

**ECONOMIC EVALUATION OF A  
COMMUNITY-BASED INTERVENTION:  
MEASURING THE VALUE TO SOCIETY**

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## Summary

Community-based participatory interventions such as those promoting health-related behaviour change present many challenges to the measurement of benefits in economic evaluation. Such interventions can influence social as well as physical well-being, and entail a multitude of outcomes both directly for intervention participants as well as indirectly for other members of the community. Furthermore, they may not achieve immediate changes in health status but their interactive and participatory nature could mean that non-health benefits are significant.

The aim of this thesis is to measure the benefits of a community-based participatory intervention in rural Nepal and draw lessons more broadly for how such interventions can be valued within economic evaluation.

A contingent valuation survey of a women's group intervention designed to improve maternal and newborn health was carried out in rural Nepal. Members of eleven women's groups were interviewed along with a sample of female non-members and males from the same communities. Monetary and non-monetary measures were used to elicit preferences and respondents were asked which aspects of the intervention they were willing to pay for: health outcomes, non-health outcomes or both. Focus group discussions were used to both inform the design of a locally relevant survey tool, to maximise content validity, and as a means of supplementing survey data with group-based discourse. Construct validity was assessed by testing for the association between willingness-to-pay and indicators of demographic and socio-economic status. Willingness-to-pay values were aggregated and combined with costs as a cost-benefit analysis. These results were compared to those of a cost-effectiveness analysis. A sensitivity analysis was conducted to assess the impact of different assumptions on total aggregate willingness-to-pay and the net benefit of the intervention.

The response rate was high in all stakeholder groups indicating that the survey was well understood and acceptable to respondents. The study found that non-health benefits were valued by over 80% of respondents and thus their omission would lead to the undervaluation of such programmes. There was no significant difference between the

willingness-to-pay of women's group members and non-members, suggesting that the programme generates positive externalities. Focus groups helped to improve the content validity of the survey and to achieve high response rates by enabling questions in the survey to be framed in a manner more relevant to the community. They also gave insight into the valuation context, helped to interpret values derived from the survey and highlighted the importance of trust in the payment vehicle. This thesis also shed light on some of the empirical challenges that are faced when attempting to extrapolate sample values to a larger population and deciding whose values to include.

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## Preface

The research presented in this thesis was motivated by the question of how to apply the methods of economic evaluation to community-based participatory interventions aimed at health promotion.

At the start of 2002, the International Perinatal Health Unit at the Institute of Child Health in collaboration with a local research non-governmental organisation (NGO) MIRA (Mother and Infant Research Activities) had recently set up a randomised controlled trial in rural Nepal to assess the effectiveness of a participatory intervention with women's groups to improve maternal and newborn health outcomes [1]. As part of a multi-disciplinary research team, I was responsible for carrying out an economic evaluation of the intervention. During an initial trip to the study site in March 2002, the full complexity of the intervention quickly became apparent.

In accordance with the principles of a 'community development' approach to health promotion, the intervention was led by communities in line with their own priorities and perceived health needs. Consequently, the intervention process was only defined up to the first ten months of the trial, after which time communities themselves were to take responsibility for implementing strategies of their choice to achieve the project objectives based on their perceived needs. Therefore, the intervention process was likely to differ from group to group depending upon the local context and extent of individual participation. It was anticipated that the women's group activities would evolve and adapt over time and across settings. By impacting on social development variables such as learning and empowerment, it was also likely that the intervention would entail a variety of non-health outcomes which could be of value to individuals. Reinforcing the need to examine these broader outcomes were the expectations of project staff, particularly the clinicians, who were initially sceptical that the intervention would be capable of achieving the primary outcome of neonatal mortality reduction within the trial time frame.

Together these factors led to concern that the conventional application of cost-effectiveness analysis (CEA) (a simple comparison of costs with health effects) would undervalue the benefits of the intervention relative to other, more clinical,

interventions, as it would fail to take into consideration the host of other benefits to communities. This led to the question of which alternative approaches might be used.

Around this time, a report by Sefton et al. was published highlighting some of the challenges of applying economic evaluation to interventions in the social welfare field [2]. Following a subsequent literature review I identified a number of other studies which pointed to the limitations of CEA when applied to health promotion type programmes (e.g. [3] [4-6] [7] [8]). The challenges of valuing the intervention in Nepal were clearly common to a whole range of interventions within the social welfare and health promotion field.

For some time, numerous researchers had also pointed to limitations of CEA in relation to valuing the processes of care. Stated preference techniques including the contingent valuation (CV) method and discrete choice experiments had been used as a means to value the non-health benefits of health care interventions (e.g. [9] [10] [11] [12] [13]). It was therefore felt that such an approach might offer a means of measuring benefits in the context of the intervention in Nepal and of capturing the broader range of benefits in monetary terms.

However, there were still a number of challenges to implementing this approach effectively. These included the cultural issues involved in employing such a construct in a setting such as rural Nepal, and the complexity of the commodity to be valued. Although the use of stated preference methods in low income settings had been used with some success previously this had mainly been for pricing purposes rather than social welfare measurement (e.g. [14] [15]). The barriers associated with poverty and illiteracy also raised serious questions about the feasibility of asking individuals for their willingness-to-pay (WTP) as a means of eliciting values in this population.

Furthermore, there had been little application of the CV method to health promotion programmes within the context of a cost-benefit analysis (CBA), and there was little guidance as to how to define the process and outcomes within the CV scenario, and whose values to elicit. The intervention was based on the sharing of information and the generation of knowledge, encouraging diffusion of key messages beyond the target group. There were also potential negative externalities because of the possibility that it would challenge existing social power structures. Therefore it was deemed necessary

to involve a range of stakeholder groups in the valuation process (both users and non-users). Given that the original mandate was to carry out an economic evaluation of the intervention, it was also necessary to compare benefits with costs in a manner that would involve substantial consultation, pre-testing and adaptation.

I was wholly responsible for designing the economic evaluation alongside the trial and the contingent valuation survey within it, under the supervision of Stephen Jan and Anne Mills. The women's group intervention and trial were designed by colleagues at the Institute of Child Health, London, namely Anthony Costello and David Osrin. They also secured funding for the project from the Department for International Development (DfID). Natasha Mesko and Joanna Morrison were responsible for providing technical assistance to MIRA, as well as for carrying out a process evaluation of the intervention. Bidur Thapa, the financial manager for MIRA provided the information on project costs. Daya and Deepa Shrestha collected and entered the qualitative and quantitative data relating to the contingent valuation study. The design of data collection tools for the study of cost and willingness-to-pay, as well as the analysis of this data, the literature review and the methodological and policy conclusions were all my own work.

## Acronyms

AIDS -	Acute Immunodeficiency Syndrome
CEA -	Cost-effectiveness analysis
CBA -	Cost-benefit analysis
CV -	Contingent valuation
DALY -	Disability-adjusted life year
DHS -	Demographic and Health Survey
ECD -	Early Childhood Development
FCHV -	Female community health volunteer
HESG -	Health Economics Study Group
HIV -	Human Immunodeficiency Virus
ICER -	Incremental cost-effectiveness ratio
LYS -	Life year saved
MCH -	Maternal and child health
MIRA -	Mother and Infant Research Activities
MWRA -	Married woman of reproductive age
NGO -	Non-governmental organisation
NHS -	National Health Service
NICE -	National Institute of Clinical Excellence
NOAA -	National Oceanic and Atmospheric Administration
NRS -	Nepali Rupees
OLS -	Ordinary least squares
PPI -	Potential Pareto Improvement
QALY -	Quality-adjusted life year
RP -	Revealed preference
SP -	Stated preference
SWF -	Social welfare function
TBA -	Traditional birth attendant
VDC -	Village Development Committee
VDCF -	Village Development Committee Facilitator
WTA -	Willingness-to-accept
WTP -	Willingness-to-pay

# Chapter 1. Introduction

## 1.1 Background

Increased expenditure on health services in middle and high income countries has put cost containment on the agenda of most governments [16] [17]. In order to ensure that resources are used effectively evidence has taken on a much greater role in decision-making [18] as has the more explicit use of economic evaluation (indicated, for example, by the establishment of the National Institute of Clinical Excellence (NICE), in the UK [19] and similar organisations in Australia<sup>1</sup> and Canada<sup>2</sup>).

Economic evaluation offers a rational basis for decision-making by enabling the comparative analysis of alternative courses of action in terms of both the resources they consume (costs) and their consequences [20]. It generally involves not only the task of measurement but also that of 'valuation' of variables of interest [21]. The different types of evaluation can generally be distinguished by the approach used to value consequences.

Cost-effectiveness analysis (CEA) is the dominant form of economic evaluation in the health sector, and is used routinely to inform resource allocation decisions through organisations such as NICE. This approach is characterised by the measurement of outcomes in terms of a single health effect, either a disease specific or generic measure of outcome combining mortality and morbidity effects into a single metric (such as the quality-adjusted life year (QALY) or the disability adjusted life year (DALY)). The latter is sometimes termed 'cost utility analysis' [20], pp 139-204 [22]. The aim of CEA, broadly defined, is to maximise health for a given budget, or minimise costs for a given health outcome. It thus informs decision making aimed at achieving technical efficiency.

In contrast, cost-benefit analysis (CBA) is the most commonly used method of evaluating projects in the environmental, transport and agricultural sectors. This approach consists of valuing both costs and benefits in monetary terms. In principle the measurement of outcomes in monetary terms also allows for public projects across

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<sup>1</sup> National Institute of Clinical Studies: <http://www.nicsl.com.au/>

<sup>2</sup> Centre for Health Evidence: <http://www.cche.net/>

sectors to be compared. Monetary estimates of benefits can be based on the income effects of ill-health (under the 'human capital' approach) or on individual preferences expressed in terms of willingness-to-pay. The findings of a CBA are generally presented either as net benefits (total benefits minus costs) or as a benefit-cost ratio [23]. Such data provide evidence as to whether an intervention is worth pursuing (allocative efficiency) because they are seen to indicate net social impact [24]. Application of CBA has remained limited in the health field<sup>3</sup> due to: the difficulty of placing monetary values on less tangible outcomes; the equity implications of using a measure which is affected by income; and the ethical concerns with explicitly placing a monetary value on human lives [26]. However, there is growing interest in the use of willingness-to-pay as a method of measuring benefits through the contingent valuation (CV) method, in recognition of the advantages of being able to value a broader range of benefits [27].

The research presented in this thesis was motivated by the question of how to apply the methods of economic evaluation to community-based participatory interventions aimed at health promotion using the example of a women's group intervention in rural Nepal. Community development approaches, based on community participation in health promotion, are on the increase [3]. The challenges of applying economic evaluation methods to health promotion interventions have been recognised. The term 'community-based participatory interventions' is chosen for use in this thesis, as this emphasises both: the location of the intervention - in the community as opposed to within the formal health care system; and the reliance on community participation and action to achieve outcomes. It is recognised, however, that many of the methodological issues explored in this thesis will also be relevant to other types of approaches to health promotion and to interventions in other sectors (such as social welfare).

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<sup>3</sup> The Australian economic evaluation guidelines to pharmaceutical manufacturers encourages cost-effectiveness analysis and does not accept cost-benefit analysis [25].

## **1.2 Aims and Objectives**

### **1.2.1 Overall Aim**

The aim of this thesis is to measure the benefits of a community-based participatory intervention in rural Nepal and to draw lessons more broadly for how such interventions can be valued within economic evaluation.

### **1.2.2 Objectives**

The main objectives are to:

- Test the feasibility of administering a contingent valuation (CV) survey to value the benefits of a health promoting women's group programme in monetary terms in a resource poor context with low levels of literacy;
- Assess the content and theoretical validity of responses derived and the key determinants of willingness-to-pay;
- Identify which attributes were valued by respondents (process and/or health) and the nature of process benefits;
- Ascertain the extent of externalities and their impact on the total economic value of the intervention;
- Explore the use of group-based discourse both to support the design of and to facilitate the CV survey and as a means of providing qualitative insight into the thought processes and decision making mechanisms used by respondents when valuing aspects of the programme;
- Consider the implications of different methods of aggregation for the conduct of cost-benefit analysis in the health sector;
- Provide recommendations of areas for future research particularly in low income settings.

### **1.2.3 Organisation of the Thesis**

The contents of the remaining chapters are summarised below:

Chapter 2 provides the theoretical background to economic evaluation and welfare measurement presenting the welfarist roots of CBA and the rationale for extra-welfarism underlying CEA.

Chapter 3 outlines the complexity of community-based participatory interventions and provides a discussion of the possible techniques for measuring the benefits of these types of intervention and the rationale for using the contingent valuation method in this thesis.

Chapter 4 provides a critical review of the empirical literature on the contingent valuation method. This chapter begins by addressing the construction of the CV scenario in terms of the development and design of the survey tool, the choice of question formats, elicitation method and payment vehicle. The next section examines the various methods of survey administration. The following section looks at the methods which have been used to analyse CV data. Finally, this chapter examines the methods of aggregating WTP within cost-benefit analysis.

Chapter 5 describes the study setting in rural Nepal and provides a background to the study, including a description of the women's group intervention and the evaluation design. This chapter also indicates how the economic evaluation fitted into a broader system of research and sets the boundaries around the author's own work and that of her colleagues.

Chapter 6 presents the research methods used in this thesis. The methods of designing the contingent valuation survey, assessing content validity, and stakeholder selection and survey administration are outlined. Data analysis methods for the quantitative and qualitative components of the study are then presented. Finally, the methods of estimating costs, total economic value, and the cost-benefit ratio are also described. The cost-effectiveness analysis methods are referred to briefly by reference to an existing publication, for the purpose of comparison with the cost-benefit analysis.

Chapter 7 presents the results of the contingent valuation survey and assesses the theoretical validity of the values derived by analysing the determinants of willingness-to-pay. The first section describes the characteristics of respondents, their knowledge and perceptions about the group and gauges sample representativeness. The second

section indicates how much respondents were willing to pay. The third section explores reasons given by respondents for not providing positive valuations. The fourth section examines programme attributes for which respondents were willing to pay. The fifth section classifies valuations in terms of their use or non-use component based on respondent characteristics. The sixth section reviews the results of different econometric modelling approaches to assess the theoretical validity of willingness-to-pay. Finally, an overview and discussion of the results are provided.

Chapter 8 analyses the results of the focus group discussions carried out prior to and alongside the CV survey and illustrates which factors were influential in decision-making, and to what extent these match with economic theory. This chapter also discusses how group level qualitative data can be used to interpret individual quantitative responses to the WTP question.

Chapter 9 begins by presenting estimates of the total economic value of the intervention in terms of aggregate willingness-to-pay. Estimates of the total cost of the women's group intervention and net benefits are then presented along with a sensitivity analysis. The health outcomes and incremental cost-effectiveness ratio follow along with a discussion of the methodological and policy implications of both approaches.

Chapter 10 brings together the results from Chapters 7-9 and highlights key lessons learnt in terms of the objectives of the thesis. It indicates the main policy and research implications highlighting a number of questions for future research.

## Chapter 2 The Theory of Welfare Measurement

This chapter reviews the theoretical underpinnings of economic evaluation and its underlying values and assumptions.

### 2.1 Welfare Economics

Welfare economics assesses the effects of government policies or projects upon the individuals that make up society and is founded on the principle that the goal of social policy is to increase societal welfare [28]. Importantly, welfare economics formulates propositions which enable the ranking of different economic situations in terms of their impact on social welfare [29].

#### 2.1.1 Welfare Measurement and Assessment of Efficiency

Welfare economics upholds individualism, or the assumption that the individual is the best judge of his/her welfare, and social welfare is determined by the sum (or some function thereof) of individual welfare. Furthermore, the theory assumes that individuals have *preferences* which determine how much welfare or utility<sup>4</sup> they will derive from the consumption of each of the goods, services or lifestyles within their choice set, and enable them to rank alternatives in relation to each other [32]. So if an individual prefers  $x$  to  $y$ , this implies that they derive greater welfare from  $x$  than from  $y$ .

In principle, utility can be influenced by a variety of factors, such as consumption of physical commodities (by the self or others), 'psychological states, peer group pressures, social norms and the characteristics of the good' [33], pp 40-41. However, economists usually concentrate on the consumption of goods as the source of utility.

It is assumed that individuals are rational and that their preferences must satisfy a number of axioms [34]. These are:

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<sup>4</sup> Definitions of utility range from the view endorsed by Bentham as happiness and fulfilment of desire [30] to a broader interpretation of utility as representing anything of 'value' as discussed by Cookson [31].

*Completeness*: that any two states of the world can be compared. This implies that individuals have well-formed preferences in relation to a specific intervention, or are able to construct preferences based upon the information they are given [35].

*Stability*: this implies holding preferences that are consistent over time, and that these are not influenced by the intervention under scrutiny.

*Continuity*: suggests that individuals can trade between attributes of a good or service [35].

*Reflexivity*: implying that each possible state of the world is as good as itself: it is either preferred or indifferent to itself.

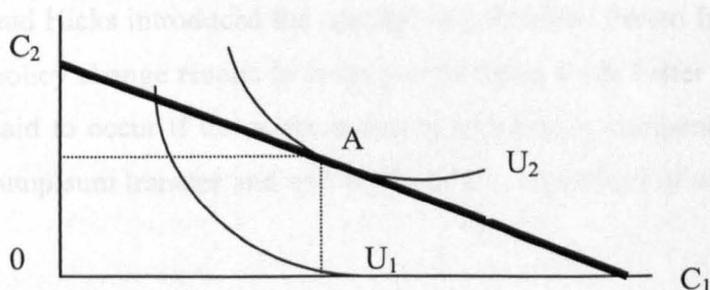
*Transitivity*: that no state of the world or bundle can belong to more than one indifference set, implying there is no intersection between sets.

*Non-satiation*: the more of at least one good in a given bundle the better (with the exception of 'bads' or inferior goods).

*Convexity*: a consumer always prefers a mixture of two bundles that are indifferent to each other than any one of those two bundles.

Under these assumptions, individuals, when making choices, are said to seek to maximise their overall welfare or utility subject to constraints such as income. Preferences then determine each person's optimal choice, and ultimately their demand for a particular good or service and they can be illustrated graphically by indifference curves as shown in Figure 1 below.

**Figure 1 Consumer Optimisation**



In a two commodity world ( $C_1$  and  $C_2$ ), combinations of  $C_1$  and  $C_2$ , which give equal utility can be represented by indifference curves which are convex to the origin ( $U_1$  and

U2). Higher indifference curves (in terms of distance from the origin) reflect greater utility. The slope of an indifference curve at any point represents the marginal rate of substitution between  $C_1$  and  $C_2$ . It is assumed that a rational consumer will maximise utility at the point of intersection between the budget line (shown by the emboldened line and determined by available resources) and the highest possible indifference curve (point A on Figure 1). This will determine the amount of consumption, or demand for  $C_1$  and  $C_2$ .

This framework establishes the basis of welfare measurement. However, the ranking of economic situations, in order to derive an overall measure of social welfare from each individual measure, also requires a set of value judgements. The most important value judgement is the Pareto principle which, under its weakest form, states that a project should be undertaken if a resource allocation improves the welfare of at least one individual and no-one is made worse off (Pareto optimality)<sup>5</sup> [28]. Arrow and Debreu (1954) came up with two fundamental theorems or conditions which need to be satisfied in order to reach a Pareto optimum, linking Pareto optima to the competitive market equilibrium [36]<sup>6</sup>. Whilst the Pareto principle has the advantage of not requiring interpersonal comparisons of utility, it is a very restrictive condition that is unlikely to hold in many instances. In the real world, the market usually fails to give a competitive outcome, leading to states of the world where there are both winners and losers - the wins to one group being non-comparable with the losses to another under the Pareto criterion. The Pareto principle therefore only offers a partial social ordering [28].

To enable the evaluation of states of the world which are Pareto non-comparable, Kaldor and Hicks introduced the concept of a Potential Pareto Improvement (PPI) [37] [38]. If a policy change results in some people being made better off and some worse off, a PPI is said to occur if the winners can hypothetically compensate the losers through a costless lump sum transfer and still be better off, *regardless of whether the redistribution actually*

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<sup>5</sup> Pareto efficiency relies on three first order conditions: optimality between inputs (technical efficiency), allocative efficiency, or optimality between outputs, and optimality between inputs and outputs (top-level efficiency).

<sup>6</sup> The first theorem states that a competitive market equilibrium is under certain assumptions Pareto optimal. The second theorem posits that any Pareto optimal situation can be achieved by a competitive market equilibrium, the precise point reached depending on the initial distribution of income.

*takes place*<sup>7</sup>. If such a redistribution is possible then, on efficiency grounds alone, the new policy should be ranked higher than existing policy. The question of whether or not redistribution actually takes place (issues of equity) is treated separately [39].

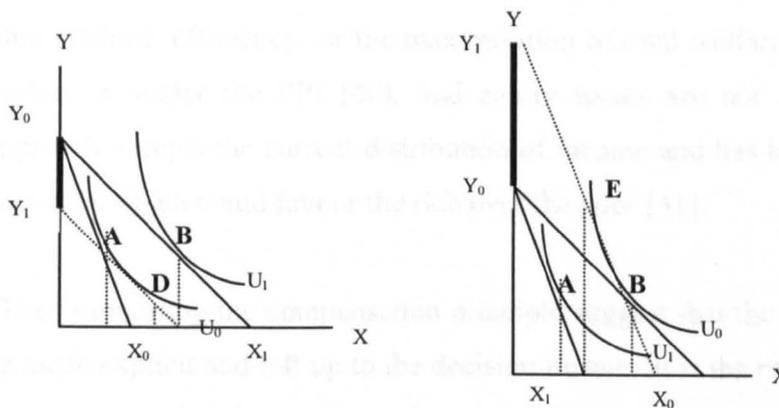
Under this framework, welfare changes (both positive and negative) in all individuals affected by a given intervention should be measured and aggregated. Pragmatically this equates to asking each individual affected by a potential policy change (i.e. a new health care intervention) how much they would be willing to give up (in terms of money or consumption of a numeraire good) in order to remain at the same level of welfare as they would be without the policy change (referred to as the '*compensating variation*'). Losers from the change would be asked how much they would need to be compensated in order to remain at the same level of utility or welfare as they were before the policy was introduced (referred to as the '*equivalent variation*'). The total benefits to gainers can then be compared to the total losses from losers and if the difference is positive, the intervention or policy change can be said to lead to a potential Pareto improvement. The association between preferences and consumption means that money becomes the surrogate for utility as the maximand.

In practice, welfare change to individuals can be depicted in terms of the area under the compensated demand curve (which holds utility constant) and above the price line, and can be related to indifference curves as shown in Figure 2. This is a simplified analysis of a two commodity world. In this case, for the gainers, shown on the left side, the policy change results in a reduction in the price of good X, shifting the budget line outwards from  $Y_0X_0$  to  $Y_0X_1$ , changing the chosen consumption bundle from A to B and increasing maximum utility derived from  $U_0$  to  $U_1$ . The compensating variation is equal to  $Y_0Y_1$  units of the numeraire good Y. For the losers, shown on the right side, the policy change results in an increase in the price of commodity X, pushing the budget line inwards and reducing the maximum utility derived from  $U_0$  to  $U_1$  (and reducing the consumption bundle from B to A). The compensation required to push the individual back to his/her original level of utility is shown by  $Y_0Y_1$  units of the numeraire.

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<sup>7</sup> As pointed out by Boadway & Bruce, redistribution is only possible if compensation can take place through a costless lump sum transfer. If the transfer is costly, then the compensation principle may not be valid [39].

**Figure 2**      **Compensating and Equivalent Variation**



Under certain conditions it was found that a movement from one allocation of resource to another could pass the compensation test as well as its reversal (Scitovsky paradox) [34]. Therefore, the condition was added to the potential Pareto improvement (PPI) that the compensation principle was only valid if its reversal was not also a welfare improvement [34].

In empirical application, for the conduct of cost-benefit analysis (CBA), the notion of a potential Pareto improvement is typically used. A monetary value is placed on the gains and losses to those affected by a policy change by eliciting an individual's maximum willingness to pay (WTP) (compensating variation) to secure a project's implementation or their minimum willing to accept (WTA) (equivalent variation) to be compensated for a project not taking place. WTP is more often used as a basis for valuing public goods as it is bounded by household income and is therefore more consistent with the economic notion of constrained choice. Consistent with the PPI rule, cost-benefit analysis makes an overall assessment of the costs and benefits of a policy change before issues of distribution are taken into consideration. The measurement of benefits in monetary terms enables the comparison of interventions from different sectors. Given that CBA is directly derived from welfare economic theory it is also subject to the same assumptions.

### **2.1.2 From Individual to Social Welfare –Distribution and Equity**

One of the main concerns levelled against the measurement of welfare in monetary terms is that willingness-to-pay reflects not just welfare or preferences but also wealth, and

differences in WTP could therefore reflect differences in the marginal value of income (or ability to pay) between groups as well as differences in preferences for the good itself [40]. Indeed, efficiency, or the maximisation of total welfare, is the only benchmark for evaluation under the PPI [40], and equity issues are not addressed. Therefore, this approach accepts the current distribution of income and has been criticised for leading to decisions which could favour the rich over the poor [41].

Those supporting the compensation principle suggest that the distributional consequences be made explicit and left up to the decision-maker: 'it is the responsibility of the decision-maker to decide whether on balance (a) change is desirable' [42], p 790. In a fully democratic system the societal level of aversion to income inequality should be reflected in the current distribution of income, with taxation rules and benefit allowances redistributing income to the desired level.

A number of alternative approaches have also been proposed. For example, it has been suggested that rather than aggregating individual WTP and assessing the overall desirability of a project, it could be sufficient to describe the effects of a policy change on specific social groups [43].

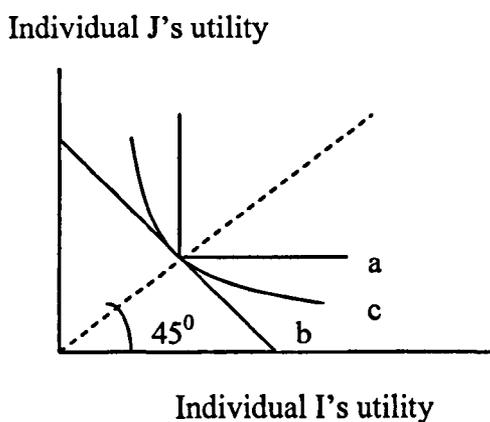
Another approach is to assess whether the income distribution differs significantly between gainers and losers [21] [43]. In cases where income distribution is shown to differ, adjustments can be made using equity weights. Ideally distributional adjustment should be based on the marginal social value of income of an individual, although in practice this is difficult to obtain [44].

