= (1 - \theta_d)\pi_{01} \\ \bar{\pi}_{00} &= \theta_d(1 - \pi_1) + (1 - \theta_d)\pi_{00}\end{aligned}\tag{9.}$$

where θ_u is the probability of responding "no" to the second bid given that the respondent agrees to the initial bid, θ_d is the probability of saying "no" to the second bid given the respondent has refused the first bid (Hanemann and Kanninen, 1996). This model is referred to as the "resentment" model 7 is listed in table 9.

The probability of responding negatively to the second bid, given that the respondent agrees to the initial bid (θ_u), is highly significant. The results suggests that for any bid level these respondents have a 0.36 lower probability of accepting the follow-up bid if it is higher than the initial bid. Further θ_d is negative, but not significant, suggesting that there is no change in probabilities if the follow-up bid is lower. There appears to be an asymmetric "resentment effect" in operation, since the reduction in probability only applies when the follow-up bid increases. Setting $\theta_d = 0$ in Equ. (9.) and re-estimating the DB model leads to model 8. This specification produces the highest estimates of the mean WTP of \$150.81.

Table 8. Estimation results for the bivariate probit model

Variable	Model 5 Bivariate probit	Model 6 Bivariate probit (Fixed coefficients)
<i>Equation 1</i>		
Constant	0.745 (1.367)	0.9457(2.952)
Bid	-0.008 (8.823) ^b	-0.0052(10.541) ^b
Distance	0.002 (2.065) ^c	0.0006(1.509)
Use	0.589 (3.277) ^b	0.554 (5.396) ^b
Married	0.246 (1.389)	0.355 (3.486) ^b
Age	-0.013 (1.789) ^d	-0.0221(4.463) ^b
<i>Equation 2</i>		
Constant	1.291 (2.564) ^b	0.9457(2.952) ^b
Bid	-0.006 (7.397) ^b	-0.0052(10.541) ^b
Distance	0.0003 (0.303)	0.0006(1.509)
Use	0.442 (2.526) ^b	0.554 (5.396) ^b
Married	0.470 (2.954) ^b	0.355 (3.486) ^b
Age	-0.027 (3.593) ^b	-0.0221(4.463) ^b
ρ	0.591 (5.677) ^b	
LLF(β)	-407.01	-432.71
Mean WTP (Equation 1)	\$130.59	
Mean WTP (Equation 2)	\$123.47	

t-ratios are reported in brackets;^b Significant at 1 percent level; ^c Significant at 5 percent level

^d Significant at 10 percent level

Table 9. Estimation results for the double-bounded resentment model^a

Variable	Model 7 DB two way resentment	Model 8 DB one way Resentment
Constant	1.195 (2.571) ^c	1.097 (2.309) ^c
Bid	-0.006(10.174) ^b	-0.006(12.179) ^b
Distance	0.002 (1.961) ^c	0.001 (1.655) ^d
Use	0.617 (4.201) ^b	0.602 (4.024) ^b
Married	0.317 (2.188) ^c	0.303 (2.046) ^c
Age	-0.023 (3.389) ^b	-0.020 (2.863) ^b
θ_u	0.36 (10.020) ^b	0.41 (10.884) ^b
θ_d	-0.119 (0.80)	
LLF(β)	-456.15	-456.77
Mean WTP		\$150.81

^at-ratios are reported in brackets;^b Significant at 1 percent level;^c Significant at 5 percent level

^d Significant at 10 percent level

6. Discussion and conclusions

The survey design used in this study represents a significant departure from previous health care contingent valuation experiments in that it combines two modes of delivery. The subjects were provided with some background information, the contingent valuation scenario, and the initial WTP question before the telephone survey was conducted. This is in contrast to previous studies which have relied on only one of these modes. For example, Ryan (1996) conducted a contingent valuation survey by mail and Kartman, Stålhammar and Johannesson (1996) used a telephone survey. This hybrid design has several advantages over these previous studies because it combines the best features of both modes of delivery: (i) conducting contingent valuation surveys by telephone produces a much higher response rate than is generally experienced in studies involving mail surveys; (ii) sending respondents information provides them with more background information than is normally possible to convey in the course of a telephone interview; and (iii) respondents are given the opportunity to think about issues prior to the telephone interview. It should be noted that the design significantly increases the complexity of administration, because the questions supplied by mail must match the questions in telephone survey. This means individuals must be randomly assigned to bids prior to the mail out of the personalized information to ensure that mail and telephone information matches. Such a protocol can be implemented with the aid of a computer data base (Microsoft Access) and a word processing package that has the capacity to undertake "mail merges" (Microsoft Word).