Distributional issues are typically addressed through the choice of social welfare function (SWF), or method of combining or comparing individual measures of welfare [45]. An additive SWF, which is convex to the origin, reflects some trade-off between the maximisation of benefits (efficiency) and equity, or the way those benefits are distributed between individuals within society (function c on Figure 3). At the extreme, the Rawlsian 'maximin' function (a) implies that social welfare is dependent on the welfare of the least well off household. At the other extreme, the utilitarian function, which is equity neutral, simply adds the utility of each individual regardless of their characteristics, depicted by

parallel straight lines (function b). Somewhere between the two is the principle of strict egalitarianism, where weights are introduced so as to equalise welfare across individuals.

Critiques of attempts to adjust for equity argue that chosen equity weights will ultimately be arbitrary (e.g. [46]). A way of deriving less arbitrary weights would be to measure the level of social inequality aversion by conducting a survey of representative individuals. Empirically, this has been attempted by getting individuals to make trade-offs between a programme that benefits two groups equally and a series of alternative programmes which benefit the worse-off group to differing degrees, in order to establish the point of indifference between the two programmes [47] [48].

**Figure 3 Indifference Curves for Three Types of Social Welfare Function<sup>8</sup>**



In addition to these distributional concerns, another critique levied against welfare economics is the extent to which individual preferences offer an appropriate measure of welfare, particularly in cases where preferences are ‘distorted’ by lack of knowledge, lack of money, or irrationality (for example in the case of addiction, where a preference to smoke or drink may be welfare reducing) [49]. Decision-making agencies often exclude ‘objectively bad preferences’ [49], pp 1121-22. Some authors have attempted to correct welfare measures for mistaken beliefs [50]. The issue of who is the best judge of an

<sup>8</sup> Diagram taken from Lijas & Lindgren [45], p329.

individual's welfare (the individual or someone else) is one of the main thrusts behind the development of new theories such as extra-welfarism and communitarianism.

## 2.2 Extra-Welfarism

In the early 1980s, a movement developed which rejected the conceptual foundations of welfare economics, especially the individualist utility-based notion of welfare, when applied to health care. Individualism implies that the amount of utility derived by individuals is dependent upon their capacity to generate utility from a given unit of consumption [51]. The main reason put forward was that health care is not utility bearing *per se*, the demand for healthcare being a derived demand for health [52]. Furthermore, individuals may not be sufficiently aware of their healthcare needs (due to information asymmetry) to demand an efficient level of health care so as to maximise their own health, or they may not be able to 'desire' adequately [53], p6.

The use of preferences as a basis for welfare measurement has also raised equity concerns as preferences may 'adapt to circumstances', individual choices, desires and judgements being dependent on expectations. Deprived (or unhealthy) individuals are more likely to lower their expectations in order to cope with adversity [53] [54] and may therefore be less able to derive welfare from a good or service than a person who is better-off.

An alternative approach is to evaluate interventions in terms of what they enable individuals to do rather than on the basis of an individual's subjective assessment of their own utility from health care. From this perspective, social policy should seek to determine an individual's level of deprivation in health, assess the need for commodities (health care) to address those deprivations and allocate resources accordingly [55]. The welfarist focus on 'demand' (preferences backed by ability to pay), is then replaced by the extra-welfarist notion of 'need' [56], p 70.

For extra-welfarists, efficiency is usually defined in terms of maximising some measure of health benefit or Quality Adjusted Life Year (QALY). It is argued that health or life expectancy are more readily interpersonally comparable than a broader notion of utility [57]. The value of a QALY is the value of one year spent in full health (1) as opposed to

death (0). QALYs are often referred to as preference-based measures of quality of life ([www.euroqol.org](http://www.euroqol.org)). The use of preference-based methods such as the time-trade off and standard gamble, applied through individual surveys, help to produce weights that are then applied to different health states to estimate the associated reduction in QALYs [33]. Consequently, it is argued that the same concerns apply regarding the adequacy of individual preferences [58]. Furthermore, given the need to aggregate benefits or QALYs, interpersonal comparisons must be made, and therefore, the same distributional concerns persist. Indeed, in using the standard gamble and time trade off methods, the valuation of health states is dependent upon an individuals' life expectancy which itself is systematically related to income and therefore biased in favour of the rich/healthy [21]. It has been suggested that weights need to be attached to account for these issues [59]. Therefore, these non-monetary methods of benefit measurement do not completely escape the ethical concerns levied against WTP.

Although the use of the health or QALY 'maximand' need not in principle be exclusive [16], p55, in practice it has become so through cost-effectiveness analysis with its focus on single measures of health gain. Some commentators have criticised the extra-welfarist approach in health care for being overly 'consequentialist' i.e. focusing on final outcomes without regard for processes [13]. This despite more recent evidence that other factors enter the utility function when consuming health care, in addition to health status, such as the process of care and other non-health benefits (e.g. [9] [12] [60] [61]).

The real departure of extra-welfarism from welfarism is that the final decision of where to invest is placed in the hands of the policy maker, letting them decide on the valuation of the changes in outcomes (i.e. the decision-makers' WTP for outcomes) [62]. So whilst the welfarist conception of welfare is simply a function of individual utilities, the extra-welfarist conception suggests that there is more to social welfare than the sum of individual utilities. The judgement of WTP for a given outcome is then made at the societal rather than individual level, introducing an element of paternalism.

Irrespective of the economics tradition, welfarist or extra-welfarist, economic evaluation is primarily concerned with the measurement of efficiency (or maximisation of benefit) leaving issues of equity (and benefit distribution) to be dealt with separately. Whilst the

extra-welfarist leaves the final decision of whether an intervention represents value for money up to the 'decision-maker', the denominator of both cost-benefit and cost-effectiveness analysis relies on the aggregation of individual level benefits, which are typically defined by individual preferences and values. Therefore both approaches are similar insofar as they embrace individualism in terms of benefit measurement and valuation, although cost-effectiveness analysis is restricted to the valuation of health outcomes.

### **2.3 Communitarianism**

Another approach which sets itself apart from the welfarist and extra-welfarist positions is communitarianism. This is based on a socio-political philosophy and has been championed by Mooney (e.g. [63] [64] [65]). This approach more fundamentally challenges the individualist perspective of welfarism. It recognises the inter-dependence of individuals within communities or society and that individuals have other objectives than maximising their own welfare (such as the good of the community) [65]. Communitarianism claims that utilitarianism is asocial and ignores the broader social system or structure in which individuals live. For example, communitarians advocate that increased participation in civic groups or social groupings is a 'good' in itself, and not just an 'instrumental' good (or a means to an end) [65], p 1173. To capture the social value of such changes, it is necessary to recognise the existence of higher order, community-level, preferences.

According to this perspective, a community means more than the inclusion of interpersonal effects in individual utility functions [65]. Mooney argues that community values (as reflected say in the form of a constitution) are important in themselves as they reflect community capabilities which in turn reflect individual capabilities. He distinguishes between two levels of preferences for health care: those at the micro-level governed by self interest and those at the macro-level concerned with changes in the structure of the health care community as a social institution [13].

It is suggested that in order to reflect both community-level and individual values, communities themselves should be interrogated about resource allocation decisions and

the underlying principles of equity, fitting closely with the calls for greater community participation in health care (e.g. [66] [67] [68]).

Whilst this perspective adds an additional and important dimension to resource allocation decisions, it is not clear whether it is fundamentally at odds with welfarism. Welfarism can accommodate a multitude of process and final outcomes, as a number of studies have shown (e.g. [9] [10] [60]), and it is therefore questionable whether welfarism is fundamentally consequentialist. Furthermore, the community perspective advocated by communitarianism would shed light on the relatively under explored area of equity in economic evaluation. Such an approach could assess society's precise level of aversion to inequality (e.g. [47]) and inform the shape of the social welfare function. It decentralises decision-making, putting communities in the role of the 'decision-maker', expanding and promoting the democratic process and empowering those who are familiar with the 'grass-roots' context and needs. A consultation with communities could therefore quite possibly add the 'something more' that is missed by simple aggregation of individual utilities and serve to complement the conventional approaches to economic evaluation in informing the resource allocation process.

## **2.4 Conclusions**

This chapter has provided a theoretical background to welfare measurement and the different schools of thought in relation to welfarism and cost-benefit analysis, extra-welfarism and cost-effectiveness analysis. An overview of recent debates regarding the limitation of both approaches to capturing community-level preferences was also provided. The next chapter considers the challenges facing economic evaluation when applied to community-based participatory interventions and offers a critical review of possible approaches to welfare measurement that might be used empirically.

## **Chapter 3 Measuring the Welfare Effects of Community-Based Participatory Interventions**

This chapter provides an overview of the types of benefits likely to result from community-based participatory interventions and an overview of different possible approaches to benefit measurement for these types of interventions.

### **3.1 Defining Community-Based Participatory Interventions and their Inherent Complexity**

Health promotion programmes generally target healthy individuals and aim to change knowledge, attitudes and behaviour in order to prevent adverse health events. Evidence suggests that more informed and knowledgeable patients seek preventive care and favour healthy behaviours that improve their health [69] [70]. Numerous authors have highlighted the challenges facing health economists seeking to evaluate the economic efficiency of health promotion programmes (e.g. [3] [4] [6] [8] [71] [72]). One of these challenges is the timing of health benefits. Behaviour change takes time, and unless the time frame for evaluation is sufficient, health benefits may be overlooked. Furthermore, the changes once initiated can potentially be sustained beyond the time frame of the intervention [3]. Unless such future effects are predicted or modelled, they risk being omitted from the evaluation process, and the value of the intervention underestimated. Furthermore, individuals having participated in a health promotion programme are more likely to be responsive to and derive greater benefit from subsequent health promotion initiatives. They have been ‘sensitised’ to certain issues, and through the knowledge gained may be better equipped to respond to future public health programmes [3]. Health promotion programmes often address issues which are more relevant to disadvantaged groups who are more likely to partake in high risk behaviours. Therefore, in terms of equity they may have an extra value-added which may not be well captured through standard economic analyses which focus on efficiency.

Community development as an approach to health promotion creates additional challenges for economic evaluation [73]. Unlike disease prevention, a community development approach to health promotion goes beyond the individual to address the ‘structural or socio-economic causes of ill health’ [3], p 242. The aim is to set community priorities, change the community environment, and promote a sense of social cohesion or community identity [74] as a means of initiating effective change and improving collective health [75] [76]. This approach recognises that community relations impact on individual identity and well-being and that in order to improve individual conditions it can be necessary to achieve broader social change [3].

In economic evaluation, the standard approach to measuring the costs and consequences of an intervention is to pose questions of Who? Does what? To whom? Where? And when? This assumes a clearly definable process for which associated resources and outcomes can be tracked. However, the nature of community development programmes means they tend to develop and change over time [77] [78] and are context specific. Therefore, the intervention process and outcomes are not fully predictable, complicating the process by which inputs become outputs [78]. For example, it can be unclear which aspect of the process lead to the observed changes in outcome.

However, the multiplicity and complexity of benefits arising from such programmes both to users and to the community at large is probably the most significant challenge to economic evaluation and is the focus of the next section.

### **3.1.1 Benefit Measurement**

#### *3.1.1.1 Non-Health Outcomes*

In addition to promoting health, the provision and sharing of information that is characteristic of many health promotion programmes can be of value in itself [4]. The demand for some health care interventions may even be a derived demand for information [79] [80] (Table 1). Knowledge can be of ‘decisional’<sup>9</sup> value in terms of changing behaviour and improving health. Numerous studies also point to the ‘non-decisional’

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<sup>9</sup> The terms ‘decisional’ and ‘non-decisional’ are borrowed from a study by Berwick & Weinstein of the value of information provided by ultrasound screening [77].

value of knowledge, including a decrease in anxiety/concern [81] [82] [83] [84]. Knowledge may also have an 'entertainment' value generated by the joy of learning [85]. The subsequent process of knowledge integration can also affect the way people feel about themselves, their self-image and ability to make informed choices. Various evaluation studies have demonstrated improvements in self esteem [86]; self efficacy [87]; increased confidence [83]; and decreased embarrassment [88] resulting from health promotion programmes. In relation to community development type programmes, participation in itself can be a source of welfare to individuals. Such outcomes are referred to as 'non-health' outcomes in accordance with a definition of health as the absence of disease or other condition<sup>10</sup>.

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<sup>10</sup> Whilst broader notions of health have been embraced by the World Health Organisation [89], we prefer to use the health/non-health dichotomy in this thesis, in order to avoid confusion between clinical, compared to broader social health outcomes.

**Table 1 A Typology of Possible Benefits**

Benefit class	Category	Descriptions
Use	Information obtained	Changing risk perceptions, behaviour change, changing demand for health and willingness to invest in future health resulting in better health
		Reassurance, anxiety
		Entertainment – the joy of learning
	Social cohesion	Interaction with other group members, with other members of the community, with educators – includes the social diffusion effect
	Self-confidence	Empowerment, self-efficacy, greater control over own life and confidence
Non-use	<b>Positive</b>	
	Option value	The value derived from being able to participate in a programme if needed in the future
	Altruism/caring	Well-being from knowing the intervention is benefiting other people
	Existence value	Well-being just from knowing an intervention exists, for its own sake
	Passive use value	Reassurance or well-being from anticipated benefits to self (positive externalities) from changes in the behaviour of others
	<b>Negative</b>	
	Regret/deprivation	From voluntary non-attendees who suffer regret later on, and for the ‘deprived’ group, those who would like to attend but are not eligible [90].
Threatened	Social changes taking place as a result of the programme challenge existing social structure	

Source: Adapted from Mitchell & Carson [91], p 61.

### 3.1.1.2 Non-Use Values

Because of the ‘social diffusion’ effect of community-based interventions, the attitudes and behaviour of targeted individuals also affect the lifestyle, behaviour and wellbeing of the surrounding community [6], resulting in potential ‘non use’ values or benefits or disbenefits<sup>11</sup> to individuals not directly participating in the programme. The main categories of non-use value are the option of participating in the programme at a later date (option value); the altruistic feelings towards those benefiting from the programme

<sup>11</sup> Because of the essentially political nature of this type of intervention, shifting the power balance within society, there are likely to be gainers and losers from this process of change, even if the overall outcome is positive.

(altruism); and indirect learning from others or reassurance from knowing others have learned (passive use value)<sup>12</sup>.

The notion of **option value** was first introduced by Weisbrod [92] and is based on the fact that people can derive benefit from anticipation of using a good or service or programme in the future; they have the option of potentially benefiting in the future.

The notion of altruism and **existence values** were first introduced by Krutilla (1967) [93]. In the context of an environmental resource, an existence value implies the belief that certain species or natural wonders have the right to exist [94]. According to one branch of thought, all existence values stem from different forms of altruism towards current or potential future users [95]. Others suggest that a good can have value independently of use and of any altruistic motive, merely because it exists: an intrinsic value e.g. [96]. In the context of healthcare, the relevance of existence value is less obvious. It is more likely that any value associated with the existence of an intervention is ultimately related to the fact the other people will benefit (altruism).

Different types of altruism have been identified in the literature. Dependent upon the nature of altruism (pure, impure or paternalistic) and the underlying motivation, there are different views about its relevance for welfare measurement.

**Non-paternalistic (or pure) altruism** represents a concern for other's well-being whilst also respecting their preferences [97]. Bergstrom argues that if we are to count the altruistic benefits that each gains from the other's enjoyment, we should not forget to also count the cost. He shows that the optimal choice in the presence of pure altruism is that determined by selfish preferences [97]. The inclusion of pure altruistic preferences, he demonstrates, will lead to a sub-optimal resource allocation decision.

**Paternalistic altruism:** reflects the desire to increase the provision of a public good, the concern being with the consumption of others rather than with their preferences or well-

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<sup>12</sup> Whilst option and passive use values are sometimes considered to be a form of use value, the distinction is made here between use and non-use values on the basis of whether or not an individual directly participated in a programme.

being. This would be applicable to merit goods for example. Jones-Lee argued that a special case of paternalistic altruism is of value for welfare measurement, 'safety-focused' altruism [98] [99]. In this case, I's altruism reflects a concern for J's welfare only in terms of J's safety (or in our case health) and not to other determinants of J's well-being [99]. It is unclear what form such safety focused altruism would take, although Jones-Lee conjectures that altruism for family and friends would take a form closer to pure altruism (concern for their general well-being) than concern for more distantly related persons (more likely to be safety focused).

There is no clear consensus on how to deal with **impure altruism** [100] and whether it should be included in welfare measurement. Impure altruism is defined in terms of the selfish motive, or private benefit derived from giving, rather than the benefit derived from the good *per se*, otherwise referred to as a 'warm glow' effect or 'moral satisfaction'. An example is the utility derived from giving to a good cause (charity) irrespective of the cause itself. The existence of warm glow has led some to reject stated willingness-to-pay as a method of welfare measurement, as such behaviour can make responses insensitive to variations in the scope of the good (the 'embedding' effect) [101] [102]. On the other hand, modern theories of social choice suggest that the motives behind individual preferences are not relevant [103]. However, a method of taking out the warm glow effect from willingness-to-pay values has been put forward by Nunes & Schokkaert [104].

The nature of evaluation, by focusing on the 'gainers', will tend to shed light on the positive outcomes resulting from an intervention which are then added to the denominator of cost-effectiveness or cost-benefit ratios. Indeed, the measurement of benefit is usually limited to the individuals actively treated or targeted, ignoring the wider societal effect [4]. The loss of welfare (other than financial) to the losers (i.e. to those who stood to benefit from the previous community structure or suffered regret from not partaking in the programme or whose expectations were not satisfied<sup>13</sup>) are less likely to be recognised or measured and are generally written off as intangible [105]. However, such welfare loss

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<sup>13</sup> Community development programmes seeking to raise expectations about health services could lead to disappointment if, for example, health facilities cannot meet the resulting increase in demand. Whilst one could argue that you cannot feel deprived of something you do not know, non-participants may still feel deprived of an opportunity to be part of a group, or to miss out on a learning opportunity, even if the process itself and the specific content of information provided are unknown to them.

could occur if individuals not participating in a programme feel a sense of regret or deprivation or if they feel threatened by the changes that are being promoted by the programme. Therefore it is helpful to distinguish between positive and negative outcomes, referred to here respectively as benefits and disbenefits, to differentiate them from financial outlays or opportunity costs.

The question remains of whether the community as a 'system' (of 'community capabilities') equates to the welfarist notion of the community as an aggregation of individuals. Welfare economics proposes that community-level effects can be incorporated as inter-personal effects within individual utility functions. However, communitarian claims suggest that the community is more than just the sum of individuals and encourage consideration of community-level preferences, reflective of the community as a whole (Chapter 2, section 2.3).

Overall, community-based programmes are likely to generate non-health benefits and non-use values. These will influence how these interventions operate and ultimately their effectiveness and sustainability. It is, however, critical that they in some way be reflected in economic evaluations as a failure to do so will lead to an undervaluation of these programmes relative to other potential investments.

All this begs the question of how best to assess and capture this diversity of values, in order to give a reasonable representation of value for money. We consider the potential means that health economists have to address these problems and assess which might be appropriate to estimate these values.

## **3.2 Empirical Approaches to Welfare Measurement**

This section presents an overview of the methods that are most commonly used to measure outcomes of health promotion programmes and which methods could be used to capture the range of benefits of community-based participatory interventions described in section 3.1.

### 3.2.1 Disease Specific and Generic Outcome Measures

Cost-effectiveness analysis is the most common form of economic evaluation used to evaluate health promotion programmes [106]. A single (or composite) measure of outcome has been commonly used in such analyses such as intermediate effects of behaviour change, changing knowledge, attitudes, and practice [107]; degree of health service utilisation or preference for treatment options [108] [109]; or level of participation in treatment decision making [110]. The use of intermediate effects as outcomes limits the comparability of cost-effectiveness results with that of other interventions<sup>14</sup>. Links have also been made to final health outcomes through existing evidence if available or through modelling [111] (HIV-cases averted), [112] (diarrhoea-cases averted). Life years gained or QALYs are sometimes estimated [113] [114] [115] (QALYs); [116]<sup>15</sup> [117] [118] [119] [120] (life years saved). The focus of most studies on a narrow measure of health outcome is consistent with the traditional theory of demand for health care as a derived demand for health, with health as the only utility-deriving attribute in the demand function for healthcare. However, it does not assist with a more 'holistic' measurement of benefits of health promotion programmes.

Whilst Quality-Adjusted Life Years (QALYs) and Disability-Adjusted Life Years (DALYs<sup>16</sup>) can in principle reflect a range of outcomes affecting health-related quality of life, the broader outcomes which have been shown to be important in the context of community-based programmes have not, as yet, been incorporated into a QALY framework [122]. Stated preference techniques such as the visual analogue scale, the standard gamble and the time trade off, have proved popular with health economists to

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<sup>14</sup> The reason for focusing on intermediate measures of outcome can be because of the timeframe of evaluation which is insufficient to assess the impact on final outcome measures such as health. However, it is not clear to what extent changes in knowledge or behaviour should be valued by society and are actually valued by the individuals concerned. Otherwise stated, it is not because behaviour has changed that there has necessarily been an increase or decrease in welfare (all depends on which activities and expenditure have been displaced and from where).

<sup>15</sup> Wutzke et al. admit that the use of life years saved from alcohol prevented deaths ignores other benefits from reduced alcohol consumption to individuals and society, such as increased quality of life, reduced health care cost, crime and violence [116].

<sup>16</sup> Disability-Adjusted Life Years have been more frequently used in developing countries due to their relative ease of estimation. They formed the basis of the estimation of the global burden of disease featuring in the World Development Report, 1993 [121]. A weight for each disabling condition was determined by expert opinion. The calculation of DALYs is based on the sum of life years lost and life years lived with disability. The standard calculation relies upon two main assumptions, that of discounting and age weighting (the productive years of life are weighed more highly than earlier and later years).

estimate the utility weights within the QALY framework. These could in principle be used to present individuals with various scenarios containing different levels of health and non-health attributes, asking them to make choices. However, the adaptation of QALYs to incorporate such outcomes would require people to trade between, for example, different levels of information and risk of death (standard gamble) or years of life (time trade off) which, although theoretically feasible, may be impractical when the risks involved are very small [33].

Another difficulty is the incorporation of non-use values within a QALY or DALY framework. The typical methods of valuing health states within a QALY/DALY framework values only the benefits to the patient (the utility of those who are directly affected by the health state) [123]. Altruism has been found to be both important and non-proportional to selfish preferences and it has been suggested that QALYs/DALYs need to be adjusted to allow for this [123].

### **3.2.2 Monetary Measures of Outcome in Cost-Benefit Analysis**

The definition of benefits as resource savings from an intervention, in terms of productivity gains and other financial savings to the health system, ‘the human capital approach’, was characteristic of early financial project appraisals, illustrated, for example, by Mushkin [124]. A number of cost-benefit analyses of health promotion programmes focused on financial benefits in terms of resource savings (e.g. [109] [125] [126] [127] [128] [129]). However, the human capital approach later came under criticism for two reasons: 1) that productivity is not consistent with welfare theory because it does not reflect utility and; 2) the ethical implications of associating welfare with productivity [130]<sup>17</sup>.

Revealed and stated preference techniques of estimating willingness-to-pay have been promoted as a means of measuring benefits and are held to be more consistent with welfare economic theory and specifically the notion of the ‘compensation principle’ [91] [131]. A number of studies have used WTP to estimate the benefits of health promotion

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<sup>17</sup> The study by House (2000) makes reference to recommendations by the then chief economist at the World Bank who used such ‘economic logic’ to suggest that the Bank should support ‘dumping a load of toxic waste in the lowest wage country’ [130], p 79.

or preventative programmes (e.g. [132] [133] [134] [135] [136]), and have also been used to capture the non-use values resulting from an intervention (e.g. [137]). Although as far as we are aware, WTP has not yet been used to value a community development approach to health promotion.

### *3.2.2.1 Revealed Preference Techniques*

Revealed preference techniques are based on the observation of actual behaviour e.g. ‘the bundles actually bought by a consumer and the prices (...) at which they were bought’ [34], p133 and drawing from this behaviour individuals’ preferences. According to this technique, the price paid for goods and services can generally be used as a lower-bound measure of value (or willingness-to-pay). One variation is the travel cost method which has been used to value goods or services that are ‘un-priced’ in the conventional sense. This approach enables the construction of a demand curve based on the variation in access costs (or opportunity cost associated with distance travelled). Its origins are rooted in the environmental economics literature and it was developed to value the economic benefits of national parks [138]. Parks are difficult to value as there is only a nominal or zero fee and so no demand curve can be observed based on price variation. However, a demand curve can be inferred by observing travel behaviour.

The impact of distance on health service use has been long established [139] [140] [141]. Therefore it has also been suggested that this method be used in health care to value the benefits to health service users [142]. However, this method presents the challenge of accurately valuing time [142] which can be especially difficult in the context of a subsistence economy where the opportunity cost of time cannot be valued in terms of wages. A more substantive problem in relation to the evaluation of community-based participatory interventions is that this approach can only capture the benefits to users of a good or service; benefits or disbenefits to non-users cannot be measured in this way.

### *3.2.2.2 Stated Preference Techniques*

The most common stated preference technique is the contingent valuation (CV) method which is used to measure the intensity/strength of preference or value of a good or a

service through surveys with individuals, estimating the maximum amount that would be given up in order to attain it [61]. The CV method elicits WTP values contingent on a hypothetical market and can therefore be used to value goods which are not exchanged within the market [91], p3. In principle, when deciding their maximum WTP, individuals will take account of the characteristics of a good/service 'that are important to them' [61], p 372; both health and non-health related. Therefore, the contingent valuation method should be able to capture multiple benefits and the value of information and other outcomes of community-based interventions.

This was borne out in two studies on the economics of screening which demonstrated that information provision, or knowledge in itself, was an important determinant of WTP, irrespective of the outcome of the screen [12] [143]. Another study demonstrated the 'non-decisional' value of information<sup>18</sup> in relation to ultrasound screening using WTP [84]. The approach also accommodated potential disbenefits, as some individuals expressed a WTP to suppress information (they preferred not to know). It has also been suggested that WTP might be an effective means of valuing 'capability' sets [31], by estimating how much individuals are willing to pay for improvements in their capability set as a result of an intervention [58], although this has not as yet been specifically tested.

Having elicited a respondent's valuation of a good or service, it may be necessary to identify the attributes on which the WTP valuation is based and the relative value attached to each. Attributes which affect WTP have been measured through quantitative techniques including the rating scale and discrete choice experiments, or by simply asking people for which attributes they are willing to pay. Dimensions of value can be ascertained during preliminary qualitative work.

In one study, for example, patients were asked to evaluate their satisfaction with a range of the attributes using the rating scale technique in order to estimate the extent to which regret and disappointment influence decisions in relation to IVF treatment ('psychological' outcomes) compared with the desire to be better informed (non-health outcomes) [10]. Each attribute of the service was evaluated using a 0-10 scale. Ordered

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<sup>18</sup> That people feel better from 'just knowing' and the enjoyment of learning [84], p883.

probit regression was used to measure the contribution of each attribute to total WTP. The disadvantage with this technique is that, unlike willingness to pay, respondents do not face any budgetary constraint in their valuation.

Conjoint analysis, which developed within the discipline of Mathematical Psychology, has been used to establish which aspects of care are most valued by patients [144] [145] [146] [147]. It offers another method of identifying and valuing attributes of a service. It involves a number of steps. Firstly researchers identify valued attributes and their different 'levels'. These are then placed together into 'scenarios' reflecting hypothetical choices. Preferences for scenarios included in the questionnaire are elicited by using one of three methods: ranking, rating, or discrete choices [144]. With ranking, respondents are asked to list the scenarios in order of preference. The rating method requires the respondents to assign a score to each of the scenarios. For the discrete choice method respondents are presented with a number of choices and for each asked to choose their preferred one.

The rating method was used in one study to establish the value to patients of providing access to patient records and general medical information in the waiting area of health centres in relation to other attributes of general practice [147]. Whilst this study did not capture the specific attributes of the new information system, in principle conjoint analysis could be used to do so.

However, when dealing with less tangible benefits such as reassurance or social cohesion, the challenge lies in how to break them down into integer amounts, a necessary step to assigning levels for discrete choice or rating experiments.

An alternative approach is to explore 'what lies behind respondents' values' by asking them why they are willing to pay [148], p9. This approach can be used to determine which attributes are influential in defining their WTP, although it does not necessarily allow a weighting of the relative importance of each attribute.

Unlike revealed preference, stated preference techniques can be used to measure benefits across a broader social grouping, including the elicitation of non-use as well as use values.

Despite the potential of stated preference techniques for overcoming a number of the problems associated with the evaluation of the benefits of health promotion programmes, there is a concern with the approach. This relates to the appropriateness of individual preferences to evaluate programmes which aim to change people's behaviour or their ability to capture the full extent of community-level changes. Welfare theory assumes that people have complete and stable preferences for a given commodity and its characteristics as seen in Chapter 2, section 2.1.1. However, in the context of a programme which aims to inform preferences and change behaviour, it would be more realistic to consider preferences as dynamic or context dependent, rather than stable, constructed progressively through the process of social interaction and the integration of information. It is important then to recognise the instability of preferences and design elicitation tasks which promote preference construction [35]. The elicitation of uninformed preferences would be misleading and potentially lead to suboptimal decisions [49]. Therefore, efforts should be made to provide best available information recognising that all decision making is inevitably subject to some degree of uncertainty.

A further issue is whether or not the sum of individual WTP adequately represents the welfare of the community or if there is something more to community welfare that is not reflected by the sum of individuals [3] [13] [71]. A number of possible ways of more explicitly capturing community-level benefits are described below.

### *3.2.2.3 Other Methods*

Qualitative methods offer a means of understanding the role of the community in defining individual preferences and placing changes in individual utility/welfare in the context of broader institutional and structural change [149] [150]. These methods can be used alongside either type of economic evaluation to expand results and put them into context. Qualitative methods can also be used to involve the community in priority setting decisions and to ascertain issues of equity [68].

An alternative approach that has been put forward as a means of capturing community-level effects includes the use of statistical techniques for analysing hierarchical or nested

data, although no evidence of its application in this way has so far been found. More widely used in the education sector to control for school-level effects when assessing individual performance, the use of multi-level models in health economics has been promoted [151] and used, for example, to examine the effect of competition on the behaviour of Australian general practitioners [152].

### **3.3 Conclusion**

This chapter has illustrated the limitations of applying cost-effectiveness analysis to community-based programmes. Whilst in principle the stated preference technique could be used to derive utility weights for all types of benefit (health or non-health) within a QALY framework, in practice this has not so far been done. The contingent valuation method can and has been used to evaluate health as well as non-health benefits. The following chapter examines the methods of application of the contingent valuation method by economists as this is the approach which is most relevant to the study in this thesis.

# **Chapter 4 Review of the Methods Used in Contingent Valuation Studies**

## **4.1 Overview of the Chapter**

Recent years have witnessed a significant growth in the number of contingent valuation (CV) studies carried out in the health sector. Reflecting this, a number of reviews of CV studies in the health sector have been carried out [153] [154] [155] [156]. The most recent, but as yet unpublished study by Sach et al. sought to place the findings of WTP studies into a league table [157]. These studies augment the numerous methodological reviews that have been carried out in relation to the use of CV in other sectors, most notably in the environmental sector (e.g. [158]). One recent paper by Hanley et al. draws comparisons between the approaches used in both the health and environmental sectors identifying areas for future research for health economists such as giving respondents more time to think, determining the geographical extent of non-use values, and validating WTP values through actual payments [159].

Given the increasing number of CV studies in the health sector, the aim of this chapter is not to provide a comprehensive review of all contingent valuation studies. The aim is rather to focus on methodological issues that are relevant to this thesis.

The first section of this chapter provides an overview of different approaches of eliciting WTP values and considers the methods that have been used by CV analysts to define the commodity to be valued. The second section explores the methods of survey administration that can be used in different settings. The third section discusses the possible methods of data analysis. The last section considers how results from CV surveys can be used to derive aggregate measures of social benefit for use in a cost-benefit analysis. Throughout this chapter particular attention is given to the application of these methodological issues in low income countries.

## 4.2 Methods of Survey Design

This section examines the issues surrounding the design of CV surveys focusing, in particular on the use of qualitative methods. It then provides an overview of the types of methods that can be used to elicit values and assesses their appropriateness in relation to the study context.

### 4.2.1 Qualitative Methods and the Design Process

The term contingent valuation is derived from its role in obtaining values from individuals conditional on hypothetical or constructed markets [156]. The CV scenario typically consists of: 1) a description of the good or service to be valued; 2) the method and frequency of payment; and 3) a specific question used to elicit an individual's maximum WTP. The scenario has the objective of creating a hypothetical market that encourages preference construction and responses that truly reflect these preferences [156]. So whilst the scenario in and of itself relates to a hypothetical situation of provision and contribution towards a good or service, it also needs to be as realistic and credible as possible in order to promote a meaningful and accurate elicitation of preferences and values [156]. The latter can be especially challenging when working in a context which is culturally foreign.

The use of qualitative methods has been recommended when designing CV scenarios to promote content validity [156] [160]. Such methods can be used to determine how much respondents already know about the commodity to be valued and to gauge the appropriate level of information that needs to be provided [161] [162]. Consequently, survey instruments developed in this way are more likely to be tailored to respondent knowledge levels [163] and to match with respondents' 'mental representations about how these and similar issues are normally decided upon' [164], p124. Findings from such qualitative work can help bridge the gap between the researcher's conceptualisation of the problem and the respondent's own understanding [165]. This has particular relevance when operating across diverse socio-cultural, linguistic settings, where perceptions may not be obvious *ex-ante*.

Qualitative methods can also be used to explore the relevance and importance of different attributes that are assumed to affect utility when describing the intervention to be valued,

especially in identifying and communicating those attributes which are not health-related and which may be less tangible and easy to measure and possibly unknown to the analyst beforehand [155]. Such methods are also helpful in assessing the appropriateness of visual aids [156] [166]<sup>19</sup>.

There are a variety of different methods that can in principle be used to inform the process of survey development. Verbal protocols are one such approach which assess the cognitive processes leading to CV responses [168]. This consists of asking respondents to ‘think out loud’ as they decide upon their maximum WTP. In most cases, verbal protocols have been used *post-hoc* to explain and interpret responses to the survey [169] [170] [171] [172] rather than in the survey design phase.

Focus group discussions, usually involving between four to 12 individuals and chaired by a moderator, are a more straight forward approach to elicit information that will inform study design. They have been promoted as a basis for exploring a wide variety of individual views [173]. Within the design of CV scenarios, they have been most commonly used to identify perceptions and attitudes with regards to the good or service to be valued (e.g. [174] [175]), attributes of value, elicitation mechanism, payment vehicle and choice of language [84] [176].

Similar information can be derived from individual semi-structured interviews [177] although the group approach benefits from interaction between participants and a less formal environment [178]. One study employed a combination of methods including focus groups and interviews for measuring the benefits of a rural transit system [176].

However, there is no gold standard for how such qualitative work should be carried out. Indeed, the methods and findings from such exploratory research are usually excluded from published willingness-to-pay studies meaning that the evidence base in this area is poor. The review of CV surveys in the health sector carried out by Smith indicated that most studies (84%) did not provide any indication of how the CV scenario was derived [156]. Most of the studies which indicated that qualitative methods were used did not

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<sup>19</sup> For example, a study in a low income setting found that photographs attracted so much attention and excitement that they interfered with the CV survey process, and were later rejected [167].

describe data collection or analysis methods. In very few cases were the findings from these discussions reported or indications provided of how the data were used to inform the survey design process, making it hard to draw lessons or make comparisons with other studies [156]. However, a detailed description of methods of qualitative data collection and analysis used to develop a novel question format, the structured haggling technique, was provided by one study [179]. Studies in the environmental sector tend to be more explicit in their methods of incorporating focus groups into the design of the CV survey (e.g. [163] [165]).

Qualitative methods have a potentially important role to play throughout the design process. The next sections highlight some of the choices facing CV analysts when designing surveys in terms of how to describe the intervention to be valued and the method of value elicitation.

#### **4.2.2 Description of Intervention to be Valued**

The importance of clearly specifying and quantifying the attributes or programme consequences to be considered by respondents in the CV scenario has been highlighted in numerous studies (e.g. [180]). Indeed, the sensitivity of WTP to the scope of benefits is promoted as an important test of the construct validity of the method [181]. Studies have shown that the provision of information on intervention processes does impact on preferences and valuations and that this needs to be included in descriptions presented to respondents to avoid bias. For example, in one case the provision of additional information on treatment process had a negative effect on WTP as it highlighted what were perceived to be negative aspects of surgery which would otherwise not have been considered by respondents [9]. In another case, the provision of process information had a positive effect on WTP for three health care programmes[161].

When deciding how much information to provide in a CV scenario and the nature of information provided, CV researchers make an implicit trade off between the level of technical precision of the scenario and the ease of understanding for the respondent. In practical terms, an influential factor is the extent to which a given piece of information is

likely to differ from a respondent's beliefs [161]<sup>20</sup>. For example, in cases where uninformed respondents would otherwise overestimate risks, the provision of risk information was found to have reduced WTP [182] [183].

One of the issues with quantifying the level of benefits as probabilities is the extent to which respondents are able to process and understand these figures. Evidence suggests that there is a tendency for individuals to be unduly influenced by near certainty (either very large or very small probabilities) [166]. In such cases, respondents have difficulty assimilating changes in risk and their subjective assessment may not reflect the objective reality, based on findings in environmental and transport economics literature [184].

In developing countries with low levels of formal education the situation is more acute. For example, a study in Uganda found that information on efficacy of an HIV-AIDS vaccine (from 50% to 95% effective) had no significant effect on WTP [185]. The authors also found that comprehension of efficacy was very dependent on respondent level of education. Only 27.6% of those with no formal education were able to understand the efficacy data, despite the use of visual tools<sup>21</sup>. Those who understood the efficacy data were also willing to pay more, although the authors did not assess the combined effect of understanding and efficacy levels on WTP.

The understanding of risk information and probabilities has not been explicitly tested for in other low income settings. For mortality outcomes, one option is to provide a description of community benefits which can be more easily measured without recourse to probabilities (e.g. this intervention will avert X number of deaths per year in this community) [187]. However, this relies on researchers providing a clear definition of the extent of the community under consideration, and the respondent's feeling part of that community and being able to relate to large numbers. Another approach would be to test the impact of risk information on WTP by including a range of benefit values to different

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<sup>20</sup> This will be dependent upon a respondent's baseline knowledge levels, risk perceptions, or uncertainties about the outcomes of the health care programme and their potential future need for it. Qualitative methods can in principal be used to help determine baseline knowledge levels and also to explore if and how best to present information about risk and probabilities.

<sup>21</sup> The method used was one used previously in Thailand [186] and involved a plastic tray with rubber figurines representing people. Subsequently respondents were asked questions to check comprehension.

respondents as recommended by the National Oceanographic and Atmospheric Administration (NOAA) [188].

Despite the recognised importance of quantifying benefits, few studies have presented risk information in scenarios. The review by Smith found that over 70% of studies had no element of risk or probability in the scenario [156].

When dealing with complex community-based programmes the specification of the complete set of consequences can be challenging, as they may be unknown to researchers who have not themselves participated in the intervention process. An alternative approach might be for researchers to guide respondents to consider and explore the range of consequences but not impose them or attempt to quantify them. Bringing people together as a group for discussion prior to the CV survey offers a possible way of so doing and is discussed in section 4.3.

In addition to the provision of relevant information, the failure to define accurately and clearly the scope of the intervention to be valued could lead to the 'embedding' effect or 'part-whole' bias [189]. This means respondents interpret a good as representing a broader set of goods than those under evaluation [91]. This was shown by Desvousges who found that WTP to save 2000 birds from oil spills was not significantly different from saving 200,000 birds [190]. In another study, individuals were asked for their WTP for different attributes of value associated with ultrasound screening and the sum of WTP for each individual attribute was valued at more than the screening as a whole [84]. One study tried to get round this issue by adopting a multi-stage approach beginning with contingent valuation followed by standard gamble questions which were then 'chained together' [191].

Finally, whilst information regarding the intervention is clearly important, as is the definition of the intervention's scope, it is also important to make reference to substitutes and remind respondents of their budget constraint [188]. Joint evaluation is a method of dealing with this and requires respondents to value substitutes sequentially [187].

### 4.2.3 Method of Value Elicitation

Having defined the scenario, the next step is choosing the method of eliciting values. A number of issues need to be resolved: the method of valuation<sup>22</sup>; the payment vehicle, or the method of collecting/disbursing money; the mode of payment (monetary or other); the frequency of payment; and the question format, either open or closed ended. Although there is no obvious order to follow in deciding which steps to take, some may relate better to others due to inter-dependency. In order to maximise credibility and acceptability, the approach which most closely reflects the decision people actually have to make should be selected [192]. Therefore, the method of choice will be to a large extent determined by the nature of the commodity being valued, how it is usually paid for, as well as the institutional context in which it is being valued. This section reviews the evidence in relation to each.

#### 4.2.3.1. *Payment versus Compensation (Gainers and Losers)*

One of the advantages of the CV method highlighted in Chapter 3 was its ability to measure gains and losses from a policy change. It has been suggested that the distribution of property rights, or whether an individual is benefiting from a programme or not, should determine whether a willingness to pay or a willingness-to-accept approach are used [193]. If an individual has property rights in relation to the commodity to be valued, then a case can be made for estimating the compensation required by an individual to give up these property rights or for an intervention to stop i.e. WTA (compensating variation) [91]. An alternative, however, would be to adopt an equivalent variation framework and ask for their WTP (equivalent variation) to maintain an intervention rather than to give it up. When there are no property rights, WTP (compensating variation) is likely to be more relevant – or the amount the individual is willing to pay to benefit from a given policy change [91].

In empirical studies WTP (compensation variation) is most commonly used. In the review by Diener et al. [153] only four studies were found that allowed for a potential loss in utility from the intervention ([194] since published as [195]) [84] [136]. However, most of those studies used WTP as a measure of loss of utility (e.g. WTP to suppress

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<sup>22</sup> Whether payment is made by an individual or compensation is paid to an individual.

information [84]) and only one study assessed WTA [136]. More recently, two additional studies were found to employ willingness-to-accept in the health sector [196] [197]. There are also some examples of WTA being successfully used in other sectors, for example to value the benefits of London hostels to the homeless [198], and to estimate the loss to rural households from forestry protection measures in Madagascar [167].

Whilst in theory the difference between WTP and WTA should be very small, in practice, empirical studies commonly find that stated WTA is higher than stated WTP which has made researchers more reluctant to use WTA [192]. One of the reasons put forward is the absence of a budget constraint limiting the upper limit value, although this can to some extent be curtailed by the use of the dichotomous choice method [167]. This difference is predicted to occur when the elasticity of substitution between the good under consideration and market goods is zero or small [199]. The choice of payment vehicle may also be more difficult to formulate credibly for WTA. For example, in settings where there is not the resource base or the institutional structure to provide social insurance or unemployment benefits to community members, the concept of receiving compensation is unlikely to be very credible. In one case, however, WTA was favoured over WTP. During the pre-test of WTP, researchers found that respondents who seemed to be WTP were responding in this way because they felt 'compelled' to do so rather than because of true non-use benefits [167], which could result from the 'Hawthorne effect' [200]. However, this study also documented a greater number of non-responses (20%) than that observed in other low income countries using WTP [167].

#### *4.2.3.2 Payment Vehicle*

An important issue in meeting the objective of realism in the evaluation task is ensuring the payment vehicle presented is representative of the context or health system with which respondents are familiar [201]. The most commonly used are: out-of-pocket payments, taxation, insurance premia, voluntary donations. There has been some debate of the relative merits of voluntary versus more coercive payment vehicles. The main concern with voluntary methods is the risk of encouraging strategic behaviour such as free riding [158]. However, it has been argued that in certain instances donations may be preferable if this corresponds to a more credible method of payment [202]. It has also been

suggested that donations be interpreted as a theoretical lower bound on values given the potential for free-riding behaviour [203]<sup>23</sup>. Although, the real world provides evidence of substantial donations to certain public goods, it has been suggested that this is motivated by the satisfaction from giving or a 'warm glow' effect [100] which can lead to the embedding effect, or insensitivity of WTP values to changes in the scope of the intervention.

The choice of payment vehicle should ultimately be driven by the method of providing the good, with coercive methods being appropriate for public provision and voluntary methods being appropriate for private provision [204]. This will be largely determined by the nature of the good. The choice of a realistic payment vehicle is important to avoid the risk of protest bids or other strategic behaviour; it also influences the values that are elicited [156].

The review by Smith found that the out-of-pocket (voluntary) payment vehicle has been most commonly used in studies in the health sector (in 91 out of 111 studies) [156]. Despite the nature of public provision through the NHS in the UK, only a few studies used general taxation as a payment vehicle in the UK [156]. In the review of studies from low income countries shown in Appendix 1, out of pocket payments were found to have been used exclusively which reflects the reality of financing of public health services in most low income country settings (households providing the major source of financing of public services, and the extent of informal employment limiting the extent of the tax base, especially in rural areas).

#### *4.2.3.3 Payment Method: Money or in Kind?*

Conventionally, WTP studies ask respondents about monetary contributions towards a good or service. However, the maximum one 'would give up' could in principle be measured in time or material resources, or any tradable item that can be translated into money. In a subsistence setting where the cash economy and access to money is limited, alternative payment methods may be more appropriate. The review of low income

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<sup>23</sup> Although, placing emphasis on the fact that others are contributing to the good can help avoid free riding [153].

country studies in the health sector presented in Appendix 1 found that money was used in all these studies. This could reflect the fact that these studies were seeking to inform pricing or cost-sharing strategies for specific commodities or health services.

In the environmental economics literature, a number of studies conducted in rural areas with a largely subsistence and non-monetised economy were found which valued willingness-to-pay in non-monetary terms (Appendix 1). For example, a study in Ethiopia asked respondents if they were willing to contribute money to a fund and/or labour time for maintaining the programme [205]. The aim was to test the acceptability of money compared to labour and also to allow people to show their support for the programme even if they could not contribute money. 59% of respondents opted for a combination of money and labour contributions and 26% volunteered labour only. Another study looked at willingness to contribute baskets of rice as this was a more familiar trading item with a well established market value [167]. The authors found that respondents treated rice as a measure of value and their responses were consistent with theoretical predictions.

#### *4.2.3.4 Frequency of Payment*

The choice of how frequently payment should be made again depends upon the nature of the commodity, whether a repeat payment makes sense within the given setting, level of respondent commitment to making ongoing contributions, and the policy context [156]. The review by Smith suggests that whilst option value lends itself well to an insurance/tax type payment mechanism, a one-off payment may be more appropriate for out-of-pocket payments [156]. However, the chosen frequency of payment and time frame for payment will influence the respondent's budget constraint affecting the amounts elicited. One-off payments have been most frequently elicited (64/111) [156]. Of the studies that adopted a specific time frame for contribution, 12 monthly and one monthly payments were the most common.

In practice, however, households may have different preferences in relation to the frequency of payment (see for example the case of payment for large consumer goods such as household appliances and vehicles in high income countries). Perhaps

surprisingly, no studies were identified that allowed respondents to choose the frequency of payment.

#### *4.2.3.5 Question Format*

There are a number of different ways in which values can be elicited, from a closed-ended approach which allows respondents to accept or reject a proposed 'price' to an open-ended format which gives complete freedom to the respondent to decide on their WTP. An alternative is to allow respondents to pick and choose, either through a payment card or scale (range) or a bidding game, where repeated bids are presented. Answers to WTP questions have been found to be highly dependent on the question format used [156] [179] [206] [207] [208] [209].

The closed-ended approach (often called dichotomous choice) was recommended by the NOAA panel as it closely mimics actual market behaviour where consumers are faced with a 'take-it-or-leave-it' decision with regards to a given price [188]. Generally people vote on policies with tax implications (higher or lower), and therefore the vote (yes or no) matches this political reality [210]. It has also been promoted due to ease of comprehension for the respondent. The closed-ended approach is also recognised to be costly in terms of sample size requirements [192]. It has been found to inflate mean WTP values, deriving consistently higher values relative to the payment card and open-ended approaches, due to 'yea-saying' (respondents wishing to please the interviewer and to register a positive 'vote' even if they would not pay the full amount) [159] [211].

The use of the double or multiple-bounded approach provides more data points and therefore reduces sample size requirements [159]. The last follow-up question can be either closed or open-ended. The multiple-bounded approach is also referred to as the bidding game which continues bidding up or down until the number of pre-decided iterations has been reached [212]. This approach has been frequently used in the studies in low income settings (Appendix 1), as it mimics to some extent the price-taking behaviour in these countries. A variation on the bidding game, developed by Onwujekwe for use in Nigeria, was the structured haggling technique to estimate WTP for re-treatment of mosquito bed-nets [179] [213]. The limitation of all these approaches is the risk of

starting point bias (that the maximum WTP is influenced by the first bid [214]) although this was not found to be a problem in the studies by Onwujekwe in Nigeria (e.g. [215]).

The payment card or scale have been the most frequently used question formats by health economists [159] [216] and have been found to achieve higher response rates than other question formats [206]. In addition there is evidence of greater validity [209]. This approach allows for a range of uncertainty in valuations by presenting respondents with a range of values and allowing them to choose the one which matches most closely their own reservation WTP. The payment card method also requires smaller sample sizes. This approach was found to be inappropriate in rural Burkina Faso, where illiteracy rates were high [15]. However, the payment card method has been validated as a method that can be used over the phone [216]. Its main limitation is the potential for range bias, where the selection of numbers presented to the respondent on the payment card influences the amount they are willing to pay [217] [218] and it is recommended that chosen ranges be determined and tested qualitatively before hand [216].

In the institutional context of most Western countries, the open-ended format has come under criticism for being unrealistic as people do not have leverage over the setting of taxes [91]. Because such questions are more cognitively challenging, there is concern about non-response rates, as well as the number of zeros or very high bids [91] and that values will reflect the perceived cost of the service [61]. However, it has been argued that the open-ended question format best resembles how people donate money and is better adapted to the estimation of altruistic WTP as well as to voluntary payment mechanisms [219]. It has also been used successfully in relation to commodities that require local participation and support (akin to the donation model) [205].

Generally it is recognised that there is no 'one size fits all' solution. The nature of the context, method of financing and provision of the commodity to be valued as well as underlying 'market behaviour' should be important factors informing the choice of question format, to ensure it is culturally relevant and reflects the way the commodity is usually paid for [14]. Rather than transferring question formats across settings, it has been recommended that the chosen approach be 'indigenous' or culturally relevant to the area in which it will be used [212].

## 4.3 Method of Survey Administration

### 4.3.1 Background

Conventionally, CV surveys are administered to households by means of face-to-face, telephone or mail surveys. Face-to-face interviews are generally considered to be the gold standard as they reduce the risk of misunderstanding and increase response rates, thus reducing the risk of sample selection bias that tends to affect mail surveys [91]. However, face to face surveys are more expensive to administer and also increase the risk of yea-saying, or interviewer-bias (willingness-to-please the interviewer) [158]<sup>24</sup>. The review by Smith found that only 37% of studies conducted in-person interviews, the remainder relying on telephone interviews or mail surveys [156]. Ten of the studies using in-person interviews (10/41) were from low or middle income countries [156]. In settings characterised by high levels of illiteracy, face-to-face interviews offer the only feasible method of eliciting values, and were the method of choice in all of the studies identified in the review of studies from low income countries (Appendix 1).