Interestingly, there appears to be no relationship between responses to the WTP questions and the respondent's knowledge or familiarity with breast cancer or mammographic screening. Firstly, those subjects who knew someone who had breast cancer did not have a significantly different WTP, because the "knowledge" variable is insignificant in all the regression models. Secondly, respondents who received the information sheet did not have a significantly different WTP (see models 1 and 2). Finally WTP responses were not significantly different between the CART intervention and control towns.

There is evidence of strategic behavior, in that 61 percent of the respondents who expressed a zero WTP also stated that they intended to use the mobile unit if it visited their town. In regard to other motivations, the most surprising is that some women who had previously made a payment to charity to provide mobile screening service were not willing to pay anything in taxes. Such behavior is the exact opposite of that observed in previous studies (e.g. Navrud 1992) that found respondents are less willing to make charitable donations than to state positive WTP amounts.

The choice between the DB and SB model is a difficult one. On the one hand, the DB model is statistically more efficient than the SB model. On the other, responses to the follow-up WTP question were not consistent with the initial WTP question in that respondents have a higher probability of refusing the second bid if the amount offered is greater than the first. Although there are several explanations for this phenomenon, it is most likely due to the "resentment" experience by some individuals when they are asked to pay a higher follow-up bid. This effect may be re-enforced by the protocol of the survey, because it gave most respondents notice that they would be asked a WTP question, but no indication that they would be asked a follow-up question. In the telephone interview, the follow-up question is introduced without prior warning immediately after the initial WTP question. Subjects had days (and in some cases weeks) to think about whether they would accept the initial bid, but only a few seconds to formulate a response to the follow-up bid.

There are two ways of dealing with this inconsistency. The first is to ignore the follow-up question entirely and rely on the SB model. A second approach is to explicitly model the

negative responses by allowing the probability of rejecting the bid to vary between the two questions. This approach produced an even higher estimated mean WTP of \$150.81. These estimates represent both use and altruistic values associated with the visit of a mobile screening unit.

In conclusion, this study estimates of the benefits of mobile mammographic screening in several rural towns in New South Wales. Although these estimates are plausible, the CVM is still in the early stages of development and policy should not be based on these estimates alone.

Appendix A: Reasons for having a zero WTP

Below are listed some selected responses to Q22 which asks women why they were not WTP anything for the visit of a mobile unit. These are listed by category. The interviewers were asked to record their response verbatim. In some cases, the respondent gave a long answer and so it was para-phrased. When two or more women provided the same reason only one example has been included.

1. Problems with the payment vehicle

- (i) "We pay enough tax as it is."
- (ii) "I already pay \$2500 in health insurance and the Medicare levy. I feel I pay enough."
- (iii) "Worked until 60 years of age and paid tax, mammograms should be free for pensioners at this time of life."
- (iv) "If people in city have free service, country people should not have to pay tax for a free service."
- (v) "We pay private health insurance as well as the Medicare levy. We both work and pay high taxes. I don't want to pay any more tax."
- (vi) "I paid taxes all my working life. I should get it free".
- (vii) "All women should be treated the same whether or not they live in city or country areas."

2. "Can't Afford it"

- (i) "I'm a pensioner, I can hardly manage as it is."
- (ii) "Can't afford it- I think it's worthwhile to pay for it, but the money is not there."
- (iv) Respondent does believe in user pays system, but because of financial situation is unable to pay.
- (v) On a pension, depends on circumstances, can't really afford extra things

3. Previously donated to a charity to provide the service

- (i) "We have raise a lot of money for a mobile unit so I feel we have already paid."
- (ii) Have paid money to charity have a mobile unit."
- (iii) "Respondent was heavily involved in fund raising for a mobile van. After raising thousands of dollars the van has not been provided. Will not pay any more in taxes for a mobile van."
- (iv) "There has been fund raising in the area to provide the service. I donated \$250 and

should not be asked to pay more money now.”

- (v) “We were involved in fundraising for a mobile unit. It seems Canberra has taken the money and nothing has happened. Would not pay any more money.”
- (vii) “Women in the area have already raised money for a mobile screening unit and I would not pay any more.”