A number of studies by health economists have explored the use of group deliberation to facilitate priority setting decisions (e.g. [220] [221]) and discussions of equity (e.g. [222, 223]). The use of deliberative methods as part of the CV method has also been promoted [224]. Although deliberative methods are known to influence the process of preference formation [220] and are being used increasingly in the context of value elicitation in the environmental sector, to our knowledge, deliberative methods have not yet been used by analysts as part of the CV survey in the health sector<sup>25</sup>. Some of the possible benefits of using such methods within the context of a CV survey are outlined below:

- A group approach can help to tailor the amount of information provided to the needs of each individual [224] reducing the risk of information overload or underload (leaving respondents unconvinced, and more likely to protest). By giving respondents more time to think and discuss the scenario, they have the

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<sup>24</sup> Although a recent study found that there was no significant effect of method of survey administration (face-to-face versus telephone) on resulting values [216].

<sup>25</sup> Such methods have been used to inform survey design and validation as discussed in section 4.2.1, but not yet as a method of survey administration.

opportunity to gain a richer understanding of the valuation question, thereby assisting preference construction. This is especially relevant in the context of a developing country where households may feel uncomfortable talking to outsiders. It also avoids, or gives the chance to iron out, any misunderstanding or concern within a community that may be unsure of the purpose of the survey.

- A group setting can be less formal and intimidating, reducing the risk of ‘yea-saying’, or a respondent opting for a quick escape strategy [224]. It can encourage respondent discussion and the sharing of views. Individuals are also generally less willing to express uncertainty in interviews than in group settings, as they may not want to appear undecided [178].
- The group context potentially encourages individuals to think as citizens, dealing with equity and distributional issues [225] and reflect on social values beyond the consideration of their own utility [226]<sup>26</sup>, enabling a more socially just assessment of policy change. However, this perspective is not necessarily what is required in a CV survey.
- Group-level discourse can also provide the researcher with a wealth of qualitative detail on context and overall perceptions in addition to the process of preference formation, complementing the quantitative data provided by individual surveys [224].

The main potential risks of using a group approach is the development of group norms and polarisation [178]. The risk of strategic behaviour, or collusion with the aim of free riding or reducing actual payment is another concern [228]). Another is that individuals may decide on what is perceived to be fair rather than their maximum value [229], although if values are elicited individually after the group discussion this is less likely. The main methods of group deliberation are outlined in the next sub-section.

#### **4.3.2 Main Deliberative Methods**

Group deliberation is usually carried out with more than two individuals and no more than 20 [226]. Most studies used focus groups [230] or some variant thereof (e.g. the market

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<sup>26</sup> In order to achieve equity each person needs to be fairly represented in accordance with political theory [227]. However, this presupposes ‘free and equal’ citizens, which may not reflect reality especially in systems with rigid class or caste systems.

stall technique [224]); or citizen juries [229] where small groups of representative citizens (the jury) gather to discuss an issue. In the latter, respondents listen to and question witnesses (external speakers) who are chosen to present differing viewpoints on a given policy change or intervention. Whilst citizen's juries are increasingly being used in the environmental sector as part of the CV method, this approach presents challenges in terms of the selection of witnesses and the inability to correct for errors presented by witnesses [229]. Focus groups offer a simpler method which has been more widely tested, and is likely to be of lower cost.

### **4.3.3 Application of Deliberative Methods**

There are three main ways that deliberative methods can be applied:

- 1) as a complement to individual value elicitation (usually preceding an individual CV survey), helping individuals formulate preferences and values;
- 2) as a means of discussing values derived from surveys and deciding what is best for society, putting them in the role of the social decision-maker; or
- 3) as a substitute to individual surveys.

Most frequently, deliberative methods have been used to explore values and perceptions as a **complement** to individual interviews prior to individual value elicitation and to explore the group processes around decision making [178] [226]. For example, one study combined the citizens' jury method with the CV approach, referred to as a 'valuation workshop' [231]. In this case, individuals began by completing a CV questionnaire and then, in groups of four to seven, discussed good and bad aspects of the programme. At the end of the discussion all participants were again asked to complete a WTP survey. The discussion resulted in two of the original 'don't know' respondents being able to give a value; and 14% of respondents increasing their bids. However, there was no statistical difference between the mean WTP before and after the discussion.

Another study compared the group versus individual approach of personal interviews to elicit values placed on goose conservation in Scotland [224]. Here, individuals met twice after a one week break. During the first meeting they were presented with a detailed explanation of the contingent market and payment vehicle. They were given the chance to discuss and ask questions. At the end of the first meeting they confidentially (in a sealed

envelope) gave their value. In the second meeting they were again allowed to ask questions and then again gave their individual WTP value. The WTP values derived from the interviews were three and a half times higher than the estimates derived from the group setting. As the regression model for the second series of group values showed greater validity and offered the best fit for the data, the authors suggested that the group values were closer to the real values held by individuals [224].

One of the advantages of the deliberative approach is that it tends to give individuals more time to think. One study considered the effect of giving respondents 'time to think' before eliciting values in relation to improved water services [228]. A first group were asked their values immediately, a second group were given a day to think and discuss with others in the community before answering. 'Considered' values were found to be significantly less than 'unconsidered' values. The authors suggest that the additional time to think may serve to carry out a more complete assessment of household resources or come up with a collective community decision of what is seen to be a just or acceptable price. In another study by Swallow and Woudyalew [205] of tsetse control for cattle, the authors presented CV scenario information through a slide presentation attended by between 100 and 150 people prior to eliciting individual WTP values. However, the effect of giving respondents more time to think was not explicitly tested for in the study.

Overall, the rationale for using both individual and group approaches together is that they provide different types of information. Groups allow for the discussion of information that individuals may have initially had in common [232]. Interviews also facilitate better the elicitation of controversial information [178]. Groups can be seen as a complement to individual interviews, providing insight into the psychological and qualitative processes underlying preference formation and perceptions about a programme, alongside the quantitative valuations provided by interviews.

Deliberation methods have also been proposed as an **alternative** to the aggregation of individual values. The aim then would be to elicit values reached through 'consensus-

based judgements' [226], p 432<sup>27</sup>, similar to the approach to eliciting social preferences described in Dolan (2003) [234]. An estimate of social value or social willingness-to-pay would then be derived [229] [235] rendering judgement about how society's resources should be spent based on the group's willingness to have society pay [236], with individuals being placed in the role of the social decision-maker. The resulting value is likely to be affected by 'payment-related altruism' or what is perceived as fair [229], p32. However, the general consensus is that values elicited in this way are not appropriate for inclusion in CBA and should not be interpreted in consumer surplus terms [225]. Rather they can be used to address distributional issues usually overlooked from a welfarist perspective.

The approach used therefore depends on the objective of the study. A complementary approach lends itself better to the conventional use of the CV method for CBA whilst the supplementary approach elicits social values which may be useful for addressing issues of equity (although some of these issues may also become apparent within the complementary approach).

#### **4.3.4 Whose Values to Elicit?**

There is an ongoing debate within the WTP literature as to whose values to elicit. Some have argued that it is the view of the community or general public that matters in the context of priority setting for public services [237]. This perspective can use either an insurance-based question [201] [237] or a tax contribution (community approach) [187]. The community approach is argued to be better able to elicit altruism or caring externalities as well as use values [187]. The insurance approach has links to option value and requires some specification of the future risk of needing treatment in addition to the risk associated with outcomes from treatment thereby possibly complicating the cognitive task of the respondent [201] [238]. An experimental study in Denmark found that for positive values, there was no significant difference between community or insurance approaches to questions, although the community approach yielded fewer zero values [238]. Ultimately, it is argued that the choice between insurance and tax should reflect the way in which a programme is funded.

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<sup>27</sup> In the absence of consensus, Wilson & Howarth suggest, quoting van Mill [233], that voting according to majority rule would be necessary [226].

Despite the benefits of the perspective of the general population, a number of arguments can also be made in favour of interviewing users (the *ex-post* perspective). These include the greater risk of miscomprehension if respondents are not familiar with the commodity in question [166]. Indeed, the general public are unlikely to have a good understanding of the intervention to be valued if they have not directly experienced it, especially in the case of complex participatory community-based interventions [239]. In addition, the danger of inducing cognitive overload arises if too much detail is provided within the contingent valuation scenario [156]. This argument has been disputed on the basis that the nature of the market means that people make such trade-offs all the time when purchasing consumer goods [158]. However, the consideration of probabilities and the more abstract nature of the hypothetical CV market are likely to make the task more difficult [156].

Another argument put forward against the *ex-ante* approach is that when interviewing non-users, their valuation is likely to be confounded by their perceived need for a commodity and, therefore, essentially what is being elicited is 'option value' [156], p616. By interviewing users the 'need' variable is neutralised, as all users need care and the values derived are only a function of the outcomes and their likelihood of occurrence [156].

The elicitation of values from users of a programme is consistent with the community development approach to health promotion, giving communities responsibility for programme evaluation. This recognises their comparative advantage in identifying and valuing the dynamic process that is community development (see for example [77]). However, this approach carries the risk that respondents will value their own personal experience rather than the scenario presented to them [156]. They may place a higher value on the programme than would a typical citizen because they are directly benefiting from it and it is in their interest to do so [234].

An alternative is to interview both users and members of the general population. This approach has been infrequently used in the health sector, but the rationale would be to explore both use and non-use values including option value and potentially altruism.

The review by Smith found that most studies interviewed users (in 69/111 studies) with 19 studies interviewing the general population and two studies interviewing both users and the general population [156]. This stands in contrast to the studies carried out in low income countries where questions have generally been addressed to the general population (Appendix 1).

## **4.4 Data Analysis**

### **4.4.1 Reliability and Validity**

#### *4.4.1.1 Reliability*

Reliability refers to the extent to which researchers obtain the same results on repeated trials of the same phenomenon [240]. The most common form of reliability test is the test-retest approach which administers the same test to the same people after a period of time (usually between three to four weeks [241]) with a correlation coefficient measuring the extent to which responses stay consistent between first and second survey [192]. In the review by Sach et al. [157] only seven studies out of 202 were found to comprehensively assess reliability. The findings from test-retest reliability assessments have been mixed. In one study, WTP was higher at retest and correlation coefficients were moderate for both tests [240]. In another study the reverse was the case [241]. A possible explanation put forward is that the change in seasonal availability of household food stocks affects household resources and therefore discretionary income levels for WTP. The choice of time interval therefore seems to be critical to ensure there are no income effects, especially in settings characterised by seasonal variation in cash availability.

#### *4.4.1.2 Validity*

Validity of measurement relates to the extent to which a tool measures what it is intended to measure [154]. The key issue is the extent to which individuals' responses are consistent with their behaviour in real market situations. There are three different

measures of validity of WTP which have received attention in the health economics literature.

Content validity refers to the extent to which a scenario reflects the good to be valued and elicits appropriate responses [91] [156]. In contrast to issues of construct validity (the degree of association of willingness-to-pay values with variables such as socio-economic status), and criterion or convergent validity (comparing hypothetical and actual willingness-to-pay [142]), content validity has been paid relatively little attention in the CV literature [242] [243]. Methods for addressing content validity were described in section 4.2.1.

Few studies have assessed criterion validity given the difficulty of providing real market situations for many non-marketable commodities. One study in Nigeria was able to assess criterion validity of WTP for insecticide treated bed nets and found a higher level of positive predictive validity between stated and actual payments for the bidding game and structured haggling question formats than the dichotomous choice with follow-up [179].

More frequent are tests of convergent validity which compare hypothetical estimates with actual estimates from revealed preference (RP) data. A review by Carson found that CV methods gave lower values than RP methods [244], which was counter to expectations, as CV methods can incorporate non-use values in addition to use values. In the health sector, the opposite appears to be true with revealed preference estimates being significantly less than stated preference methods [142] [245].

Studies are less likely to achieve convergent validity in the presence of biases such as yeah-saying (strategic or interviewer bias), range and starting point bias [91].

Whilst content and criterion validity testing has been quite limited, tests of construct validity have been frequently conducted. The review by Diener et al. [153] found that some form of construct validation tests, particularly associations between WTP and income, were carried out in 21 studies (50%). One method of assessing construct validity that has been less explored in the health sector is the extent to which WTP discriminates

between different sizes and ranges of the benefits associated with goods [246]<sup>28</sup>. Some studies have found that increasing the scale (or level) of benefits impacts on WTP in the expected direction [247], more so than for the time-trade-off [248]. However, other studies have demonstrated the opposite [238].

The main method of assessing construct validity is by checking that income and other socio-economic variables conform to prior expectations in terms of their relationship to WTP. Income is the strongest predictor variable against which WTP is almost systematically compared. However, one of the issues in low income country settings, is how best to measure income in subsistence and informal economies. Collecting income or total expenditure data can be problematic and prone to measurement error or misreporting as well as being time consuming to collect. Thus, the use of asset indices as a proxy for income has become common practice in these settings [249] [250].

Many studies carried out in low income settings indicated the difficulty of estimating household income and instead used such proxies for income measurement (Appendix 1). Household asset indices developed by principal component analysis were used in a number of studies, including [185] [251] [252]. In others, a series of assets were entered into the regression model but were not compiled into an index (e.g. [253] [254]). Household expenditure or consumption was used in other studies (e.g. [255] [256] [257]). A number of studies used a combination of proxies including a series of assets and expenditure on food [258] [14] [259], or school fees [212].

The positive association between income and WTP is most often taken as an indicator of the theoretical validity of the values derived. However, this presupposes the normality of the good being valued. It has been suggested that the responsiveness of WTP to income depends upon the responsiveness of quantity demanded to income and the elasticity of substitution [199] [228]. A number of studies found that there was no significant income effect [256] [185] [252] [260]<sup>29</sup>. One of the reasons put forward as to why this might happen is the lack of variation in the income measure between households [252]. Another

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<sup>28</sup> Furthermore, it has been suggested, based on the findings of two studies, that sensitivity to scale decreased as the size of benefit increased which is explained as being due to the increasing relevance of the value of the good in relation to the budget constraint [246].

<sup>29</sup> In this study [260], the effect was only found in the higher income group.

study found an income effect for males but not females [261]. The nature of the income measure used is another possible cause, with one study reporting a lack of significant effect when using expenditure on schooling as an income proxy but a marginally significant effect when using assets [212]. Another study found, however, that an index which included assets and food consumption had a significant positive association with WTP [262]. Similar findings were reported in the environmental sector [167] [263]<sup>30</sup>. The impact of alternative wealth measures on the assessment of construct validity is clearly an important area for further research, although not one addressed by this thesis.

The review by Sach et al. found that of 202 studies reviewed only 20 comprehensively assessed validity [157]. This suggests it continues to represent a fairly under-addressed issue in CV studies.

#### *4.4.1.3 Econometric Techniques*

Econometric analyses are used to assess construct validity of WTP estimates and also to quantify the marginal effect of programme attributes on WTP. The choice of econometric model is largely dependent upon the question format used to elicit willingness-to-pay values and underlying theoretical considerations. With continuous data derived from an open-ended question format or the bidding game with open-ended follow-up, the ordinary least squares (OLS) multiple regression has been frequently used by researchers. This classical linear regression model is based on the assumption that:

$$\text{WTP}_i = \sum \beta_i x_i$$

Where WTP is a linear function of independent variables  $x$ , for each observation  $i$ .

However, this approach does not account for the qualitative difference between those giving zero compared to positive responses [264]. The estimation of parameters assumes a continuous distribution of WTP, whereas negative values are usually constrained to a lower limit of zero. Failure to take this into consideration can lead to bias and inconsistency in the estimates obtained [265]. On the other hand, ignoring (zero) values

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<sup>30</sup> This second study by Johnson & Baltodano [263] used annual coffee production as a proxy for income.

means throwing information away. If zero responses are genuine then the Tobit model is more appropriate and takes account of the censored nature of the data [264]. The regression model is then formulated as:

$$\begin{array}{l} \text{WTP}_i = \Sigma \beta_i x_i \text{ if } \text{WTP} > 0 \\ \text{WTP} = 0, \text{ otherwise} \end{array}$$

The resulting error term has a censored normal distribution. Using the Tobit model, the coefficients have to be adjusted so that they can be interpreted in the same way as OLS coefficients.

If many of the zeros responses are due to protest bids or reporting errors then a Heckman sample selection model can be used under the assumption that the error term has a bivariate normal distribution [14] [264]. This approach would first model the choice of being willing to pay a positive amount and, second, model the reasons for being willing to pay. According to Kennedy, however, the Heckman method does not perform well when the amount of censoring is small [266]. In the latter case, there will be limited correlation between errors of the regression and selection equations but high collinearity between the variables in each equation [14].

In some cases CV data may be of a hierarchical nature, for example if individuals are clustered within higher level groups, for example households, schools or communities and these contextual factors are expected to influence values in addition to individual effects. If this clustering is real it can invalidate the assumption of independence leading to inefficiency in the resulting OLS estimators [151] and an underestimate of the standard errors increasing the risk of a type-I error [267]. The real sample size will be effectively less than the assumed sample size depending on the extent of dependence within groups, measured by the intra-class correlation. The problem of ignoring clustering is particularly acute in cases where the sample size within groups is large [267].

There are different ways of dealing with this type of clustering. The first is to regard it as a nuisance and to control for it. In such cases the robust standard error, cluster option, can be used to adjust standard errors [268]. However, this approach does not regard the

clustering to be of interest in itself and only allows inferences to be made about lower level units (individuals). Alternatively, dummies can be introduced (along with interaction terms) for each group (or higher level variable). However, the disadvantage is the resulting loss of power. Although different approaches exist<sup>31</sup>, the random effects model is the only approach which allows for the inclusion of group level variables in the regression<sup>32</sup>. However, a random effects model cannot be used if the random error term (group level) is correlated with explanatory variables from the model as this creates bias. This bias arises because the intercepts of explanatory variables are incorporated into the error term rather than made explicit through a dummy variable. So for example, in the case of the present study of willingness-to-pay, if being a member of a specific women's group were correlated with any of the explanatory variables in the model, it would not be appropriate to model it as a random effect. A Hausman test can be applied to check if the random effects estimator is unbiased and is appropriate for use [266].

Whilst increasing attention is being given to hierarchical models in the health economics literature [151] [269] [270], so far they have not been used in contingent valuation studies in the health sector. Multi-level models have been used in CV studies in the environment sector [271] and arguments advanced by some commentators for their use in the health sector [3].

For closed-ended or binary data, the logit or probit regression models can be used to estimate median WTP and to study the influence of independent variables [15].

#### *4.4.1.4 Dealing with Zeros and Protest Bids*

Protest bids, non-genuine zero bids or unrealistically high bids are usually identified through follow-up questions, and by asking respondents to give reasons for their

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<sup>31</sup> By transforming the data such that the mean value from each group is subtracted from each individual data point, OLS can then be run on the transformed data (termed a 'fixed effect' model – assessing within group variation but not between group variation). However, this approach suffers from a loss of power and the inability to accommodate explanatory variables that do not vary within groups (or group-level characteristics) [266]. A between effects model can be run which takes the averages for each group and runs the regression on these, which reduces the sample size for analysis.

<sup>32</sup> This is made possible by treating the group effect as a random effect and including it as part of the error term (deviation of the group observations from the overall intercept) along with a conventional error term marking the deviation of the individual observation from the overall intercept.

unwillingness to pay. Unrealistically high bids have been identified as those where WTP is greater than ability to pay<sup>33</sup> [272] [273]. Having distinguished the protest bids from the genuine zero bids, one option is to exclude these responses from the sample, as long as the exclusion does not bias the sample (i.e. there is no systematic characteristic associated with non-responders) [192].

## **4.5 Aggregation Methods**

In order to use WTP data in a CBA, costs should be compared with the estimated benefits to derive net benefits or a benefit-cost ratio. The estimation of total value requires: 1) a definition of the relevant population to which the results will be applied; 2) the choice of unit of aggregation; and 3) that the sample population be representative of or equal to the transfer population [274]. This section considers the methods that can in principle be used to address these points and how the literature has dealt empirically with these issues. As cost-benefit analysis has been applied more frequently outside of the health sector, studies from the environmental sector are also considered.

### **4.5.1 Definition of the Relevant Population**

The definition of the population for aggregation is dependent upon the geographical extent of the market [275]. The question of where to draw the boundaries in terms of potential programme beneficiaries becomes especially relevant in the case of interventions with large non-use values. The distance-decay approach has been put forward as a means of defining the relevant population for aggregation in relation to environmental commodities [275]. This approach suggests observing how WTP falls as distance to the good increases. Such data can be used to establish a cut off point beyond which WTP becomes zero. However, this approach has not to date been used in the health sector [159] and not all goods lend themselves to this model (for example, we in the UK can have existence values for Brazilian rainforests). An alternative boundary for benefit measurement would be the area of intervention implementation. In the case of a trial, for example, this would be the target population. If the intervention is based in a hospital: the relevant population would be that which uses or could potentially use the hospital.

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<sup>33</sup> Ability to pay is usually defined in terms of household income, although in resource poor settings, in particular, it is conceivable that individuals may want to borrow to pay for an intervention.

#### *4.5.1.1 Non-Use Values*

One of the key issues is whether non-use values should be included in the analysis. There has been much discussion in the environmental literature of how to deal with non-use values. Indeed, the CV method was first used in the early 60s to measure the total value of wilderness preservation [210]. Subsequently, the debate over the relevance of non-use values heightened when the CV method was used in legal proceedings to estimate legal payments for damage to natural resources [210]. This was employed in relation to the Exxon Valdez case in 1991. The inclusion of non-use values had a dramatic effect on overall liability. The NOAA panel was subsequently developed to provide guidelines to the US Chamber of Commerce of how such estimates should be derived and whether the CV method was indeed appropriate [188]. The Panel recommended that the CV method can produce reliable enough estimates including existence values. However, the inclusion of non-use values, particularly existence value, is still controversial in this sector given the difficulty of knowing where to draw boundaries in terms of beneficiaries.

The debate around non-use values, however, has been much less vocal amongst health economists. The review by Smith indicated that most studies (74%) in the health sector assessed use value only [156]. This may partly due to the nature of the commodity 'healthcare' which for many services involves less existence value (although blood transfusion services and vaccines are notable exceptions). The most relevant non-use value in the context of economics and also health care is altruism (or caring externalities), or the welfare gained from the consumption of others.

One of the challenges of measuring altruism and other non-use values is separating them from use values. Some studies have formulated the WTP question in such a way as to avoid selfish preferences entering into the equation and isolate altruistic values. For example, one study asked individuals sequentially for their WTP for an insecticide treated bed net for themselves, for other members of the household, and for the poor [219]. The authors found that whilst the altruistic values derived were construct valid, criterion validity was low to medium, with a smaller proportion being actually prepared to pay for others compared to paying for themselves. The same study also found that altruistic WTP

was lower than their willingness-to-pay for themselves. Another study estimated altruistic preferences for other people's health, or the values of curing patients other than oneself from specific health states, as well as selfish values of these health states [123]. To this extent it was an attempt to measure health-focussed altruism. The study found that mean altruistic value was lower than selfish WTP in all ill health states [123]. Severity of illness had a greater effect on altruistic value than selfish value [123]. Use values may also be higher than non-use values as they include consumption benefits [155].

An alternative approach which has been used less frequently in the health sector is to interview both users and non-users [276] [277]. In these cases the general population (non-users) were interviewed to gauge ex-ante WTP - which was found to be significantly lower than that of users in both cases. In a study of an improved rural transit system in the United States, willingness to pay was estimated by interviewing users and non-users of the existing transit system [176]. They found that users were willing to pay more than non-users. A similar approach was used to estimate the use and non-use values of Lake Kerkini in Greece [278]. User and non-user values were not significantly different in this case.

A number of other studies have inferred altruism from results without being able to separate it out from use value. For example, one study considered individual WTP for a flu vaccine for themselves compared to the social value of a public vaccination programme [279]. The study included a sentence indicating that a preventive policy would be carried out only if everybody would agree to pay for it. This aimed to minimise potential free riding and to ensure paternalistic altruism was elicited. The social value was 14% greater than the private value and the authors inferred that altruism was a significant component of the social value, even for small risk reductions. However, in this case they were dealing with a service with high externalities (i.e. a communicable disease). Therefore much of the social value could be indirect use value (people would pay for others to be vaccinated in order to reduce the risks to themselves). Another study [142] considered the value of mobile clinics for breast cancer screening for women who would not use the service. Their WTP was then put down to altruism, although this could not be tested for.

Furthermore, a number of studies were identified which considered parental WTP for their children (e.g. [280] [281] [282]). This is a special case of altruism, more likely to be pure altruism, as children from a parent's perspective can be considered as an extension of the self.

#### *4.5.1.2 Unit of Aggregation: Individual or Household?*

Analysts using the contingent valuation method usually blur the distinction between the individual and the household. It is assumed that the individual answering the survey speaks for the household as a whole, consistent with the unitary model of household behaviour [283]. There is little guidance in the literature on how to elicit values from members of the same household. This may be necessary in instances where interventions or commodities affect individuals within the household differently (externalities). For example it might occur that a husband would be negatively affected by an intervention benefiting his wife in highly patriarchal societies where benefits to women might be perceived as threatening. Whilst in theory, the benefits to one party would be offset against losses to the other, in practice this can be complicated by altruism. For example, Bergstrom examined the question of whose values should be included in CBA for a programme that improves the health of the woman in a two person (man – woman) household. Should it be the sum of each person's WTP? Or if their values differ, the maximum or minimum of the two? The answer depends upon the nature of altruism and the extent to which it is paternalistic and which budget constraints are considered by individuals (their own or that of the household) [97].

A couple of studies in the health sector have elicited the WTP of couples (be it parents or potential parents) and therefore interviewed both husbands and their wives (e.g. [33] [284] [280]). In one study, data from husbands and wives were pooled and gender was included as an explanatory variable in the OLS regression [33]. However, no adjustment was made for the hierarchical nature of the data in the regression analysis. In another study the data were analysed separately by gender [284]. Another study interviewing parents estimated household WTP as the mean between parents [280]. In each of these studies (apart from [284]) the commodity under valuation was a joint 'good' with shared benefits across husband and wife. Altruism between couples for their partner was assumed to be zero and

only selfish 'use' values were elicited. As none of these studies went on to use the data in a CBA, there was no guidance as to whose values should be included (although implicitly by pooling values, the study by Ryan [33] implied that women's and men's values should be added together). The methods used by Amin & Khondoker suggest that mean parental WTP is the appropriate measure of household WTP [280], yet the validity of this measure has not been proven empirically. Lastly, none of the studies allowed for an assessment of individual income effects or hierarchical effects from clustering at the household level.

For cases where it is deemed necessary to elicit values from couples, a number of methodological challenges therefore face CV analysts and those wishing to conduct a CBA. These have not yet been addressed or fully recognised in the health economics literature, notably the specific issue regarding the analysis of WTP data and aggregation.

#### **4.5.2 Alternative Ways of Aggregating**

A comprehensive overview of methods of aggregation and their underlying assumptions is presented in Loomis [285]. More recent reviews include that of Morrison [274] and Barton [286] and a recent publication by Brouwer & Bateman related to the health sector [287]. The following section draws collectively from these pieces.

Distinction is commonly made between value-based and function-based aggregation as shown in Table 2, which also describes the underlying assumptions and the advantages and disadvantages of each approach. In terms of the former, a simple generalisation of sample values (mean or median) to the population can be sufficient if respondents are representative of the population. Mean WTP is the conventional measure in benefit-cost analysis and reflects efficiency, or the Kaldor-Hicks potential compensation criterion [192]. However, the median is also informative in a world where decisions are based on voting and decision-makers want to choose a policy based on the majority voting rule [192]. If respondents are not representative, the mean or median can be weighted by the variables which differ between sample and population, to adjust for under or over-representation. A conservative approach of assuming zero values for non-respondents can provide a lower limit beyond which the population mean is unlikely to fall.

Function-based approaches estimate a population mean using a WTP function, relating WTP to sample characteristics, and then imputing population averages for these determinant characteristics. This can be done using either a linear regression equation (OLS) or through weighted least squares, the latter adjusting for differences between sample and population proportion for certain characteristics (e.g. age, literacy, income), and avoiding the inconsistency of estimators which would result from using OLS. However, weights can only be applied for one variable. The appropriate function may be different to that used to assess the construct validity of WTP, if site specific factors, which have little relevance in population, are strong predictors of WTP [287]. Functions which are theoretically determined may offer a better model [287].

**Table 2 Advantages and Disadvantages of Alternative Methods of Aggregation**

Methods of Aggregation	Assumptions	Advantages	Disadvantages
<b>Value-based calculation</b>			
Unadjusted sample mean	Observed sample is representative of the aggregation population	Simplicity and ease of calculation	Assumes non-respondents are no different from respondents and are willing to pay the same amount. May overestimate total WTP if this is not actually the case.
Weighted mean	Adjusts sample mean to reflect population characteristics	This approach is fairly simple. The adjusted mean more accurately reflects the population mean of the weighted variable. This approach can be applied to as many variables as necessary.	Given that preferences may be imperfectly related to socio-economic characteristics, the ability of this approach to deal with unrepresentative samples will be limited. Inconsistent results may still be produced
Non-respondents have zero value	Non-respondents have different preferences to respondents	Simple and conservative	If protesting against an aspect of the questionnaire, non-respondents are unlikely to have zero value. They could even have greater WTP than respondents.
Re-classifying non-respondents	Looks at reasons for non-response and re-classifies respondents whose WTP is reflected by the sample mean and those with a zero value.	More accurate than the above methods when non-respondents differ in some way from respondents, as trying to understand determinants of non-respondent WTP.	May not always be possible to re-classify non-respondents, or may misclassify them.
<b>Function-based calculation</b>			
OLS regression	Assumes preferences are equally determined: WTP determinants are equal and coefficients are stable between sample and aggregation populations.	Allows for differences between sample and population in multiple characteristics	<ul style="list-style-type: none"> <li>• Preferences may be imperfectly related to function variables (especially if <math>R^2</math> is low)</li> <li>• If sample proportions do not match population proportions, estimators will be inconsistent</li> <li>• The availability of primary data for explanatory variables for the wider population may be limited. In such cases it will be necessary to resort to secondary sources, with the limitation that the time frame may be different to that of the survey and the quality less reliable.</li> </ul>
Weighted least squares regression	Use of weights in regression analysis to correct for differences between sample and population for a given variable.	Adjusted mean reflects the distribution of a given variable within society more accurately and produces consistent results	As above Can only weight by one variable

Note to Table: the content of this table draws from [285] and [274]

A discussion of the treatment of equity and distributional issues when aggregating values, or the implicit social welfare function underlying any process of aggregation was addressed in Chapter 2, section 2.1.2 and is not repeated here.

#### *4.5.2.1 Application in the Health Sector*

Few studies measuring WTP go on to use these data in a CBA [180]. The review by Sach et al. [157] identified 10 cost-benefit studies using willingness-to-pay data; communication with the authors revealed an additional nine studies that had since been identified<sup>34</sup>, hence a total 19 which presented both intervention costs and WTP data. However, four studies had not estimated costs within the study [288] [185] [136] [289] [290]. Ten studies did not aggregate WTP estimates, they just considered mean and/or median WTP in relation to per capita cost (Table 3). This implicitly assumes that the sample is representative, yet only three of these studies discussed representativeness [291] [292] [293].

Only five studies aggregated WTP values to estimate total economic value. These studies all used the individual rather than the household as the unit of aggregation. Two studies did not address sample representativeness and took values from users (*ex-post*) and aggregated to the whole population [294] [295]. Two studies considered the treatment or prevention of Alzheimer's disease. The first aggregated results from the general population (without Alzheimer's disease and not caregivers) to the general population [296]. This is likely to underestimate the value to people with Alzheimer's disease and caregivers. In the second, WTP estimates from caregivers were applied to the general population, which is likely to over-estimate the value to people with no exposure or experience of Alzheimer's disease [297]. A regression-based transfer was used to aggregate WTP [297]. Only one of the five studies distinguished between use and non-use values and externalities (either positive or negative) [298]. In this study the sample was found to be representative of the general population so no adjustment was made. But it was not clear whether the sample was still representative when protests or non-responses had been eliminated. All five studies multiplied mean and/or median WTP by total national population.

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<sup>34</sup> Personal communication with Tracey Sach, May 2005.

**Table 3 Selected Cost-Benefit Analyses in the Health Sector**

Authors	Country	Intervention	Sample representative	Adjustment made to sample	Unit	Sample description	Ex-ante / ex-post perspective	Calculation	No. of beneficiaries
Wu et al. 2003 [297]	Canada	Cholinesterase treatment for patients with Alzheimer's disease	No	Estimated WTP based on sample income, income of Canadian population and elderly	Individual	Clinic-based convenience sample of 28 caregivers of dementia outpatients	Non-users (ex-ante)	Compare mean WTP with mean cost for one year. Regression-based transfer adjusting for income	Total Canadian pop. & elderly
Nocera et al. 2002 [296]	Switzerland	Programmes against Alzheimer's disease (AD)	Yes random sample, representative on age and gender	No	Individual	1,240 individuals selected by telephone book	Non-users (ex-ante), but 17% had relative with AD	Unadjusted mean & median compare to per capita cost	Total Swiss pop. > 18 yrs (not differentiate between use and non-use)
Donaldson et al. 1996 [298]	Scotland	Food irradiation	Yes	No	Individual	144 individuals	Benefits and disbenefits potential users (benefits – disbenefits)	Unadjusted mean & median	Total Scottish pop.
Kurth et al. 2004 [291]	US	Contraceptives	Yes except age and ethnicity	No (age found to be significantly related to WTP, ethnicity not controlled for)	Individuals	659 adults in Washington State	Users, future users, nonusers <sup>35</sup>	Compare actual cost with WTP of full sample	NA

<sup>35</sup> The study does not analyse WTP by use or not (State level).

Authors	Country	Intervention	Sample representative	Adjustment made to sample	Unit	Sample description	Ex-ante / ex-post perspective	Calculation	No. of beneficiaries
Carlsson et al. 2004 [292]	Sweden	On-demand and prophylaxis treatment for severe haemophilia	Yes except age due to drop-outs	No	Individuals	609 adults from Sweden as a whole	Non-users (general population) ( <i>ex-ante</i> ) include altruism but not assessed (only 253 users within country)	Compare cost per tax payer with mean WTP	NA
Johannesson et al. 1991 [299]	Sweden	Non-pharmacological treatment of hypertension	Not discussed	No	Individuals	327 patients participating in the programme	Users (ex-post)	Compare per patient cost with WTP (minus actual payment).	NA
Tarasiuk et al. 2003 [300]	Israel	Polysomnography in children with obstructive sleep apnea syndrome	Not assessed	No	Individuals	252 parents (75% mothers)	Users (ex-ante and ex-post)	Median WTP plus health system savings compared to cost per diagnosis	NA
Smith & Cunningham 2004 [293]	UK	Orthognatic treatment	Discussed	No	Individuals	88 orthodontic patients & 100 adults from general population	Users & general public	Mean WTP in patient group compared to mean resource cost of treatment	NA
Dranitsaris et al. 2004 [301]	Canada	Docetaxel for treatment of advanced ovarian cancer	Not discussed	No	Individuals	40 oncology nurses & 40 pharmacists from 9 cancer states	Ex-post user perspective	Mean benefit compared to net cycle cost per patient	NA

Authors	Country	Intervention	Sample representative	Adjustment made to sample	Unit	Sample description	Ex-ante / ex-post perspective	Calculation	No. of beneficiaries
Miller et al. 2002 [302]	UK	Occupational health (OH) services	Not discussed	No	Individuals	38 key decision-makers	Insurance perspective WTP for employee	Median WTP for OH cover per business unit compared to cost	NA
Hsu et al. 2003 [295]	Taiwan	Childhood vaccination against chickenpox	Not discussed	No	Individuals	188 varicella cases from across country	User perspective	Aggregate benefits compared with total costs	Total Taiwan population (assumed-not specified)
Onwujekwe et al. 2004 [303]	Nigeria	Combination therapy for malaria	Randomly selected – not discussed	No	Household	600 households	Non-user (ex-ante)	Compare unit price of drug (using 2 brands) to mean WTP	NA
Dong et al. 2004 [304]	Burkina Faso	Community-based health insurance	Purposive sample – not discussed	No	Household	160 households	Non-user (ex-ante)	Compare benefit package cost per household and premium	NA
Cote et al. 2003 [294]	Canada	Pharmacy-based health promotion programme	No (discussion provided)	No	Individuals	100 individuals participating in study and consenting to participate	Users and non-users before and after use	Compare user cost post exposure aggregated to potential beneficiaries	Population of Quebec.
Lindholm et al. 1994 [136]	Sweden	Community-based prevention programme for cardiovascular disease	Not discussed (although almost 10% of population were interviewed)	No	Individuals	409 residents in Norsjo, 200 received screening and 209 not	Users (screen) and non-users (no screen, although still received programme messages)	Compare WTA tax reduction with mean cost per tax payer	NA

## **4.6 Conclusions**

This chapter was concerned with the application of the CV technique in low income countries. Attention was given to the design of the CV scenario and methods of survey administration and the evidence on the validity and reliability of the technique and its use in CBA was also considered.

The contingent valuation method has been widely used in low income countries but not to date for the valuation of the social welfare effects of interventions. The use of qualitative methods is an important step in designing a locally relevant survey tool, and the use of non-monetary payment methods has been tested and validated in subsistence settings. The importance of giving respondents time to think has been emphasised particularly in low income country settings and for complex commodities. Administering the survey to a group and allowing for discussion prior to individual interviews has been used in the environmental sector but not yet in the health sector. It offers potential insight into the processes underlying people's understanding and preference formation through qualitative analyses. The CV method has been used to value non-health benefits (Chapter 3) and to elicit non-use values for interventions with externalities. Despite the increasing use of CV studies in the health economics literature, few have gone on to use their results in a CBA. Yet, if this technique is to be of value for informing resource allocation decisions, this is an important area for further research.

## **Chapter 5 Background to Case Study – Economic Evaluation of a Participatory Intervention with Women’s Groups in Rural Nepal**

### **5.1 Study Setting**

Nepal is situated in the Himalayan region of South Asia and has a population of 23 million [305]. With a per capita gross national product of US\$260 and over 40% of the population living below the poverty line [306], Nepal is one of the poorest countries of the world. Literacy rates remain low despite steady improvements, with only 35% of females currently literate [307]. Life expectancy at birth is lower than other countries in the region and estimated at 58.9 years [308]. In terms of demographic and health statistics, again Nepal stands out within the South Asian region, with a higher total fertility rate than most of its neighbors at 4.1 [309]. The infant mortality rate is high at 64 per thousand live births, which is largely accounted for by neonatal mortality (defined as deaths within the first 28 days of life) (39 per 1 000 live births) [309]. The maternal mortality ratio is the second highest in Asia after Afghanistan, most recently estimated at 539 per 100 000 live births [310].

Such high mortality rates can be partly explained by low health service coverage during pregnancy. For example, only about 45% of women receive any antenatal care and over 90% of births take place at home [310], mostly without a skilled attendant. Despite efforts to prioritise maternal and newborn health in the current national development plan [311], the expansion of the network of local health facilities has not been matched by an increase in utilisation [312]. Facilities furthermore suffer from staff absenteeism, lack of supervision, medicines and equipment and the lack of an adequate referral system [313]. This, combined with geographical and financial barriers to access in many districts as well as cultural preferences for home births, makes a substantial increase in the rate of institutional deliveries unlikely to be feasible in the short term [314].

A further barrier to accessing health care is the ongoing conflict between a Maoist guerrilla movement and government forces which has afflicted the country since early 1996. Following the establishment of a multiparty democracy in 1990, within the framework of a constitutional monarchy, the Maoist movement launched a popular uprising against the government. Their aim is to institute constitutional reform to achieve a Republic. The struggle was fuelled by disillusionment with the newly elected government which was perceived to have failed to carry out necessary reforms and deliver visible improvements to the poor [315]. The situation was aggravated by political instability in central government, with no overall majority, and twelve changes in government taking place between 1991 and 2002. It is now estimated that the Maoists have between 10,000 to 15,000 fighters across the country [316]. Many of the rural areas are completely under their control.

Following the massacre of ten members of the Royal Family in June 2001, the situation took a turn for the worse. The new King (the former King's younger brother) declared a state of emergency in November of the same year after more than 100 people were killed in four days of violence. In October 2002, he dismissed the prime minister and his cabinet for "incompetence". In June 2004, the most recently elected prime minister was reinstated and formed a four-party coalition government, which was given the task of preparing the ground for elections to be held in spring of 2005. However, the King again dissolved the government in February 2005 for not having adequately addressed the Maoist insurgency, and himself assumed power.

### **5.1.1 Makwanpur District**

Nepal is administratively divided—in descending order of size—into development regions, zones, districts, village development committees (VDC), and wards [1]. Nepal comprises 75 districts, mountain, hill and terai. [309]. The study was conducted in Makwanpur district which is a middle hill area situated to the south west of Kathmandu and has a population of 376 000 [317]. Makwanpur consists of hill and plain areas, with 15 different ethnic groups, the largest being Tamangs, a Tibeto-Burman group (46%), followed by a Brahmin and Chhetri group of Indo-Aryan origin (25%) [317]. Reflecting

the ethnic mix, Hinduism (49%) and Buddhism (48%) were the predominant religions [317]. There is a 24-bed District Hospital in the district headquarters, Hetauda, four Primary Health Care Centres and 40 Health Posts or Sub-Health Posts across the district. An estimated 500 deliveries per year take place in the hospital, which has blood transfusion facilities but cannot perform caesarean section [313]. The district is divided into 43 VDCs. A VDC is an administration area covering 60 square kilometres and approximately 7,000 population.

District statistics show that half of all households in Makwanpur district are engaged in subsistence farming, fishing or forestry, 23% engaged in salaried work or business [318]. Fifteen percent of households have neither land nor livestock. Only 62% have access to safe drinking water and 67% to toilet facilities. Sixty one percent have electricity and firewood is the predominant fuel used for cooking [318].

During the study period, Maoists were active in many of the areas outside of the district headquarters: Hetauda. Their movements were constantly changing and during the course of the study the Project Manager kept in daily contact with Maoist and local government representatives as well as project field staff to keep track of affected study areas. With the weakening of local government control and representation in the rural areas, Maoists began placing increasing demands upon international NGOs operating in the district, for example, requesting payment of additional taxes, and this influenced the work of these organisations and led to the closure of a number of them [319] [320]. However, Mother and Infant Research Activities (MIRA), the NGO responsible for implementing and evaluating the MIRA Makwanpur Trial, managed to maintain women's group activities in almost all of its study areas throughout this time. The selection of wards for the conduct of the present research was therefore guided by the security constraints that existed at the time of the research, although efforts were made to ensure the selection of a diverse set of women's groups within those constraints. However, it was not possible to value the effect of the conflict on community valuation of the programme. Further discussion of sample selection methods is provided in Chapter 6.

## **5.2 Study Background**

This study was carried out as part of an economic evaluation alongside a trial of a community-based participatory intervention with women's groups to improve birth outcomes in rural Nepal (the MIRA Makwanpur trial) [1].

The intervention was based on a model developed in Bolivia for the Warmi (a Save the Children) project, which attempted to improve maternal and neonatal health at the community level by working with women's groups [321] [322]. The approach involved community diagnosis, planning together, implementation of plans, and participatory evaluation. As a result of these groups, literacy, savings and credit programmes were set up. The study reported a reduction in the perinatal mortality rate by means of a before-after analysis. This model of participatory action groups in health care has also been applied in developed country settings e.g. Australia [323] and Wales [324].

The rationale for such community-based interventions is rooted in the philosophy of community participation developed at Alma Ata, which argues that as communities feel greater ownership of health services, they in turn will become more culturally acceptable and responsive to local needs [325]. This approach can also increase self-reliance and social awareness in order to produce better health outcomes [66] [326].

## **5.3 The MIRA Makwanpur Trial**

### **5.3.1 Trial Design**

The MIRA Makwanpur trial was implemented by a Nepalese research NGO, MIRA with technical assistance from the Institute of Child Health, London and was designed to test the impact on neonatal mortality of a participatory intervention with women's groups, based on the Warmi Bolivia model, but on a much larger scale and using a randomised and controlled design [1]. The village development committee was chosen as the cluster unit for randomisation. A closed cohort of married women of reproductive age (15–49 years inclusive on June 15, 2000) were enrolled. Twenty four VDCs were pair-matched

on the basis of ethnicity, topography and population density. One cluster was then randomly selected from each pair and the intervention introduced [1].

### **5.3.2 Intervention Activities**

#### *5.3.2.1 Facilitation of Women's Groups*

At baseline, an ethnographic study was conducted to assess the nature of maternal and neonatal illness and conventional management strategies [314]. This informed the intervention design, and was followed by the recruitment of 12 locally based female facilitators. Each facilitator worked alongside nine women's groups within a VDC. The facilitators convened monthly meetings, guiding women's group members through an iterative participatory process. The meetings were set up in co-ordination with the local Female Community Health Volunteer, an unpaid community based health worker, responsible for health promotion activities. The facilitator used a manual to run the meetings which was developed by the project. Facilitators received training in the use of the manual and in basic essential newborn care. One supervisor oversaw the work of three facilitators, providing support through monthly supervision meetings and regular visits to the community.

The women's group participatory action cycle initially involved a period of problem identification and planning together: encouraging women to explore problems in pregnancy and childbirth, share experiences and plan strategies to address these problems (see Table 4) [325].

**Table 4 Overview of the Aims of Women's Group Meetings [1], p 972**

<p><b>Introduction</b></p> <p>1 To introduce the study to the group</p> <p>2 To discuss why mothers and newborn infants die and how the intervention will work in the community</p> <p><b>Problem identification</b></p> <p>3 To ascertain how women understand maternal and neonatal problems</p> <p>4 To find out about maternal and neonatal problems in the community</p> <p>5 To understand the frequency of maternal and neonatal problems and to identify strategies to obtain information in the community</p> <p><b>Problem prioritisation</b></p> <p>6 To share information from other women in the community and to prioritise three important maternal and neonatal health problems</p> <p><b>Planning together</b></p> <p>7 To discuss possible strategies for addressing the priority problems</p> <p>8 To discuss involvement of other community members in developing strategies</p> <p>9 To discuss preparation for a meeting of community members</p> <p>10 To hold a meeting involving other community members to discuss the activities of the women's groups, the priority problems identified by the groups, and possible strategies, and reach consensus</p>
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A picture card game was later developed and used to encourage problem recognition, home care activities and referral (Figure 4). The cards are hand held and pictorial, aimed at helping to create links between maternal and newborn health problems and prevention activities to encourage participatory learning<sup>36</sup> [325]. After the cycle of the first ten meetings, strategies were introduced and subsequently the groups undertook a participatory evaluation of their work together as a group<sup>37</sup>.

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<sup>36</sup> They were developed by the MIRA team with a local artist and were extensively piloted prior to use. A manual for facilitators was also developed to accompany the cards.

<sup>37</sup> Later group members were trained to play the picture card game with pregnant women in the community who were not group members, although this took place after the end of the trial period (and hence was not included in the costing).

**Figure 1** Women's Group using Picture Cards



Picture by Joanna Morrison

A total of 111 women's groups were running during the trial period, one group per administrative area of around 800 population. Generally 8% of all married women of reproductive age and 35% of all pregnant women attended meetings [1]. There were an average of ten members per group.

### 5.3.2.2 Strategies

After a cycle of ten meetings, the groups concluded by presenting the main problems they had identified in relation to maternal and newborn health. They then discussed a range of possible strategies to deal with these problems and in response to feedback from the community reached a consensus as to which one to adopt. The main strategies developed by the groups were MCH funds, stretchers and production of clean, safe home delivery kits which were implemented by 77 women's groups [324].

Sixty nine groups chose mother and child health fund schemes (Figure 5). Women were to contribute money, between Rs 5 to Rs 20 (US \$0.07 to \$0.26) per person per month, which could be used to support the costs of transportation and consultation and hence facilitate access to formal health care. The amount was decided by the group on the basis of being affordable to all. The costs of care seeking in Nepal can be substantial and the quest for funds to pay for health care can substantially delay the care seeking process

[326]. Each group nominated a fund management committee (with at least basic literacy and numeracy skills) to collect and take care of the money. The latter received training in fund management from MIRA. Groups also decided on how to deal with defaulters and on the level of interest to be charged to those taking loans.

**Figure 2 Women's Group Collecting Money for Fund**



Picture by Thomas Kelley

Lack of transport to reach facilities is another barrier to service use, especially in hilly areas. To address this issue, 42 groups decided to raise money for stretchers (Figure 6). Contributions were obtained from group members, other community members, forestry user groups and sometimes the local government office. Some groups found and if necessary repaired existing stretchers and promoted their use. Others made their own stretchers in the form of a bamboo basket (dhoko) which is traditionally used to carry food and crops using a head strap. Others purchased stretchers. A stretcher management committee was appointed and each group decided on where the stretcher would be kept and conditions of use, including whether or not to charge a nominal fee to those borrowing the stretcher.

**Figure 3** Women's Group Members with Stretcher



Picture by Thomas Kelley

Nineteen groups made clean safe home delivery kits [324]. These kits contain a blade, a bar of soap, three cord ties, a plastic coin for cord cutting, a plastic sheet, and a set of pictorial guidelines developed in collaboration with local artists. They promote hygiene and cleanliness during home delivery and reduce the risk of maternal and neonatal infection [327], however they are not readily available in rural areas [324]. The price was decided by the group with profits being used to reproduce the next batch. Kits were distributed for example through local shops, and directly through group members.

A last approach that was used by groups to raise awareness within their communities about maternal and newborn health problems was a video show. MIRA produced a 20 minute film about newborn care in the district and group members identified households in the community with electricity and a television and showed the video in homes or public buildings [324].

#### *5.3.2.3 Health Service Strengthening*

A detailed assessment of staff and equipment availability in health facilities indicated that some health service strengthening was required to meet an increase in demand generated by women's group activities [313]. Locally-made resuscitaires, phototherapy units, warm

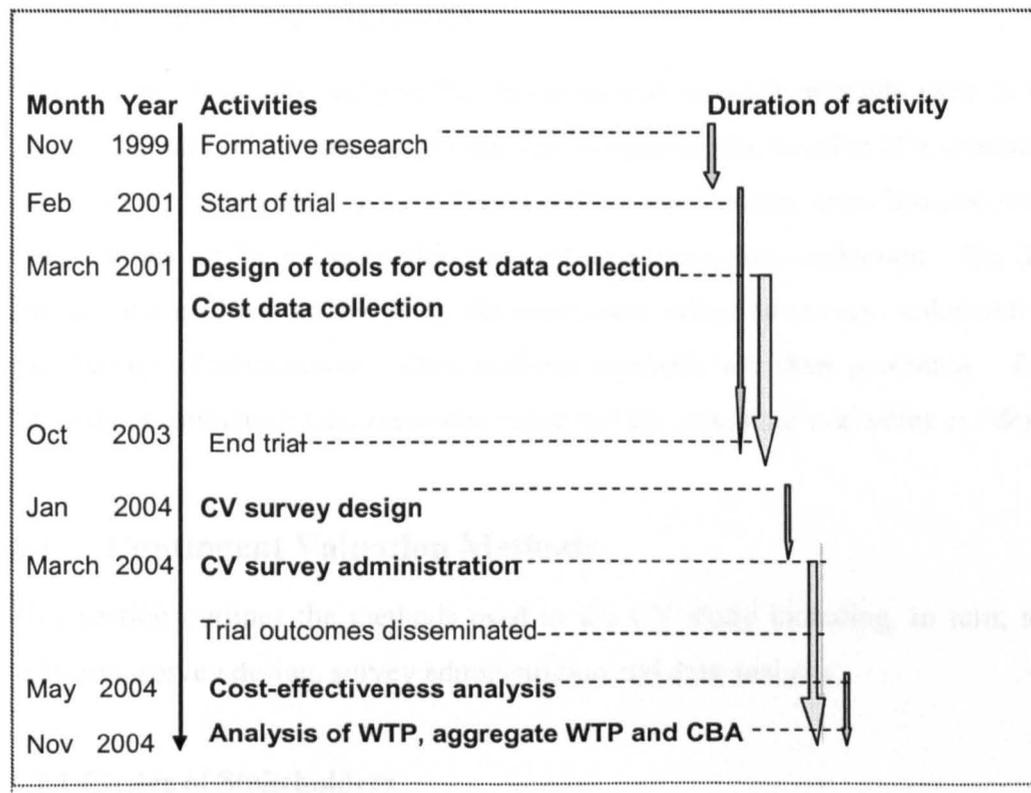
cots and neonatal resuscitation equipment were provided to the district hospital and three primary health care centres. Resuscitation equipment was provided to all health posts and sub-health posts. Community health workers received a basic newborn care kit containing a rubber bulb for suction, tube-and-mask for assisted respiration, iodine solution, gauze, two pieces of cloth to wrap infants, and a pictorial manual. Essential newborn care training was given to all government health staff. For ethical reasons health service strengthening activities were carried out in both the intervention and control areas.