4 Prefer a substitute site

- (i) “I can get a free service in Lismore.”
- (ii) “Lismore service is excellent and has all the facilities.”
- (iii) “I would go to private radiologist.”
- (iv) “Find Lismore service excellent and feel confident in using their service.”
- (v) “More confident having it done at a private radiologist.”
- (vi) “I prefer to go to my doctor who would have my previous x-rays.”
- (vii) “I have a business and have to travel to Tamworth (nearest fixed site) anyway.”
- (viii) “Don't feel that service is as good as a specialist. When I first approached the mobile service they refused to give me a mammogram because I was only 40.”
- (ix) “Would use a private radiologist. Two friends had mammograms at mobile units then got breast cancer within six months.”

5. No difficulty in using the fixed site

- (i) “Rather combine a mammogram with a trip to Coffs Harbour.”
- (ii) “I would rather travel elsewhere and combine the trip with other activities than paying more taxes.”
- (iii) “I have to go to Port Macquarie (nearest fixed site) to do the shopping. Would rather combine having a mammogram with a shopping trip.”
- (iv) “I would just go to Echuca to do other things and have my mammogram then.”
- (v) “Just as easy to travel to Armidale (nearest fixed site).”
- (vi) “I travel to Tamworth regularly and it a waste to have a screening van visit, because all the local women travel to Tamworth regularly.”
- (vii) “Because there a volunteer car pool people can easily get to Canberra to have a mammogram.”
- (viii) “There is a screening centre at Orange (nearest site) and would be happy to travel.”

6. Would not use it

- (i) “Would not use the service. I need a special screening tests due to thickening of the breast tissue.”
- (ii) “Being disabled, a mobile unit has no access for me.”
- (iii) “Don't believe in mammograms- would not have one.”
- (iv) “MRI is a better method for detecting breast cancer and should be used instead”

7. Other reasons

- (i) "Not enough information given on who would receive the mammograms. Would be willing to pay if mammograms were available to women of all ages."
- (ii) "Mobile units should be for all types of cancer. Would be willing to pay if benefited the whole community"

Appendix B: Information sheet and survey questionnaire

The information sheet and telephone questionnaire are reproduced in this appendix. In both the information sheet and survey different information was provided in the several fields denoted by «». A description of each of these fields is as follows. Each rural town was defined in terms of a postcode which covers the main town and the surrounding districts. The field «Town» is the main town within that postcode. The field «Substitute Site» is the town where the closest alternative mammographic screening unit that operates under the NPEDBC is located. The field «Bid1» is the randomly selected initial bid from one of eight amounts in the bid vector. (\$5, \$20, \$50, \$75,\$100, \$150, \$200,\$300). The field «Bid2» is the lower follow-up amount . The field «Bid3» is the higher follow-up amount. These details were entered into a database (Microsoft Access) and then "mail merged" in Microsoft Word so that each respondent received a personalised information sheet and survey.

Breast Cancer Screening Survey

Background information

To help you answer our questions we have provided you with some background information on breast cancer screening. Could you read the information below and answer the two questions (see over the page). These questions are similar to the questions you will be asked in our phone survey.

What is a mammogram?

A mammogram is a breast x-ray. It detects breast cancer, including those cancers too small to be felt. In the past, only women who had breast lumps or a family history of breast cancer had mammograms. It is now recommended that **all** women aged between 50-69 years have a mammogram every two years.

What is breast cancer screening?

Both the Federal and State governments have combined to setup the *NSW program for Mammographic screening*. The program aims to make mammograms available to all women over 50 years of age. Women between 40-49 years may also have a mammogram if they request it. This program involves the setting up mammographic screening units in larger towns and cities and the use of mobile screening clinics to provide mammograms in country towns. Mammograms are provided free of charge.

What is a mobile breast cancer screening service?

Mammographs can be provided through a mobile screening service that has all the x-ray equipment on board a special van. It uses staff who are experienced and specially trained in breast cancer screening. The mobile units usually visit towns for two months a year to allow women to have access to breast cancer screening.

P.T.O

Questions

We are interested in your attitudes and opinions on how breast cancer screening should be provided in «Town». **There are no right or wrong answers to these questions.**

Would you use a mobile screening service to have a mammogram if it visited «Town»?

Yes ☐

No ☐

(✓ the box that applies)

To provide a breast cancer screening service in town like «Town» will cost the government money. Such health programs are normally funded through higher taxes. **It is important to find out if the community wants to pay for a service such as mobile breast cancer screening.**

Would you be prepared to pay **extra** tax to have a mobile breast cancer screening unit located in «Town»? If you don't currently pay tax think of the payment as an increase in rates to the local council to provide the service. **If there was no mobile screening service women «Town» would still be able to use the existing services in places such as «Substitute site».**

Would you be prepared to pay \$«Bid1» to have mobile breast cancer screening unit visit «Town»?