### **5.3.3 Monitoring and Evaluation**

Separate to the intervention, monthly interviews were conducted with all married women of reproductive age within the study area to identify pregnancies and monitor birth outcomes [1]. The primary outcome monitored by the trial was the neonatal mortality rate (deaths in the first 28 days per 1000 livebirths). Both the intervention and these monitoring activities were implemented over a 33 month period, starting February 2001 through to October 2003.

An overview of the main activities of the study and their timing is provided in Figure 7. The economic evaluation, which includes the contingent valuation study, was carried out alongside the MIRA Makwanpur trial and is the focus of this thesis. The timing of the various of activities that comprised the economic study carried out as part of this thesis (e.g. collection of cost data, contingent valuation study, and data analyses) are outlined in bold in Figure 7.

**Figure 7 Study Outline (Economic Activities in Bold)**



This chapter has provided an overview of the study context and the intervention which is the focus of the present study. Methods of the economic evaluation are provided in the next chapter.

## **Chapter 6 Study Methods**

This chapter describes and justifies the empirical research methods used in this thesis. The overall aim of the empirical study was to measure the benefits of a community-based participatory intervention in rural Nepal and to draw lessons more broadly for how such interventions can be valued within the context of economic evaluation. The first section outlines the methods of designing the contingent valuation survey, stakeholder selection and survey administration. Data analysis methods are then presented. Finally, the methods of estimating total economic value and the economic evaluation are described.

### **6.1 Contingent Valuation Methods**

This section outlines the methods used in the CV study including, in turn, stakeholder selection, survey design, survey administration and data analysis.

#### **6.1.1 Choice of Stakeholders**

The selection of stakeholders was based on the prior belief that there would be members of the community beyond users who would be affected by the intervention through externalities (either positive or negative) and therefore have preferences for it. Table 5 provides an overview of the stakeholders selected and the prior hypotheses about their preferences. Women attending meetings were included to ascertain the use value of the intervention as well as to determine the nature of perceived benefit. Women not attending were also selected to determine non-use values in terms of potential future use, deprivation disutility or altruism (as defined in Chapter 3). Women's group meetings were carried out at the ward level - with a ward spanning a walking distance of up to two hours. Wards were divided into four sectors for the purpose of the identification of pregnant women carried out as part of the trial evaluation, and women attending meetings usually came from just one of the four sectors (that encompassing the meeting place). Therefore, it was felt that reasons for not attending meetings, and resulting perceptions of the groups would most probably differ between those living near the meeting place (defined as less than 30 minutes walking distance) and those living far away (defined as more than 30 minutes walking distance). Consequently, they were considered as two separate stakeholder groups.

Husbands and mother-in-laws<sup>38</sup> were considered for potential negative externalities. However, mother-in-laws were later dropped as it transpired during initial focus groups that many of the women's group members were mother-in-laws themselves. Therefore, they were already included as women's group members and it would have been difficult to include them as a separate stakeholder group.

The facilitators of the women's groups were also included to triangulate the data obtained from the other stakeholders and to generate background information about the group characteristics, activity level and history.

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<sup>38</sup> Married women in Nepal usually live in their mother-in-law's home.

**Table 5 Stakeholder Groups and Prior Hypotheses about Preferences**

Stakeholder group	Prior hypothesis about preferences
Women attending women's group meetings	They will value the programme <i>positively</i> because of associated learning, empowerment/self-confidence, and potential for improved health status (for self and newborn)
Their husbands	They may value the programme <i>positively</i> because of altruism, their wife/daughter-in-law are benefiting; or they may value the programme <i>negatively</i> because they feel threatened by their relatives' increased confidence and do not appreciate her/them spending time away from home.
Women not attending meetings living near to where the meeting is held	They may value the programme <i>negatively</i> or not at all as they chose not to attend or stopped attending.
Women not attending meetings living faraway from where the meeting is held	They may not know about the programme, but once it is described to them could either have altruistic feelings for those women who are benefiting and value the programme <i>positively</i> , or they could be <i>indifferent</i> to the programme, or they may feel a sense of deprivation disutility and have a <i>negative</i> value for the programme (prefer it to stop).
Husbands of non-attending women	They will either be <i>indifferent</i> to the programme or value it <i>negatively</i> , as they are not encouraging their wives to attend.
Women's group facilitators	They will provide information about the activity level and functioning of the group and help triangulate data derived from other stakeholders.

### 6.1.2 Contingent Valuation Survey Design

Qualitative methods were used to design the CV survey. These are explained in full elsewhere [329] and summarised below:

### *6.1.2.1 Objectives*

Qualitative methods for survey design were used with two objectives. The first was to find out how to communicate to those both familiar and unfamiliar with the programme what it was they were being asked to value (in terms of key attributes) and to ascertain how it was perceived by each. The second was to find a way of effectively communicating what is meant by willingness-to-pay to both respondents and field workers and to select an appropriate payment and elicitation mechanism to minimise non-response and protest bids.

### *6.1.2.2 Approach*

Given the potential for respondent shyness and fear in a face-to-face interview (the field researchers were not known to the communities), focus group discussions were adopted rather than in-depth interviews as a means of involving community members in the survey design process. Women's group members were identified by the group facilitator. People knew each other in most of the groups which were 'natural' in the sense that they formed independently of the research and consequently, their use was seen to encourage more open dialogue between participants.

### *6.1.2.3 Data Collection*

Two female field researchers were recruited to carry out the qualitative and subsequent quantitative research. The first was of Newari ethnicity and was from the capital, Kathmandu. She spoke fluent English and had an MSc in Sociology. She acted as the moderator of the focus groups, provided detailed feedback from each session and translated the transcripts from Nepali to English. The second field researcher was also of Newari ethnicity. She used to work for the NGO implementing the programme and was very familiar with the project and local communities. She did not speak English. She helped build rapport at the start of the meetings, observed and documented body language and tape recorded the sessions. The English translations were checked and if necessary corrected by the Project Manager. Both field workers received two days of training on

qualitative methods and the purpose of the research and a further two days of training on willingness-to-pay and the contingent valuation method. The author observed the first series of focus group discussions and documented body language and other environmental observations.

Wards were selected through discussion with the project team on the basis of security and geographical accessibility to ensure the safety of the field researchers. A total of eight focus group discussions were initially held and one individual interview (insufficient numbers of husbands could be located for a group discussion) (Table 6). For women attending meetings the objective was to include all, or as many as possible, women's group members from the selected ward in the discussion. A convenience sample of non-attending women were selected from within the same ward. Husbands of these two groups were also gathered for a focus group discussion where available. The resulting survey and group discussion guide were then piloted on women's group members in another ward.

#### *6.1.2.4 Focus Groups Process*

All discussions began by introductions and by welcoming the participants to the group discussion (Appendix 2). The purpose of the meeting was then outlined and the moderator explained that they would like to tape record the meeting. Sometimes the sight of the tape recorder generated curiosity and intrigue. In such cases, the moderator would explain how it worked and give a short demonstration. It was explained that data would be confidential. Respondents were then asked for their consent to participate. Those attending the discussions were provided with light refreshments.

Project staff advised us that women's group members were likely to have problems recalling all of the processes they had been through as a group, some of which had taken place up to three years prior. Therefore, they were first reminded of the activities they had been through (e.g. discussion of problems, the picture card game, their chosen strategy). Then they were asked why they attended meetings to gain insight of their understanding of 'benefits'. Women who were not attending the meetings and husbands were asked what they knew about the women's groups to gauge baseline knowledge levels. To identify

possible negative aspects of the intervention, husbands were asked how they felt about women going to the meetings and non-attending women were asked why they did not attend. Four such group discussions were held (Table 6). For those likely to be less familiar with the programme it was described both in words and using a photograph (Appendix 2). This was found to facilitate discussion but did not interfere with the process.

An additional four focus groups and one individual interview were carried out to help inform the choice of payment and elicitation methods. These took place in another ward. During these focus groups, an exercise was introduced which allocated ten stones to each participant (Appendix 2). Respondents were asked to attach a value of between 0 (no value) and ten (maximum value) for three separate services: the local traditional healer; the local school and; the women's groups. From this process the notion of 'giving something up' was introduced.

Having established a basis for discussing willingness-to-pay, group participants were briefed as to the possibility of the intervention ending. They were then asked if and how they thought the intervention could continue in the absence of government and donor support. The moderator was instructed to initially probe by asking participants if they would be willing to contribute to the salary of the facilitator. Husbands were asked whether they would prefer to pay for the intervention to continue or to be compensated for the intervention stopping in order to assess which elicitation method (WTP or WTA) was more acceptable to them.

The group discussions were also used to decide on the most appropriate method of payment. Most households in the study area were involved in the cultivation of various grains, namely corn and millet, and it was thought that this could be more manageable than money, particularly given the limited cash economy in the region. Group participants were asked which method of payment they would prefer: money, grains and/or time, and the most acceptable frequency of payment (either one-off or repeated).

The choice of question format and frequency of payment were also explored during these discussions. The open-ended question format was initially introduced. It was felt that the

study needed to establish a contribution scenario that would best mimic the actual decision process faced by participants.

**Table 6 Survey Design Process: List of Focus Groups and Participants by Ward**

Objectives/wards	Participant Numbers				
	Women's group members	Non-members nearby	Non-members faraway	Husbands attending women	Husbands not attending women
<b>Describing the intervention &amp; identifying benefits</b>					
Nibuwatar-6	4	13	17	6	-
<b>Scenario construction</b>					
Nibuwatar-1	11	6	5	1	4
<b>Pilot</b>					
Bhaise-2	9 in FGD 5 interviews				

#### 6.1.2.5 Data Analysis

Data were analysed manually and using QSR-NVIVO. A combination of thematic and content analysis was adopted to identify recurrent themes. The choice of themes was guided by the nature of information required to support the design of the CV scenario and included: description of the good (what it is or does, how it affects the community, reasons for attendance and non attendance); payment vehicle, frequency of contribution and elicitation method. The issues raised under each theme were then directly translated into questions which were included in the final survey and piloted on nine women's group members from a poorer community.

#### 6.1.2.6 Focus Group Findings and Design of the Final Survey

No disbenefits were reported by non-members and participants from all groups were positive about the intervention. The notion of being compensated (WTA) was rejected by husbands and the contribution scenario of WTP for the programme to continue was preferred. Therefore, all stakeholders were asked about their willingness to contribute towards programme continuation in the final survey.

The most frequently mentioned benefits were:

- the additional knowledge gained from the meetings
- being able to share knowledge with others
- knowing others are benefiting
- health benefits including changes in health practices and reduced mortality.

In addition, the development of community strategies, particularly the emergency loan fund, was emphasised to be of significant value to all concerned (even husbands), not only for the associated sense of financial security ('if I need a loan I can take it') but also because it provided a sense of achievement and community development.

In the final survey with those not attending groups, the interviewer first asked what respondents knew about the programme and then filled gaps in knowledge by specifying these attributes. Rather than describe the intervention to women's group members, they were prompted to discuss the processes they had been through as a group. Female non-members were asked why they did not attend the groups in order to determine whether they would be potential future users or permanent non-users.

Generally, group participants felt comfortable contributing money. Crops and other 'in kind' contributions were not supported due to the difficulty of measuring contributions of rice or corn or other grains and the need to cash in these items. The option of contributing grains was, however, retained in the final survey to allow for poorer members who may not have had money, as indicated by one woman during the survey pilot. Women living faraway struggled with the idea of contributing either money or grains therefore the option of giving up time to attend or indirectly support the meetings was piloted and proved to be more acceptable for these women.

When discussing the frequency of contribution, there was wide variation in the responses given. So it was decided to allow respondents to contribute as often as they wanted. In order to standardise the WTP values, the contribution period was set at three years<sup>39</sup> to match the duration of the women's groups intervention at the time of interview.

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<sup>39</sup> 33 months was used for the actual calculation to match the period over which costs were estimated.

The voluntary payment vehicle was defined in terms of contributing money or grains to a fund which would be used to support the facilitator's time or train a woman from the village to run meetings. This same scenario was independently proposed by participants from different focus groups. Respondents in each of the groups spontaneously discussed how much they could give without prompting from the moderator. This indicated that the open-ended question format was acceptable to participants and was used as the starting point for a bidding process. The interviewer then sought to bid respondents up from this amount until they reached their maximum.

For some, this was a source of confusion with respondents thinking the money would add to their existing (emergency loan) fund and could be used in the case of health problems. To avoid such misunderstanding in the final survey, the interviewer asked the reasons for making a contribution to identify any potential confusion and, if necessary, clarified the reason for contribution and repeated the willingness-to-pay question.

When asked why they were or were not willing to pay, respondents were talked through the following options based on the attributes presented earlier, taking care to distinguish between health and non-health outcomes:

- learning new knowledge, social gathering, increasing the confidence of women (*'non-health' outcomes*)
- to improve mother and baby health and reduce the number of mothers and/or babies dying (*health outcome*)
- both the above
- other \_\_\_\_\_ (respondent asked to specify)

Interviewers were also instructed to list any additional attributes mentioned by respondents. These were later classified as either related or not to health.

### 6.1.3. Survey Administration

#### 6.1.3.1. Sample Selection

Eleven groups (one pilot) were selected for the contingent valuation study and all their members were interviewed. Group selection was guided by security considerations, the strategy in place and level of group activity (ranked by the supervisors). The selected sample comprised groups in plain and middle hill areas and groups with different strategies (Table 7).

**Table 7 Overview of Wards selected for Survey Administration**

VDC, ward No.	Strategy	Predominant ethnic group	Proportion with no household appliances	Monthly contribution in NRs
Bhaise 2 (pilot)	Fund	Magar	46%	5
Bhaise 3	None	Magar	49%	0
Bhaise 4	Fund	Tamang	57%	5
Bhimpheedi 3	Fund	Tamang	71%	5
Bhimpheedi 4	Fund	Tamang	29%	5
Daman 4	Mixed	Chhetri	19%	10
Daman 8	Stretcher/Kit	Tamang	50%	Total funds collected 70
Fakhel 9	Stretcher	Newar	48%	Total funds collected 10
Nibuwatar 5	Fund	Tamang	38%	5
Nibuwatar 7	Fund	Tamang	48%	10
Nibuwatar 8	Fund	Magar	29%	10

A similar number of females currently not attending meetings were selected at random from the administrative areas encompassing four of the eleven groups (Table 8). Selection was stratified in terms of distance from the group with the same number of women living nearby and faraway being interviewed. Interviews were conducted in the respondent's home. Husbands of both women's group members and non-members who were available at the time of interview were also interviewed.

**Table 8 Survey Administration – Number of Participants by Ward**

Final survey	Focus Group	Individual Interviews			
	Participants	Women's group members	Female non-members nearby	Female non-members faraway	Husbands
Bhaise-2	9	5			
Bhaise-3	10	8			
Bhaise-4	11	11	8	10	11
Bhimphedi-3	7	7			
Bhimphedi-4	10	10			
Daman-4	15	13	11	12	14
Daman-8	8	6	5	7	4
Fakhel-9	15	9	8	9	4
Nibuwatar-5	8	7			
Nibuwatar-7	9	7			
Nibuwatar-8	11	10			

### 6.1.3.2. Structure of the Questionnaire

#### Group-Based Discussion

For women's group members, the CV scenario was first presented to the group as a whole to ensure a common understanding and to give the opportunity for discussion and questions. The question guide was fairly structured to ensure that the key points were covered, although the order in which topics were covered and the way in which questions were formulated varied from group to group, depending on the extent of their participation in the discussion and their experiences as a group (Appendix 3). Due to constraints in time and resources these discussions were not carried out for non-members (female or male).

In-depth interviews were conducted with each women's group facilitator in order to obtain additional insights into the functioning of the groups and to triangulate the data obtained

from the other stakeholder groups (Appendix 3). This was done after a number of contacts had been made so that rapport had been established.

The process of data collection followed the same format as the survey design process (in terms of tape-recording, consent etc.).

### Structured Interviews

Structured interviews were then conducted with women's group members the day after the group discussion. They were also conducted with non-users (both females and males) (Appendix 3).

A list of variables with potential relationship with WTP were collected from two sources. The primary source was the CV survey. However, in order to minimise the interview duration and avoid repeat questioning of respondents, where available, this was complemented by information obtained from the monitoring and evaluation database of the MIRA programme. Respondents could be linked to project databases according to a unique identifying number which was used for the purpose of the monitoring and evaluation of births and deaths in the study area. The main sources of data included:

- A baseline census of demographic and socioeconomic indicators carried out by a team of local enumerators from September, 1999, to November, 2000, conducted in all households (defined as a group of individuals sharing one kitchen) of each of the 24 village development committees [330]. Information on household livestock, land ownership and certain assets were derived from this dataset.
- For women who had given birth in the last two years as of the year 2000, information on care seeking patterns for the previous pregnancy and total number of children as well as incidence of unfortunate outcomes including miscarriage, stillbirth and/or neonatal death were compiled from a retrospective survey of married women of reproductive age.
- Women from the trial cohort who became pregnant (defined as absence of menstruation for 3 months) during the trial period were also interviewed at one month postpartum and information about practices during this pregnancy were obtained during the interview.

A description of the variables on which data were collected are described below. These can be grouped into four categories defining respectively: wealth status; socio-demographic status, maternal health history and level of involvement in/experience of women's groups. Individually, these can be further classified as strong predictors of willingness-to-pay and weak predictors. Strong predictors include those variables with a well established theoretical link to demand for health care, and weak predictors are those variables for which there is less robust evidence to determine the direction and extent of influence. A list of variables and rationale for their collection is provided in Table 9 below. A summary of evidence for those variables for which it is available are provided below. Those variables obtained from the project data sources are indicated by an asterisk (Table 9).

**Table 9 Variables with Hypothesised Relationship to Willingness-to-Pay**

Variable	Specification	A priori expectations with regards to association with WTP
LITERATE	1=literate 0=illiterate	By facilitating understanding of health messages, literacy will increase the capacity to benefit from women's groups, and therefore is positively associated with WTP.
ASSET	An asset score which ranks more highly those households with more assets, this is a continuous variable with values ranging from -4.87 to 5.70. (see Appendix 4)	Respondents with a higher asset score will be willing to pay more than respondents with a lower asset score.
AGE	Continuous years of age	Unclear relationship with WTP. Potential peak at key reproductive years.
PROF	1=Professional (lowest) caste 0=other ethnicity	Negative association between WTP and professional caste. Unclear relationship for other ethnic groups.
NEWARI	1=Newari ethnic group 0=other ethnicity	
INDO	1=Indo-Aryan ethnic group 0=other ethnicity	
TIBETO	1=Tibeto-Burman ethnic group (reference case) 0=other ethnicity	

Variable	Specification	A priori expectations with regards to association with WTP
RISKHIGH	A subjective assessment of risk measured on a three point scale: many mothers and babies are at risk; moderate; few – none	Those with higher perceived risk will be willing to pay more.
COMPLIC	Whether or not had previous negative birth outcomes, either stillbirth or miscarriage or neonatal death	Those with previous negative birth outcome will be willing to pay more due to greater perceived risk.
CONTRACE*	1= had permanent contraception 0 = either temporary or no contraception	Negative association with WTP for those with permanent contraception
INTERVIEW	1 = interviewer 1 0 = interviewer 2 (reference case)	No relationship with WTP. This variable was included to check for interviewer bias. Interviewer 1 was from Kathmandu and educated to Masters level. Interviewer 2 was local to the area and educated to age 16.
GROUP	1= attend at least one women's community group (in addition to/ other than MIRA group) 0=not attend any community groups	Those who attend other community groups may be willing to pay more than those who are not.
MEETMONT**	Continuous measure of the number of meetings attended. Information was collected from the project registers at the time of interview. As interviews took place at different time periods we adjusted the estimate to a per month figure.	Those attending more meetings value the intervention more and will be willing to pay more.
ROLEGP	Dichotomous variable for women's group members indicating whether they have a role in the group, i.e. whether they received training to play the picture card game and/or manage the strategy.	Those with a role in the group will be more engaged in group activities and aware of benefits and therefore willing to pay more.
ROLEFORM	Dichotomous variable indicating whether or not respondent is a TBA or an FCHV.	Unclear relationship

Variable	Specification	A priori expectations with regards to association with WTP
ANCVISI*	Continuous variable of the number of antenatal check-ups during the last pregnancy	Unclear relationship. Those with more ANC check-ups in previous pregnancy may be willing to pay more (as they attach a greater value to health), or they may be willing to pay less (they already have access to health care and women's groups have less added value).
LOGMED*	Continuous measure (in logs) of total household expenditure on health during the previous year.	Those who spent more are more likely to recognise the benefits of preventive care and be willing to pay more, or represent greater access to care and will be willing to pay less.
KIT*	Whether or not used clean safe home delivery kit during last delivery (1=yes; 0=no)	Those who used a kit will be willing to pay more as have greater awareness about potential risks during childbirth.
KNOWLEDGE	A five point scale of knowledge in relation to different components of the groups. These were given equal weighting and aggregated to give a maximum score out of 5.	Those who knew more about the groups would be willing to pay more.
HTOTAL	Number of people living in the same house.	Individuals from larger household will be willing to pay more as they have greater access to cash.

\*Variables derived from the project data sources.

\*\* This information was collected from the meeting registers of respective groups.

### *Literacy*

Strong evidence exists of the relationship between education and good health (e.g. [331] [332] [333]) as well as the use of curative health services (e.g. [334] [335] [336] [337] [338]). Data from the MIRA programme suggest that women were more likely to attend if they had some education although not if they were highly educated [339]. By facilitating understanding of health messages, literacy and language skills also increase the capacity to benefit from women's groups [340]. The same authors found that literacy skills have a predominant effect over attendance at school for influencing ability to tell a coherent story

about illness. Only one study was identified where maternal education was not found to be a positive predictor of care seeking [341] (as there was a correlation with employment and opportunity cost of time). Hence, overall, this is believed to constitute a strong predictor of willingness-to-pay and the benefits derived from women's groups. In the survey, women were asked whether or not they had any formal education (at least 2 years or more), if yes, they were considered to be literate, if not, they were considered to be illiterate. The total number of years of formal education was also elicited where relevant.

### *Wealth Status*

The relationship between income and demand for health services is well established in traditional demand models as well as those applied to low income countries and maternal and child health care utilisation (e.g. [342]). For normal goods, a positive relationship is expected, for inferior goods, a negative or no relationship. In most cases a positive relationship has been reported with some exceptions (e.g. [252] [256] [343]). Income was considered to be a strong predictor of WTP. The approach used to measure wealth in this study was based on ownership of assets and housing construction materials. A detailed description of how the asset index was developed and tested for reliability and internal consistency is presented in Appendix 4. Most of the assets included in the index were obtained from the CV survey. However, a small number were derived from the project database. The initial plan was to collect data on monthly household income to validate the index, however, this proved difficult and was discontinued half way into the study. Total medical expenditure in the past year was used instead as a means of validating the index (Appendix 4). A correlation coefficient of more than 0.20 was chosen as a reasonable correlation.

### *Age*

Those interviewed were married women of reproductive age and it is expected that all else being equal younger women would be willing to pay more as they are more likely to benefit from the intervention in terms of health outcomes as they have potentially a greater number of future pregnancies. However, in the context of this intervention, given the age-based social ordering within Nepal, older women also tend to take on a greater leadership

role within groups and may have a greater sense of ownership over the programme. Therefore the extent and direction of predictive effect was unclear.

### *Ethnicity*

Tibeto-Burman groups were found by one study in Nepal to have more antenatal care compared to others [344], although no other evidence could be found of the role of ethnicity in demand for health care in Nepal. Evidence from the MIRA programme suggests that there was no significant difference in attendance at women's groups by the largest ethnic groups, but there were some differences amongst smaller groups [339]. There are sixty different ethnic groupings within the study population [345]. For simplicity, the classification adopted by Acharya & Alpass [344] of the following four main groups were considered in this study: a) Indo-Aryan; b) Newar; c) Tibeto-Burman and d) professional castes. Ethnicity was considered to be a weak predictor of willingness-to-pay.

### *Perceived Risk*

It was hypothesised that those at greater perceived risk of maternal and newborn health problems would be willing to pay more and more likely to value health aspects of the programme. Two measures were derived to assess levels of perceived risk. The first was a subjective assessment of risk measured on a three point scale: many mothers and babies are at risk; moderate; few – none; do not know. This was derived from the CV survey. The second was experience of previous obstetric complications, ending in either stillbirth or miscarriage, or having a hospital delivery (given the small number of hospital deliveries within the area it was assumed that they involved some form of complication). These data were derived from the project database.

### *Contraceptive Status*

Information on contraceptive status was also obtained. It was expected that women who had undergone a form of permanent contraception would be less willing to pay than those who were still able to reproduce, as they would not benefit directly from the health benefits of the intervention.

### *Interviewer Effects*

In order to gauge any potential interviewer effects, each interviewer was coded and included in the analysis as a dummy variable.

### *Participation in other Groups*

There were a number of other women's groups operating in the wards where we collected data. These were run by Plan International, Gramin, Gramin Swabalamban, Women's Development Programme and, a government initiative to help alleviate poverty, Garibsanga Bishweshwor. The main focus of all these groups was to encourage saving, provision of loans and credit to women to support income generating activities, and in some cases infrastructural development work. All these groups grant credit without collateral. The groups run by Plan International sometimes offered literacy classes. A number of mixed gender agricultural and goat groups were also in operation to support rural villagers with their agricultural livelihoods. Data were gathered on the number of other community groups attended by women, the hypothesis being that women who were members of other groups would be willing to pay more. Although it was also possible that, due to the substitution effect, this effect would be reversed.

### *Experience of the Group*

In order to assess women's group members' experience of the groups data were compiled from the group registers to document the number of meetings attended by each woman. As these data were collected at two different points in time, the total number of meetings was converted to an average per month. Furthermore, data were collected from individuals during the CV survey as to their role in the group. Some women had an active role in managing the strategy (e.g. treasurer) or had received training in playing the card game. It was felt that those women who had a role would be willing to pay more than those who did not have. Other women participating in the group were traditional birth attendants (TBA) or community health volunteers (FCHV). Their preferences in regards to the groups may again be different.

### *Access to Health Services*

Two variables were used as a proxy for access to maternal health services. The first was the number of antenatal care visits in the last pregnancy. The second was the total household expenditure on health in the previous year.

### *Knowledge Levels*

In order to gauge to what extent pregnancy related issues were perceived to be important, data were obtained on whether or not a safe clean home delivery kit was used at the last delivery. These are being actively promoted by the women's group programme and it was felt that women using the kits had a better understanding of programme messages and were more motivated to apply them. This variable was derived from the project database.

In order to assess how much non-members knew about the women's groups, their knowledge levels were assessed on a five point scale in relation to different components of the groups<sup>40</sup>. These were given equal weighting and aggregated to give a score out of 5. Those who were not aware of any of these five elements had a score of zero, those aware of all of them, a score of five.

### *Household Size*

It was felt that bigger household sizes may be willing to pay more as they have greater access to cash. This was found to be the case in other low income country studies (e.g. [346]).

## **6.1.4 Data Analysis Methods –Group-Level Data**

Data were analysed manually and using QSR-NVIVO and were combined with the data from earlier focus groups. The combined set of qualitative transcripts were analysed using thematic analysis and content analysis. The coding scheme was initially guided by previous studies exploring how people respond to CV surveys (especially [164] and [169]). However, these categories were later modified and additional codes included based on what emerged as common themes within the dataset. Therefore the approach

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<sup>40</sup> These five elements are: 1) Monthly meeting of women in a given place; 2) a woman trained by MIRA runs the meetings; 3) during the meeting women discuss problems and solutions of mother and baby health; 4) they also play the picture card game; 5) they created a fund/stretchers for emergency health care.

was mixed using an existing scheme and an inductive approach (this is also the approach used by [164]). The quotes from women's group members in the group setting were matched to the interviews to enable comparison of responses within the group compared to the individual interview context. This approach was used to get insight into the reasons for non-response during interviews and to ascertain as far as possible the extent of impact of the group discussions on subsequent individual values.

### **6.1.5 Data Analysis Methods –Survey Data**

The analysis of the survey data followed a number of stages. First the data were analysed to check for sample representativeness. Then protest bids were identified and reasons for being willing to pay were classified as described below.

#### *6.1.5.1 Representativeness of the Sample*

A first step in the data analysis was to assess sample representativeness in terms of the total population in the intervention area. By making use of the project surveillance database described in a previous section, female respondent characteristics from the sample could be compared with that of the population of married women of reproductive age in the intervention area, for those variables which were available. This was largely socio-economic and demographic information. Information on attitudes and perceptions of the women's groups or the availability of substitutes (other groups), which were collected as part of the CV survey, were not available. Information for husbands was not available at the population level, and therefore such analysis for males was not possible. Furthermore it was not possible to identify women's group members from within the project database, so the population level data relate to women in general (both members and non-members, with members representing only about 8% of all women; compared to 57% in the sample). To get around this, separate comparisons were made for female non-members and the pooled sample of females (including members and non-members).

### *6.1.5.2 Protest Bids*

Numerous measures were undertaken to identify protest bids. Those who had zero willingness-to-pay or were unable to give a value were classified as protests if they were rejecting an aspect of the CV scenario or as ‘true zeros’ if they were unable to pay or were indifferent to the groups. Respondents whose willingness-to-pay exceeded their ability to pay (consumed more than 5% of their income; [272] [273]) were classified as outliers. To this end, respondents with an above average stated willingness-to-pay and a below average asset score were first identified. Their willingness-to-pay was then compared with reported individual income data, where available<sup>41</sup>.

### *6.1.5.3 Analysis of Willingness-to-Pay and Reasons for Being Willing to Pay*

Mean WTP (with 95% confidence intervals) and median WTP (with 25<sup>th</sup> and 75<sup>th</sup> percentiles) were calculated for each stakeholder group.

For those with zero or no response to the willingness to pay question, the reasons were recorded. For those who were able to provide a positive WTP value, the specific nature of the benefits that they were valuing were ascertained. Comparisons were made between women’s group members and non-members for each of the variables shown in Table 9 to identify significant differences. Statistical significance was measured by the Pearson chi square test (for binary variables), the Mann-Whitney U test and t test, for non-normal and normally distributed continuous variables, respectively. The reasons given by women not attending meetings were analysed in order to breakdown the different types of non-use value.

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<sup>41</sup> These data were only available for 57% of respondents. Where unavailable, judgement was made about the affordability of stated payment by comparison with other respondents with the same asset score.

## **6.2 Statistical Analysis**

### **6.2.1 Dealing with Missing Data**

The first step in dealing with missing values was to investigate the cause of ‘missingness’ and assess whether the full set of sample data was representative of the population of the intervention area. The representativeness of the data set used in the econometric analysis (observed data for all variables) was assessed by examining the characteristics of respondents with complete data for all variables with those of respondents with missing data in at least one or more variables.

### **6.2.2 Construct Validity**

One of the most commonly used tests of construct validity is to check that variables with a theoretical link to WTP based on conventional demand models (such as income and education) have the expected association. To test for construct validity therefore total willingness-to-pay was regressed against the variables listed in Table 9 and the signs on the coefficients as well as their significance were assessed. To adjust for non-normality in the dependent variable, two transformations were undertaken, the log and square root of willingness-to-pay. Three econometric models were then used to analyse the data: the classical OLS on positives, the Tobit model for censored (or limited) dependent variables, allowing for zero values, and a random effects model to allow for the hierarchical nature of the data. A Heckman model was to be used only if the amount of censoring was found to be significant.

The choice of random effects model was based on the need to adjust for the potential lack of independence between women attending each group. Women attending meetings were likely to share certain characteristics specific to their community, some of which made them join the group in the first place, and these may not be observed within the model. Furthermore, their valuation of the intervention was likely to be influenced by how well their own group was functioning as well as the particular attributes of their geographic area (e.g. ethnicity and topography etc.). Lastly, the focus group discussion prior to individual interviews may have influenced their individual responses. A random effects

model was used to test to what extent these group level variables were important in predicting WTP<sup>42</sup>. The robust standard error cluster option was also used in the OLS model to adjust standard errors from potential group level effects [268].

For each model, a general to specific regression specification method was used whereby explanatory variables are excluded from the equation in a stepwise manner. All variables with a hypothesised relationship with WTP were first entered into the general model. The first variable to be excluded was the one with the smallest correlation with WTP. The variable was then dropped from the model if the probability that the coefficient on that variable was zero was greater than or equal to 0.10 – as indicated by the F-statistic. The variable was re-entered if the probability associated with the F-test was less than 0.10. This procedure was carried out on all variables until none of the remaining variables satisfied entry or exit criteria (Norusis, 1990 in [10]).

A decision was required as to whether or not to pool women (group members and non-members) into a single regression or to run them separately. The pooled regression has the advantage of gaining power from an increased sample size but would not enable us to assess differences in the determinants of WTP should they exist. To test which approach offered the best fit for the data, interaction dummies were introduced for variables which were likely to have differential effects on women's group members compared to non-members. A Chow test was then carried out to assess which version, pooled or separate, was preferable in interpreting the determinants of WTP [347]. This tests the null hypothesis that the coefficients in a pooled regression model are the same as in separate sub-samples. A separate regression model for husbands was estimated to avoid the problem of possible intra household clustering. The models derived were then subject to the following diagnostic tests.

#### *6.2.2.1 Functional Misspecification*

For the OLS and Tobit regressions, the Ramsey RESET test was used to check for functional misspecification in both the general and reduced models [348]. For the random

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<sup>42</sup> Because of the need to include group level variables with little or no variation between women within groups, a random effects model was preferred to a fixed effects model.

effects model, the Breush and Pagan Lagrangian multiplier test was used to assess whether the random effects were significantly different from zero (or whether or not a random effects model should be used in place of OLS) [265]. The Hausman specification test was also conducted to check if the model was correctly specified and that the random error component was not correlated with the explanatory variables [265].

#### *6.2.2.2 Heteroscedasticity*

Analysis of plots of residuals against fitted values was used to check for heteroscedasticity, or non-constant variance in the error term in the OLS regression. The Cook Weisberg test for heteroscedasticity was also used. This test consists of regressing the squared residuals on all distinct regressors, cross-products, and squares of regressors. The test statistic, a Lagrange multiplier measure, has a Chi-squared distribution under the null hypothesis of homoscedasticity [265]. Corrections for heteroscedasticity can be carried out if present using the correction proposed by White [349].

#### *6.2.2.3 Multi-collinearity*

Vif scores were assessed to check for multicollinearity (a vif score above 10 indicating presence of multicollinearity).

#### *6.2.2.4 Normality*

The skewness and kurtosis test was used to assess normality of the residuals in the linear regression model. For the Tobit regression, the conditional moment test for normality derived by Pagan and Vella (1989) was undertaken [265]. The test statistic has a chi-squared distribution with two degrees of freedom.

### **6.3 Aggregation of Willingness-to-Pay**

Having analysed individual WTP data, the next step was to aggregate the responses across the target population and estimate total WTP. This involved two steps: defining the population for aggregation; and estimation of total economic value. The choice of social

welfare function, assumptions about equity, and methods of sensitivity analysis were considered in this process.

### **6.3.1 Population for Aggregation**

The aggregation population for the purpose of this study was defined as the population of married women of reproductive age residing in the intervention area: the twelve VDCs where the women's groups were operating. This was the area over which costs were estimated. The reason for focusing on married women of reproductive age (MWRA) was that they were most likely to benefit from the intervention. Furthermore, 96% of women of reproductive age in Nepal are married and only 12% are over the age of 49<sup>43</sup> [309].

In the intervention area 14,884 married women of reproductive age were enumerated in 14,879 households, which equates to about one married woman of reproductive age per household. Very few women's group members therefore appeared to share a household with a female non-member (of this age group). Individuals rather than households were still chosen as the unit of analysis to allow for differential preferences between females and husbands. Using trial statistics, the total number of women's group members was estimated at 1,123 (8.3% of all MWRA), the remaining 13,761 being female non-members. As all these women were by definition married, it follows that there were a total of 14,884 husbands. Amongst female non-members, 2,598 women were estimated to live near the meeting place (a quarter of the ward population minus women's group members, or 24 women per ward) and 11,163 were estimated to live far away (103 per ward).

### **6.3.2 Whose Values to Include?**

The values derived from women's group members ('use' values) were the most obvious to include in the aggregation process. However, as described in Chapter 2, there is little consensus amongst economists as to whether or not the values derived from non-users should also be aggregated and included in a CBA. Therefore, the aggregation process was conducted both with and without the values derived from female non-members.

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<sup>43</sup> In the sample, three women were aged above 49 years (49.2-52 years). Two of them had a positive WTP and one had zero WTP.

The question remained as to how to deal with husbands and whether or not their values should also be included. As described earlier in this chapter, the initial rationale for including husbands was to gauge the extent of externalities expecting that in some cases they may experience disutility from the intervention, resulting in a negative WTP. In practice, however, husbands were generally favourable in the views they expressed about the groups. However, there is potential for an overlap in the values given by husbands and their wives if they were considering the same household budget constraint. In Chapter 7, the willingness-to-pay of women is compared with that of their husbands to examine this issue, and the qualitative discussions presented in Chapter 8 were searched for evidence as to which budget was being considered when coming up with WTP values.

### **6.3.3 Estimating Aggregate Willingness-to-Pay**

In order for aggregation to be valid it was necessary to ensure that there was no non-response bias and the sample was representative of the population.

#### *6.3.3.1 Non-Response Bias*

If those who were able to give a WTP value differed significantly from those who could not, then the extrapolation of mean WTP to the target population would result in bias [285]. To test this, the reasons for non-response were first examined in order to gain insight into the preferences of non-respondents [274]. Then the characteristics of those who could give a WTP estimate were compared to those who could not, to test for significant differences and to see if non-response occurred at random. Two sets of assumptions about non-respondents were then envisaged: the first assuming non-response was random and thus non-respondents were attributed a WTP equal to the sample mean; the second, conservatively, adjusting for the potential non-randomness in non-response by attributing non-respondents with a zero WTP [274].

#### *6.3.3.2 Representativeness of the Sample Population*

The characteristics of the observed sample of females were compared with that of the target population for aggregation (married women of reproductive age) to check for significant differences ( $p < 0.05$ ) using the surveillance data. Due to the absence of

programme specific variables (e.g. membership of other groups, perceptions about the programme) at the population level, it was not possible to assess sample representativeness in these respects. It was also not possible to compare the asset index as some of these data were collected only as part of the CV survey. However, comparisons between sample and population were made using a number of possible proxy variables for wealth: total medical expenditure in the last year; food security; livestock ownership; and a three point asset score<sup>44</sup>. For males, literacy rates of the sample were compared with population level data using the DHS (2001) [309]. If the sample were found to be representative in terms of all variables which impact significantly on WTP, then a value-based (unadjusted or weighted mean or median) aggregation can be justified. If the sample were not representative in one or more of these variables, adjustments should be made to the sample mean using function-transfer, whereby we substitute the population averages into independent variables of an OLS or weighted least squares regression equation and re-estimate willingness-to-pay [274].

#### *6.3.3.3 Social Welfare Function*

A utilitarian (Benthamite) social welfare function was adopted, which aggregates willingness-to-pay across the population, treating everyone equally and assuming constant marginal utility of income [350] [39]. This provides consistency with the method of aggregating life years saved in the CEA and is the most commonly used approach for estimating economic value. No value judgements were initially made about equity weights, allowing decision makers to make a separate decision about the resultant distributive effects [274]. A 3% discount rate was used to estimate total economic value.

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<sup>44</sup> Which ranked as follows: 1) none of the assets on the list; 2) clock, radio, iron, or bicycle; 3) more costly appliances.

## **6.4 Economic Evaluation**

### **6.4.1 Measurement of Cost**

The costs associated with start-up activities and with the women's group intervention were estimated (Table 10). The methods are outlined in Borghi et al. [314] shown in Appendix 5 and are described subsequently. A provider perspective was used and included relevant costs incurred by MIRA, local government, and technical assistance provided by staff at the Institute of Child Health. The additional costs of the intervention were compared to current practice from November 1999 to October 2003. Monitoring and evaluation costs were not included. In the current analysis, the costs of health service strengthening were also not included as the focus of the willingness-to-pay study was on the women's group intervention. (although these costs were estimated and presented in the paper by Borghi et al. [314]).

Financial cost data were obtained from project accounts. Donated items were valued at current market prices to reflect their full economic value. Staff time were allocated through monthly activity records and discussions with the project team. Transport-related expenditure was allocated with vehicle log books.

Costs were classified as recurrent and capital items and discounted at 3%. Capital costs were annualised and start-up costs were treated as capital costs with an estimated length of life of ten years. Costs were also classified by project activity including: start-up, recurrent and one-off activities (Table 10). All costs are presented in 2003 prices in Nepal Rupees.

**Table 10 Project Activities for Cost Analysis**

Nature of activity	Description of inputs
<i>Start-up</i>	<ul style="list-style-type: none"> <li>Ethnographic study, training of staff, introduction to communities and design of the intervention process and manual.</li> </ul>
<i>One-off</i>	
Picture card game	<ul style="list-style-type: none"> <li>Design, piloting, printing of cards, training facilitators and design of accompanying manual (includes time of expatriate staff).</li> </ul>
Training on mother and child health fund	<ul style="list-style-type: none"> <li>Design, translation and printing of manual, training session given to facilitators (includes time of expatriate staff).</li> </ul>
Preparation and conduct of the group's participatory evaluation	<ul style="list-style-type: none"> <li>Design, translation and printing of manual, training session given to facilitators (includes time of expatriate staff).</li> </ul>
Capacity development of staff involved in the women's group intervention	<ul style="list-style-type: none"> <li>Computer skills and language training.</li> </ul>
<i>Recurrent</i>	
Facilitation of women's groups	<ul style="list-style-type: none"> <li>Time of facilitators; renting of field office; financial support given to the groups; time spent going house to house to mobilise women; support given by women's group intervention staff to health facilities.</li> </ul>
Supervision of women's groups	<ul style="list-style-type: none"> <li>Time of expatriate staff member, 1 manager of the women's group intervention, 5 supervisors, 1 local project manager and the director of MIRA supporting the intervention.</li> <li>Transport and overheads for supervision meetings.</li> </ul>
General administration	<ul style="list-style-type: none"> <li>Includes time and resources associated with all administrative staff, other than driver and vehicle.</li> </ul>

The effect of variations in uncertain parameters on total cost estimates was ascertained through a series of one-way sensitivity analyses, on the following variables:

- proportion of time spent by administrative staff supporting the intervention was varied between reasonable ranges (from 30% to between 10 and 45%);
- discount rate between 0 and 6%.

To estimate the cost of replicating the intervention elsewhere in Nepal, technical assistance costs were estimated replacing expatriate with local salaries. To assess the impact on costs of scaling-up the intervention to a larger population of 400,000 population (the average population of a district in Nepal), it was assumed, based on discussions with field supervisors, that seven facilitators could be supported by each supervisor in plain districts, 4.2 in hill districts and two in mountain districts. It was further assumed that such a scale-up would lead to a 10% increase in administration costs and a 50% reduction in neonatal mortality effects.

#### 6.4.2 Cost-Benefit Analysis

Costs were combined with benefits to estimate both net benefits (benefits minus costs) and a benefit-cost ratio (benefits divided by costs).

The impact of uncertainty in key assumptions in relation to aggregate WTP was also examined. The assumptions considered were: the method of aggregating WTP; the inclusion or not of the values of female non-members; the unit of aggregation; and the method of dealing with non-respondents. The method of valuing time was based on estimates of earnings provided by respondents, where available. However, this may have overestimated the total opportunity cost of the time individuals were willing to give up to support the programme. Therefore, time contributions were conservatively set to zero in the sensitivity analysis to gauge effects on results. The discount rate was varied between 0 and 6%. In order to assess the impact of non-health benefits on aggregate WTP, the values given by those valuing non-health benefits only were set to zero. The impact of including equity weights was also considered [43]. Based on the methods outlined by Donaldson [43] strength of preference was first estimated for each wealth group to assess whether or not this differed significantly between the poor and the least poor. Two types of distributional weights were then introduced to adjust for any potential difference in strength of preference between wealth groups: weighting by the ratio of the inverse of income (as measured by the asset index) to the mean of inverses, as in [43]<sup>45</sup>; and multiplying the values given by those in the poorest wealth group by a factor of 1.5 and 2.

To estimate the aggregate benefits at district level, were the intervention to be taken to scale, it was assumed that 130,910 MWRA live within a district, 10,866 of which are potential women's groups members, and that their preferences are adequately represented by the study sample.

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<sup>45</sup> Following the methods described in Donaldson (1999) a variable  $X_i$  was created whereby  $X_i = Y_i^{-\alpha}$  ( $\alpha > 0$ ). Distributional weights were then defined as  $X_i / X_j$  where  $X_j$  is the sample mean of  $X_i$  [43].

### **6.4.3 Cost-Effectiveness Analysis**

Life years saved were estimated by discounting local life expectancy at birth (58.3 years) by 3%. Cost-effectiveness was defined as the cost per neonatal death averted and the cost per life year saved (LYS) [314].

The effect of variations in uncertain parameters on the incremental cost per life year saved was assessed through a series of one-way sensitivity analyses. Parameters tested were:

- statistical error in the trial evidence on the number of neonatal deaths averted;
- number of deaths that could be averted in the same cohort of women during their remaining reproductive life;
- including maternal life years saved during the trial.

The sensitivity analyses are presented in detail in [314] (Appendix 5).

Overall this chapter has presented the research methods used in the thesis. The next three chapters present the study results. Chapter 7 presents the results of the CV survey. Chapter 8 presents the results of the qualitative data analysis from focus groups. Chapter 9 presents the results of the economic evaluation.

# Chapter 7 Results from the Contingent Valuation Survey

## 7.1 Introduction

This chapter presents the results of the contingent valuation survey and assesses construct validity of the stated willingness-to-pay. The first section describes the characteristics of respondents and their knowledge and perceptions about the group. The second section indicates how much respondents were willing to pay. The third section explores reasons given by respondents for not providing positive valuations. The fourth section examines the programme attributes for which respondents were willing to pay. The fifth section classifies valuations in terms of their use or non-use component. The sixth section reviews the results of different modelling approaches to assess the construct validity of willingness-to-pay. Finally, an overview and discussion of the results are provided.

## 7.2 General Descriptive Statistics

### 7.2.1 Survey Administration

The first 75% of interviews took place from 27<sup>th</sup> March to 3<sup>rd</sup> May 2004 and the remaining interviews (with women's group members only) were conducted between 9<sup>th</sup> September and 7<sup>th</sup> October 2004. In total, 196 interviews were conducted, of which 93 were with members of women's groups, 70 were with female non-members (32 living near the meeting place and 38 living faraway) and 33 were with husbands (15 husbands of women's group members and 18 of non-members). The mean duration of interview was 21 minutes (95% CI: 20-22) ranging from a minimum of 10 minutes to a maximum of an hour. Sixty three percent of interviews were conducted by interviewer 1 (MSc in Sociology), the remainder by interviewer 2<sup>46</sup>.

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<sup>46</sup> Interview patterns did not differ significantly between stakeholder groups: interviewer 1 interviewed 65% of women's group members; 64% of female non-members and 55% of husbands.

## 7.2.2 Respondent Characteristics

### 7.2.2.1 Socio-Demographic Characteristics

Literacy rates were low across all stakeholder groups but were higher amongst women attending meetings than those not attending (30% compared to 16%) and highest of all amongst men (70%) (Table 11). Males were significantly older than females at 37 compared to 31 years respectively ( $p < 0.01$ ). Women attending meetings were mainly from the dominant Tibeto-Burman ethnic group (51%) whereas a large proportion of non-attending women were from Indo-Aryan ethnic groups (41%). Women attending meetings were more likely to have used a safe delivery kit in the last pregnancy than those not attending (16% versus 7%) ( $p < 0.10$ )<sup>47</sup>. The mean asset score for women's group members was higher than non-members but not significantly so. Twenty seven percent of women's group members were in the lowest wealth tercile compared to 40% of nearby non-members and 43% of non-members from faraway. The proportion of husbands in the lowest wealth tercile was 32%.

### 7.2.2.2 Perceptions and Knowledge about the Women's Group

Women attending the meetings were significantly more likely to be a member of at least one other women's community group than non-attending women (89% versus 47%) ( $p < 0.01$ ) (Table 12). Women who were members of the MIRA groups, attended on average one of these meetings every two months for the duration of the intervention.

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<sup>47</sup> Findings confirmed by Manandhar et al. [1].

**Table 11 Socio-Demographic & Economic Characteristics of Respondents**

Variables	Measurement	Women's group members	Female non-members	Husbands	All	
	n (%)	Nearby	Faraway			
Literate***	1=yes	28 (30)	3 (9)	8 (21)	23 (70)	62 (32)
	0=no	65 (70)	29 (91)	30 (79)	10 (30)	134 (68)
	Total	93 (100)	32 (100)	38 (100)	33 (100)	196 (100)
Indo-Arayan ethnicity***	1=yes	11 (12)	11 (34)	18 (47)	13 (39)	53 (27)
	0=no	82 (88)	21 (66)	20 (53)	20 (61)	143 (73)
	Total	93 (100)	32 (100)	38 (100)	33 (100)	196 (100)
Tibeto-Burmese ethnicity***	1=yes	47 (51)	6 (19)	13 (34)	6 (18)	72 (37)
	0=no	46 (49)	26 (81)	25 (66)	27 (82)	124 (63)
	Total	93 (100)	32 (100)	38 (100)	33 (100)	196 (100)
Newari ethnicity*	1=yes	24 (26)	9 (28)	1 (3)	8 (24)	42 (21)
	0=no	69 (74)	23 (72)	37 (97)	25 (76)	154 (79)
	Total	93 (100)	32 (100)	38 (100)	33 (100)	196 (100)
Professional caste	1=yes	11 (12)	6 (19)	6 (16)	6 (18)	29 (15)
	0=no	82 (88)	26 (81)	32 (84)	27 (82)	167 (85)
	Total	93 (100)	32 (100)	38 (100)	33 (100)	196 (100)
Suffered previous complications(i)	1=yes	26 (31)	7 (24)	7 (21)	8 (26)	48 (27)
	0=no	58 (69)	22 (76)	26 (79)	23 (74)	129 (73)
	Total	84 (100)	29 (100)	33 (100)	31 (100)	177 (100)
Used safe delivery kit*(i)	1=yes	12 (16)	1 (4)	3 (9)	5 (16)	21 (12)
	0=no	65 (84)	27 (96)	30 (91)	26 (84)	148 (88)
	Total	77 (100)	28 (100)	33 (100)	31 (100)	169 (100)
Permanent contraception (i)	1=yes	11 (14)	10 (33)	5 (14)	7 (22)	33 (18)
	0=no	69 (86)	20 (67)	32 (86)	25 (78)	146 (82)
	Total	80 (100)	30 (100)	37 (100)	32 (100)	179 (100)
Interviewer	1=interviewer1	60 (65)	23 (72)	22 (58)	18 (55)	123 (63)
	0=interviewer2	33 (35)	9 (28)	16 (42)	15 (45)	73 (37)
	Total	93 (100)	32 (100)	38 (100)	33 (100)	196 (100)
Proportion in lowest wealth tercile	1=yes	19 (27)	10 (40)	15 (43)	9 (32)	53 (33)
	0=no	52 (73)	15 (60)	20 (57)	19 (68)	106 (67)
	Total	71 (100)	25 (100)	35 (100)	28 (100)	159 (100)
Asset index	n	71	25	35	28	159
	Mean	0.18	-0.26	-0.19	0.02	0.00
Age***	n	85	32	36	33	186
	Mean	31.15	32.61	29.94	36.94	32.19

Note: \*\*\*<0.01, \*\*<0.05, \* < 0.10 (associations considered between attending women and non attending women (pooled) only)

(i) For husbands, responses from wives were used for these variables.