Yes ☐

No ☐

(✓ the box that applies)

**Do not send your answers to us.
We will ask you these questions again over the phone.**

BREAST CANCER SCREENING SURVEY
WTP Survey
(November 1996)

Name: «Title» «First Name» «Last Name» Address: «Street» «Town» «Post Code» Ph Number: («STD») «Phone» Date of Birth: «Birthday»/«birth month»/«Birth year» Initial amount offered for mobile service: \$«Bid1»	
Consent status : 1 Consent 2 Non consent	Interview: 1 Yes 2 No
New Contact Details: New postal Address: _____ _____ _____ New phone number: _____ _____ _____	

Contact Record

1. _____
2. _____
3. _____
4. _____
5. _____

Call Back Date

1. _____
2. _____
3. _____
4. _____
5. _____

1. TO THE PERSON THAT ANSWERS THE PHONE:

Hello, my name is _____. Your household should have received a letter from the Australian National University addressed to _____ telling her about a health survey we are conducting. Could I speak to _____?

YES goto "2. TO SELECTED RESPONDENT"

NO goto "3. TO ANOTHER HOUSEHOLD MEMBER"

2. TO SELECTED RESPONDENT:

Three years ago the Cancer Education Research Project contacted you and asked some questions on cancer and other health issues. One of the researchers has since moved to the National Centre for Epidemiology and Population Health in Canberra. We are now conducting a follow-up survey on breast cancer screening. This study should take no longer than a few minutes. Is now a convenient time to answer a few questions?

YES Go to "4. START OF SURVEY:"

NO Continue

Would you like to do the survey some other time?

YES What time would be a good time to contact you?

Write time on "Call Back Date" section of cover sheet.

NO Thank the respondent for her time and record on cover sheet
"Non Consenter"

3. TO ANOTHER HOUSEHOLD MEMBER:

Do you know when _____ will be home so I can call and talk to her then? How about I call back on _____ at _____? {Record on cover sheet}

IF NO LONGER LIVING AT ADDRESS

Three years ago we surveyed _____ to find out her attitudes to cancer. At that time she said that she was willing to under take a follow-up survey on this issue.

Do you have a contact address and phone number for _____?
{Write information on cover sheet}

1. Could you tell me your date of birth? _____ {check with birthday on cover sheet}

2. What is your current occupation? _____

Unemployed 1
Home Duties 2
Pensioner 3
{Circle if not employed}

3. Do you know anyone who has had breast cancer in the last 5 years?

```
YES  goto Q4      1
NO   goto Q5      2
```

4. How was this person related to you?
{ *Unprompted* }

Self	1
Mother	2
Daughter	3
Sister	4
Cousin/Aunt	5
Other relative	6
Friend	7
Acquaintance	8

{If they know more than one person circle as many as apply}

5. I would now like to ask you some questions about mammograms. A mammogram is an X-ray of your breasts. It is used to detect breast cancer while it's still small.

How many mammograms have you had in the last five years (since Jan 1992)?

One	1	<i>goto</i> Q6
Two	2	<i>goto</i> Q6
Three or more	3	<i>goto</i> Q6
None	2	<i>goto</i> Section 5.

4. QUESTIONS FOR WOMEN WHO HAVE HAD MAMMOGRAM IN LAST THREE YEARS

6. How long ago did you have your {most recent mammogram / mammogram before that/ etc}?

	Most recent	2nd most recent	3rd most recent
Was it:			
{Read out list}			
This year (1996)	1	1	1
Last year (1995)	2	2	2
In 1994	3	3	3
In 1993	4	4	4
In 1992	5	5	5

7. If had a mammogram: Where did you go to have your {most recent mammogram/ mammogram before that/ etc}?

	Most recent	2nd recent	3rd recent
{Read out list}			
Free screening service			
by health Dept	1	1	1
Specialist Doctor (Radiologist)	2	2	2
Public Hospital	3	3	3
Private Hospital	4	4	4
Other	5	5	5

8. If had a mammogram: Can you tell me why you had your {most recent mammogram / mammogram before that/etc}?

	Most recent	2nd recent	3rd recent
{Unprompted}			
Had breast cancer in the past	1	1	1
Had a breast lump/breast pain at the time	2	2	2
Had a breast lump/breast pain in the past	3	3	3
Have a family history of breast cancer	4	4	4
Heard of a free service and decided to attend	5	5	5
Received a reminder to attend	6	6	6
My GP suggested I go	7	7	7
Wanted to make sure they didn't have breast cancer	8	8	8
{circle as many as apply}			
Other			

9. *If had a mammogram:* What was the name of the town where you had your {most recent mammogram / mammogram before that/ etc}?

Most Recent	2nd most recent	3rd most recent

10. *If had a mammogram:* If you hadn't been going to have a mammogram would you still have traveled to {town name Q9} on that day for some other reason?

	Most recent	2nd recent	3rd recent
Yes	1	1	1
No	2	2	2
Don't remember	3	3	3

{Repeat questions in Section 4 if they have had more than one mammogram}

5. GENERAL QUESTIONS ON MAMMOGRAMS (ASK ALL WOMEN):

11. In the last two years, has a doctor or nurse asked or suggested you have a mammogram?

Yes	1
No	2
Don't remember	3
Have not seen a doctor/ nurse in that time	4

12. Do you intend to have a mammogram sometime in the next two years?

Yes	1 goto Q14
No	2 goto Q13
Don't Know	3 goto Section 6

13. *If not intending to have mammogram:* What would you say are your reasons for not having a mammogram?

{Unprompted}	
Discomfort of procedure	1
Do not think they are effective	2
Will not have an x-ray	3
Cannot afford to travel to have a mammogram	4
Too young	5
Too old	6
Other _____	

{After asking Q13 goto Section 6}

14. *If they are intending to have a mammogram:* If you couldn't have the mammogram in «Tname» to what town would you go?

_____ {write response} goto Q15

Don't Know 1 {Circle 1 and goto Section 6}

15. If they know the town for next mammogram: Do you think you would be likely to combined a trip to {response from Q14} to have a mammogram with other activities (e.g. business/social visit/ or shopping.)

Yes	1
No	2
Don't Know	3

6. CONTINGENT VALUATION SECTION (FOR ALL WOMEN)

I am now going to ask you some questions on whether you think mammograms should be provided locally. We recently sent you some information on this issue through the mail.

16. Have you received this information from us?

Yes	1
No	2
Don't know	3

If No or Don't Know: Don't worry I'll repeat this information over the phone.

READ THIS TO ALL WOMEN:

There are two ways mammograms could be provided. They could either be provided locally using a mobile screening van that would visit «Town» at least once a year or women in «Town» could travel to a town such as «Substitute Site» and have a mammogram at any time of the year. In both the cases the mammogram is free, but women would have to pay any travel expenses.

17. Would you use a mobile screening unit to have a mammogram if it visited «Tname»?

Yes	1
No	2
Don't know	3

To provide a breast cancer screening service locally will cost the Government more money. In the next part of this survey I'm going to ask you a few questions on whether you would be prepared to pay higher taxes to have a mobile breast cancer screening unit located in «Tname».

17a. Do you currently pay tax?

Yes	1	goto Q18
No/ refused to answer	2	continue

If respondent doesn't pay tax: Think of the payment as a levy paid to the local council to provide the service.

18. Would you be willing to pay \$«bid1» in {tax/council levy} to have a mobile unit visit «Town»?

Yes	1 goto Q19
No	2 goto Q20
Don't know	3 goto Q20

19. If willing to pay \$«bid1»: Lets suppose providing a mobile screening unit is more expensive. Are you willing to pay \$«bid3»?

Yes	1 goto Q23
No	2 goto Q23
Not sure	3 goto Q23
- (After answering Q19 goto Q23)

20. If *not* willing to pay \$«bid1»: Lets suppose providing a mobile screening unit is cheaper. Are you willing to pay \$«bid2»?

Yes	1 goto Q23
No	2 continue
Don't know	3 goto Q23

21. If *not* willing to pay \$«bid2»: Would you be willing to pay something (i.e. an amount below \$«bid2») to have a mobile unit located in «Town»?

Yes	1 goto Q23
No	2 continue

22. If *not* willing to pay anything: Why don't you want to pay any more {tax/council levy} to have a service located in your town?

{Unprompted}

Don't believe I should pay for other people's health	1
Money should come from existing taxes/less waste	2
Would not use the service	3
Other _____	

{write response}

23. The final question relates to your household's income (i.e. the combined income of all people currently living in your household).

Could you tell me if your household income is:

Less than \$15,000 per year	1
Between \$15,000-\$30,000 per year	2
Between \$30,000-\$45,000 per year	3
Between \$45,000-\$60,000 per year	4
Between \$60,000-\$75,000 per year	5
Between \$75,000-\$90,000 per year	6
Greater than \$90,000 per year	7
Refused to answer/don't know	8

That concludes the survey, thank you very much for your time.

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