Non-attending women living faraway lived at a significantly greater distance from the meeting place than attending women and non-attending women from nearby, which simply reflects the way they were selected (Chapter 6). Forty-one percent of non-attenders from nearby had previously attended at least one women's group meeting (a mean of six meetings and a median of three) but had since stopped attending. Thirteen percent of those living faraway had previously attended a meeting (a mean of two meetings; and a median of one) but had since discontinued. Knowledge levels for women

who had previously attended meetings were greater than other non-attenders with a mean score on the index of knowledge of 1.77 (with 0 representing no knowledge and 5 representing complete knowledge) (37% knew nothing about the meetings). Those who had never attended a meeting had much lower knowledge levels with an average score of 0.44 (81% knew nothing about the groups). Husbands of women's group members had higher knowledge levels with an average score of 1.21 (43% knew nothing about the groups). Husbands of non-members had low knowledge levels with an average score of 0.47 (74% knew nothing about the groups).

**Table 12 Perceptions and Knowledge of Women's Groups**

Variables	Measurement	Women's group members	Female non-members		Husbands	All
			Nearby	Faraway		
n (%)						
Whether member of other community group(i)	1=yes	83 (89)	14 (44)	19 (50)	17 (55)	133 (69)
	0=no	10 (11)	18 (56)	19 (50)	14 (45)	61 (31)
	Total	93 (100)	32 (100)	38 (100)	31 (100)	194 (100)
Whether ever attended a women's group meeting	1=yes	-	20 (63)	6 (16)	-	26 (37)
	0=no	-	12 (38)	32 (84)	-	44 (63)
	Total	-	32 (100)	38 (100)	-	70 (100)
Whether saw MIRA video	1=yes	-	9 (28)	5 (13)	7 (21)	21 (20)
	0=no	-	23 (72)	33 (86)	26 (79)	82 (80)
	Total	-	32 (100)	38 (100)	33 (100)	103 (100)
Average no. meetings attended/month (i)	n	88	32	38	32	190
	Mean	0.51	0.06	0.01	0.19	0.28
	Median	0.50	0.00	0.00	0.00	0.20
Knowledge Index	n	-	32	38	33	103
	Mean	-	1.72	0.34	0.85	0.93
	Median	-	1.50	0.00	0.00	0.00
Distance in mins***	n	91	24	32	23	170
	Mean	7	8	45	15	15
	Median	3	5	30	5	5

(i) For husbands, responses from wives were used for these variables.

### *7.2.2.3 Health Care Seeking Behaviour*

There was no significant difference in average total health care expenditure in the last year between women attending and women not attending meetings, mean Rs 5,376 (median Rs 2,700); and mean Rs 5,626 (median Rs 2,600) respectively ( $p=0.41$ ). Furthermore, there was no significant difference in antenatal care uptake between women's group members compared to non-members, with mean visits during the previous pregnancy at 1.36 (median 0) for women's group members (45% having at least one visit); and 1.60 mean visits (median 0.5) for non-members (50% having at least one visit).

### *7.2.2.4 Reasons for Non-Attendance*

Seventy two percent of women not attending meetings living nearby the meeting place knew about the meetings. The main reason given for not attending meetings for women living nearby the meeting place (in 46% of cases) was a barrier of some kind (either a lack of time, too many other meetings or a member of the family opposing attendance), making it unlikely for them to attend again in the future (Table 13). A couple of women (6%) suggested that they had only temporarily stopped attending meetings (they had had a child or were out of town) and may therefore re-attend in the future.

For those women living further away, not knowing about the meetings was the main reason given for not attending (66%), meaning that they could start attending in the future. The distinction between respondents who may potentially attend in the future and those who are unlikely to attend in the future becomes especially relevant in section 7.6 and Chapter 9, as a means of classifying the willingness-to-pay values given by non-attenders in terms of use and non-use values.

**Table 13 Reasons for Non-Attendance for Women**

Reasons for not attending	Predicted future attendance	Non-attenders Nearby n (%)	Non-attenders Faraway n (%)
Distance	Not attend	-	2 (5%)
Lack of time	Not attend	10 (31%)	7 (18%)
Family barrier	Not attend	5 (16%)	4 (11%)
Other meetings	Not attend	3 (9%)	-
<i>Total: Barriers</i>	<i>Not attend</i>	<i>18 (46%)</i>	<i>13 (34%)</i>
<i>Temporary pause</i>	<i>May re-attend</i>	<i>2 (6%)</i>	<i>-</i>
<i>Not relevant to me*</i>	<i>Not attend</i>	<i>2 (6%)</i>	<i>-</i>
<i>Don't know about it</i>	<i>May attend</i>	<i>9 (28%)</i>	<i>25 (66%)</i>
<i>Don't like other members</i>	<i>Not attend</i>	<i>1 (3%)</i>	<i>-</i>

\* Either not planning on having more children or just had a child, or too old (only for women with small children).

### 7.3 Description of Stated Willingness-to-Pay

#### 7.3.1. Individual Willingness-to-Pay

Overall, 153 (78%) respondents stated a positive willingness-to-pay for the women's group intervention (Table 14). The numbers stating a positive amount were highest amongst the women's group members (84%) compared to 74% of female non-members and 70% of husbands. Ten respondents (5%) were not willing to pay anything, 29 (15%) could not give a value, rejecting the CV scenario, and four responses were outliers, their willingness-to-pay was beyond their ability to pay. The latter were classified as protest bids and were not included in subsequent analysis. Full details about these respondents are provided in Appendix 6.

For those who were willing to pay, most respondents (92%) chose money in preference to grains or giving up time. Seven percent of respondents opted for giving up extra time<sup>48</sup>.

<sup>48</sup> 40% said they would give up an hour a month to support the groups, a further 40% would give two hours per month and the remaining 20% three hours per month. Using reported average daily wage rates as a proxy for the value of time, this equates to a mean total WTP of 751 RS (95% CI 500 – 1001 RS); median 723 RS (435-869 RS).

Only two women (non-members) opted for the contribution of grains. Forty-three percent of those opting for non-monetary contribution were from the lowest wealth group.

The preferred frequency of contribution was once per month (62%) followed by once per year (25%). The proportion preferring yearly contributions was significantly higher amongst non-users than women attending meetings. Those opting for a monthly contribution were willing to pay significantly more than those opting for less frequent payment.

Mean willingness-to-pay for the full sample was Rs 449, whilst the median was Rs 330. Those not attending but living nearby were willing to pay more than current women's group members, although the difference was not significant (the mean was Rs 435 (median Rs 330) versus mean Rs 392 (median Rs 275)). Husbands were willing to pay significantly more than women's group members ( $p < 0.05$ )<sup>49</sup>. For female non-members the difference was only significant at 90% level. Although the sample size was small, WTP for husbands of users was greater than that of husbands of non-users (the mean was Rs 1,236 (median Rs 1,080) versus mean Rs 465 (median Rs 360)) ( $p < 0.1$ ). Although the numbers are small, there appears to be a fair amount of both within and between group variation and mean WTP. The group-level data are shown for women's group members and non-members in Appendix 8.

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<sup>49</sup> When non-responses were coded to zero there was no longer a significant difference in mean WTP between men and women: Rs 285 (median Rs 165) for women's group members; mean Rs 314 (median Rs 165) non-members; mean Rs 382 (median Rs 275) nearby; mean Rs 257 (median Rs 151) faraway and mean Rs 524 (median Rs 220) husbands).

**Table 14 Stated Willingness-to-Pay for the Women's Group Intervention**

Variable	Women's group members	Non-members			Total
		Nearby	Faraway	Husbands	
	n (%)	n (%)	n (%)	n (%)	n (%)
% willing to pay positive amount**	78 (84%)	26 (81%)	26 (68%)	23 (70%)	153 (78%)
% WTP=0	5 (5%)	3 (10%)	1 (4%)	1 (4%)	10 (6%)
% WTP=no response including outliers	10 (11%)	3 (9%)	11 (29%)	9 (27%)	33 (17%)
<b>Currency</b>					
% willing to pay money	71 (91%)	23 (88%)	24 (92%)	23 (100%)	141 (92%)
% willing to give grains**	-	2 (8%)	-	-	2 (1%)
% willing to give time	7 (9%)	1 (4%)	2 (8%)	-	10 (7%)
<b>Frequency</b>					
Once per month	54 (69%)	18 (69%)	15 (58%)	11 (48%)	98 (64%)
Once per 3 months	9 (12%)	3 (12%)	-	3 (13%)	15 (10%)
Once per 6 months	3 (4%)	-	-	-	3 (2%)
Once per year***	12 (15%)	5 (19%)	11 (42%)	9 (39%)	37 (24%)
<b>Initial bid \$ RS</b>					
Mean WTP	310	372	331	466	348
95% CI	244-377	208-536	196-467	178-755	284-411
Median WTP	165	165	165	248	165
25 <sup>th</sup> -75 <sup>th</sup> percentile	165-330	138-495	138-435	165-550	138-435
<b>Final WTP RS</b>					
Mean WTP **	392	435	399	721	449
95% CI	308-476	270-601	236-563	360-1,081	372-527
Median WTP	275	330	289	550	330
25 <sup>th</sup> -75 <sup>th</sup> percentile	165-495	151-660	165-495	165-990	165-550
Mean log final WTP	5.68	5.76	5.68	6.14	5.83

Note: \*\*\*p<0.01, \*\*p<0.05, \* p< 0.10

\$ The effect of the bidding process on WTP values is described in detail in Appendix 7.

### 7.3.2. Household Willingness-to-Pay

A total of thirty married couples were interviewed<sup>50</sup>. Complete WTP data were available for eighteen of these couples. Within these couples, on average, men were willing to pay significantly more than women (p<0.05) (Table 15). In four cases women were willing to pay more than men (these were all female non-members). Although the numbers were too small to ascertain statistical significance, the difference between male and female WTP was greater for households of women's group members compared to non-members.

<sup>50</sup> 16 non-members and 14 current members.

**Table 15 Male and Female Willingness-to-Pay from the Same Household**

	Household of women's group members n=7 couples	Household of non- members n=11 couples	Combined n=18 couples
<b>Mean WTP in NRs (95% CI)</b>			
Males	1454 (304-2603)	398 (248-547)	808 (348-1268)
Females	479 (200-759)	318 (2-635)	381 (176-585)
Difference (Males – females)	1063 (-140-2266)	86 (-338-511)	466 (-48-990)
<b>Median WTP in NRs (25<sup>th</sup>-75<sup>th</sup>)</b>			
Males	1320 (660-1375)	330 (165-660)	605 (330-990)
Females	330 (275-550)	165 (55-435)	289 (151-495)
Difference (Males – females)	780 (300-1140)**	210 (-114-540)*	375 (120-555)**

Note: \*\*p<0.05; \*p<0.10

#### 7.4 Reasons for Zero or No Response

A total of 10 respondents (5% of the sample) said that they would not pay anything for the women's groups (they had zero willingness to pay). The main reason given was lack of money (60%) or indifference to the groups indicating a genuine zero value rather than a protest vote (Table 16)<sup>51</sup>.

<sup>51</sup> These respondents were generally from the lowest wealth tercile. Two respondents from the middle tercile claimed they were unable to pay but, given their higher wealth status, may have been free riders.

**Table 16**      **Reasons Why Respondents Were Not Willing to Pay**

Reasons why not willing to pay	WTP=0 n (%)	Unable to give WTP value n (%)	Total n (%)
Not enough money	6 (60%)	-	6 (15%)
Indifference	3 (30%)	-	3 (8%)
Too many groups	1 (10%)	-	1 (3%)
Will contribute later	-	12 (41%)	12 (31%)
Others should pay		5 (17%)	5 (13%)
Need to decide as a group		2 (7%)	2 (5%)
Need to ask budget holder		6 (21%)	6 (15%)
Not understand/ don't know the programme		3 (10%)	3 (8%)
Other		1(4%)	1 (3%)
Total	10 (100%)	29 (100%)	39 (100%)

A further 29 respondents said they did not know how much they could give. None of these respondents could easily be classified as having a genuine zero WTP, the reasons given for non-response suggested a rejection of the evaluation process itself [91]. A large proportion (41%) said they would contribute later, to enable them to assess how well the groups were working. Some of these respondents also felt the need to see if and how much others were giving. A number of respondents said they needed to consult with budget holders (generally their husbands, or brother in one case) prior to responding (21%). Seventeen percent of respondents rejected the payment scenario, saying that it would not be possible to run the women's groups in this way, or that the NGO (MIRA) should pay. However, 10% said the reason for non-response was that they did not understand the scenario. Those who fell into this category were also of the lowest wealth group with two out of three respondents being illiterate. It was therefore possible that these respondents could well have held underlying zero valuations. As mentioned in section 7.3.1, four respondents gave a willingness-to-pay value which was above their ability to pay. These respondents were classified as outliers and excluded from subsequent analyses (Appendix 6).

## 7.5 Programme Attributes for Which People Were Willing to Pay

Of those willing to pay a positive amount, 97% were able to give reasons for their willingness to pay. One-hundred and thirty respondents gave reasons which clearly reflected either health and/or non-health attributes. Fifty-five (42%) respondents valued non-health outcomes only, 21 (16%) valued health outcomes only and 54 (42%) valued both non-health and health outcomes. So non-health outcomes were valued by respondents in 84% of cases. In addition to those outcomes determined prior to the survey, another non-health outcome response included the group strategy (one respondent) and broader community development (seven respondents). Three respondents gave general reasons for valuing the programme: to support the group or future generations which could reflect health and/or process attributes. Six respondents gave reasons which justified their method of payment rather than attributes of the programme, or indicated that they may pay more in the future<sup>52</sup>.

There was no significant difference ( $p < 0.05$ ) in the wealth index, age, ethnicity, contraceptive status or education of those valuing non-health compared to health outcomes only. Those having complications in previous pregnancies were no more likely to value health outcomes than those with no previous complications. Women's group members were significantly more likely to value a broader range of outcomes, inclusive of health and non-health attributes, than female non-members: 54% versus 15% ( $p < 0.01$ ). Female non-members were more likely than members to opt for either non-health or health outcomes only (57% versus 36% for non-health outcomes only and 27% versus 10% for health outcomes only ( $p < 0.05$ )). Of husbands who were willing to pay something, 48% of said that they valued only the process of the intervention, whilst 42% valued both the process and the health outcomes.

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<sup>52</sup> Two respondents opting for a time contribution said they did not have enough money to give money; one said they would contribute more later if the programme runs smoothly; and one said they would pay what others pay; and one said that they needed to confirm with the budget holder before giving a value.

Of those valuing only non-health outcomes, mean WTP was Rs 396; median was Rs 275 (Table 17). The WTP of those valuing only health outcomes was significantly higher than those valuing only non-health outcomes ( $p < 0.05$ ). When benefits were re-estimated replacing the values of those valuing only non-health benefits with zero, the mean and median WTP fell significantly in all stakeholder groups: from mean Rs 721 to Rs 459 (median Rs 550 to Rs 124) for husbands; from mean Rs 418 to Rs 241 (median Rs 316 to Rs 0) for women not attending meetings; and from mean Rs 392 to Rs 286 (median Rs 275 to Rs 165) for women's group members.

**Table 17 Willingness-to-Pay for Health Versus Non-Health Outcomes**

Measurement	Total
<i>For health outcomes only</i>	
Number of Observations	21
Mean in Rs (95% CI)	803 (387-1,220)
Median in Rs (25 <sup>th</sup> – 75 <sup>th</sup> )	413 (275-990)
<i>For non-health outcomes only</i>	
Number of Observations	63
Mean in Rs (95% CI)	396 (304-489)
Median in Rs (25 <sup>th</sup> – 75 <sup>th</sup> )	275 (165-660)
<i>For both health &amp; non-health outcomes</i>	
Number of Observations	54
Mean in Rs (95% CI)	439 (330-549)
Median in Rs (25 <sup>th</sup> – 75 <sup>th</sup> )	330 (165-550)

## 7.6 Use versus Non-Use Values

The previous section described why people were or were not willing to pay. This section aims to unveil the motives behind values in terms of their value in 'use' (or selfish) component and their 'non-use' value. First, consideration was given to those women who were aged over 49 years or had a permanent form of contraception, who would not become pregnant and therefore would not have any direct personal health benefit from the programme. Respondents in this category who said their willingness-to-pay only reflected the health outcomes of the programme can be described as having a non-use or altruistic

value<sup>53</sup> in the sense that they could not conceivably benefit directly. Table 18 below indicates that for women's group members with no direct (personal) health benefit, 11% still valued health outcomes only, indicating that they valued health benefits to others (health-focused altruism); 67% valued both health and process aspects indicating at least some degree of altruism. This suggests that the motives for attending this type of programme were mixed: both selfish (personal benefits) and altruistic (to produce benefits for others, either other members, or by sharing knowledge gained with others).

Of non-attending women, 38% of those with no direct capacity to benefit from improved health outcomes valued health outcomes only, also indicating (health-focused) altruism. An additional 15% of these respondents valued both health and process aspects indicating at least some degree of altruism.

The numbers were too small to ascertain statistical significance, but the results suggest that a higher proportion of respondents with no direct health benefits valued the health attributes of the programme than those with direct potential health benefit (23% versus 13% respectively).

**Table 18 Benefits Derived by Capacity for Health Benefit**

<i>Stakeholder benefit</i>	No direct health benefit			Direct potential health benefit		
	<i>Nature of Process only</i>	<i>Health only</i>	<i>Both</i>	<i>Process only</i>	<i>Health only</i>	<i>Both</i>
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Users	4 (22%)	2 (11%)	12 (67%)	21 (42%)	4 (8%)	25 (50%)
Female non-users	6 (46%)	5 (38%)	2 (15%)	19 (63%)	6 (20%)	5 (17%)
Total	10 (32%)	7 (23%)	14 (45%)	40 (50%)	10 (13%)	30 (37%)

To further distinguish between use and non-use values amongst female non-members, respondents were classified according to whether or not they had previously attended a meeting; whether or not they planned to attend meetings in the future; and whether or not they knew anything about the women's groups. Table 19 illustrates the categories of value which may be associated with each situation, as described below:

<sup>53</sup> Payment for the benefits to others.

- Those who previously attended meetings and may re-attend (category 1). The values given by these respondents will potentially reflect a combination of past use, passive use (learning from others), and potential future use (option value) as well as altruism or existence values. Respondents who said the reasons they stopped attending meetings were temporary fell into this category.
- Those who previously attended meetings and are unlikely to re-attend (category 2). They have the same potential spectrum of values as category 1 except for option value. Respondents who gave a 'barrier to access' as the reason for not attending fell into this category.
- Those who may attend meetings in the future gave lack of knowledge about the meetings as the main reason for not currently attending (category 3).
- Those women living nearby the meeting place who had never attended meetings and were unlikely to attend in the future (they faced a barrier to access), but knew something about the meetings (category 4); those who know nothing about the meetings (category 5).
- Those women with no direct health benefit (with permanent contraception and/or aged over 49 years) (category 6).

Women falling into categories 5 and 6 have altruistic and/or existence values exclusively. The values given by the remaining women could reflect a combination of past or passive use, option and altruistic and/or existence values.

**Table 19 Classification of the Values of Females Not Attending Meetings**

Types of value	Direct Benefit					No direct benefit (6)
	Previously attended		Never attended			
	May re-attend (1)	Will not re-attend (2)	May attend in future (3)	Will not attend in future Knows something (4)	Knows nothing (5)	
Use Value – direct (past)	X	X				
Passive use value				X		
Option Value	X		X			
Altruism/ existence value	X	X	X	X	X	X

Respondents were classified in terms of the above based on their responses to the relevant questions. The proportion of respondents falling into each category and their mean WTP are presented in Table 20 below.

**Table 20 Distribution of Responses and Willingness-to-Pay for Female Non-Users by Category of Benefit**

Category of Benefit	Female non-users Nearby		Female non-users Faraway		Female non-users Total	
	n (%)	Mean WTP	n (%)	Mean WTP	n (%)	Mean WTP
Category 1	2 (7%)	536	-	-	2 (4%)	536
Category 2	10 (34%)	346	5 (18%)	358	15 (27%)	350
Category 3	7 (24%)	383	16 (59%)	390	23 (41%)	388
Category 4	3 (10%)	660	-	-	3 (5%)	660
Category 5	4 (14%)	323	4 (15%)	539	8 (14%)	431
Category 6	3 (10%)	710	2 (7%)	303	5 (9%)	547
Total altruism/existence value (5+6)	7 (24%)	489	6 (22%)	460	13 (23%)	476
Total (1-6)	29 (100%)	435	27 (100%)	399	56 (100%)	418

The willingness-to-pay of those non-users whose valuation fell into category 5 or 6 was mean RS 476 (median Rs 275); for partly selfish users, the mean was RS 401 (median RS 330). The difference was not statistically significant.

A husband cannot benefit from the process of attending meetings but can experience the indirect benefit of improved health for his wife and child. For husbands, 50% were willing to pay for process benefits only, indicating a significant degree of altruism and/or existence value (appreciation of benefits to their wives and/or other women in the community).

## **7.7 Construct Validity**

Having analysed the willingness-to-pay data and the factors lying behind individual valuations, this section assesses the construct validity of the WTP estimates by regressing willingness-to-pay on the variables listed in Chapter 6 with a hypothesised relationship to WTP. Due to missing data on a number of these variables, the regression was run on a reduced data set. In order to assess the validity of drawing inferences from the reduced data set, the full and reduced sample were first compared.

Three model specifications were then compared: the OLS on the full sample and on positive WTP amounts, the Tobit regression taking account of the censored nature of the dependent variable, and a random effects model to adjust coefficients and standard errors for potential within and between group variation and to test whether these effects are significant. A sample selection model was not used due to the small size of the censored variable and the apparent randomness of missing bids in relation to variables affecting WTP. In each case, to adjust for non-normality in the dependent variable, both the log WTP and the square root of WTP<sup>54</sup> were used.

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<sup>54</sup> For the Tobit model, the actual transformation used was  $\log(\text{WTP}+1)$ , so that the minimum value of the dependent variable was still zero.

### **7.7.1 Missing Data**

Seventeen survey respondents were not included in the original trial cohort<sup>55</sup> meaning that they could not be matched with the trial data sets so they were missing both individual and household level data. Three female id numbers could not be matched to surveillance data for individual women (such as main occupation and age) consequently these individual level data were missing for these women. Five women had not had a birth in the two years prior to the start of the trial and, therefore, were missing data pertaining to previous birth history, such as antenatal care use, type of delivery etc. As the probability of having such missing data depends only on whether or not the respondent had a baby in the two years prior to the trial, the data can be said to be missing at random (MAR) [351].

Ethnicity was the variable which differed most between those with missing data on at least one of the independent variables and those without. Respondents with missing data on one or more of the independent variables were less likely to be of Indo-Aryan ethnicity (13% versus 32%) and more likely to be Newari, (35% versus 17%) ( $p < 0.01$ ). Respondents with missing data were also more likely to have suffered a complication in a previous pregnancy (42% versus 24%) ( $p < 0.05$ ). If those with missing data in the dependent variable were added, these individuals were again more likely to have suffered complications in previous pregnancy (38% versus 22%) ( $p < 0.05$ ) and to have incurred more medical expenditure in the last year than those with complete data (8.41 versus 7.80) ( $p < 0.01$ ). To control for these variables they were introduced into the regression model.

### **7.7.2. Ordinary Least Squares Estimators**

This section presents the results of the OLS regression on positive WTP amounts. Given the potential differences in preferences between women's group members and female non-members, the first decision was whether or not to pool the data or to run separate regressions for each of these stakeholder groups. The choice between pooled or separate regressions was assessed by the Chow test, which tests the null hypothesis that

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<sup>55</sup> These women are therefore likely to be either older (above 44 years) or younger (less than 20 years) than the others, or to have moved to the area within the previous three years.

coefficients on all the interaction dummies, when the data are pooled, are jointly zero<sup>56</sup>. The resulting F statistic was less than the critical value of F (15, 61), 0.81, (p =0.6654) indicating that there was no structural difference in the two models and the data could be pooled.

The results from the regression are presented in Table 21. Many of the signs on the coefficients and level of effect of the explanatory variables were as predicted. However, surprisingly, the wealth score had no significant effect on WTP<sup>57</sup>. Furthermore literacy exerted a significant negative effect on WTP in both the full and reduced forms of the equation. The number of meetings attended had no significant effect on WTP, confirming the earlier finding of no significant difference in the willingness-to-pay between women's group members and non-members.

The number of antenatal check-ups in the last pregnancy exerted a significant and negative effect on WTP which, using this variable as a proxy for access to health care, suggests that those with greater access to formal health care are willing to pay less.

The interviewer effects were borderline significant (p<0.1) in the full equation and significant at 5% in the reduced form, indicating that interviewer technique may have influenced results.

Age had a significant negative effect on WTP, and there was age modification of the contraceptive effect (those who were older and with permanent contraception were willing to pay more than those without permanent contraception). The interaction term was highly correlated with contraceptive status, and the coefficient on contraceptive status therefore may not be reliable. However, there was no effect on the coefficients of the other variables in the model of including the interaction term (AGE\*CONTRACE).

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<sup>56</sup> To ascertain whether each individual interaction dummy variable should be included in the analysis, these were also tested one by one using the t-test, but none had coefficients which were significantly different from zero and therefore no interaction dummies were included in the model.

<sup>57</sup> There was little to no difference in the coefficients on the estimators or the standard errors when the more restricted asset index was used. Given the similarity in the remaining results, we have listed the regression output only for the full asset index.

Of the significant variables, the use of a safe delivery kit had the greatest effect on WTP, increasing WTP by over 70% compared to those who did not use a kit. Those who were illiterate were willing to pay over 50% more than those who were literate.

The adjusted  $R^2$  for the OLS was 19% in the reduced model. Both full and reduced models were homoscedastic and normally distributed. Furthermore, the Ramsey RESET test failed to find evidence of misspecification in the models ( $p>0.1$ ).

The use of the robust cluster command adjusts standard errors for intra-group correlation within wards. This was found to have had very little effect on the standard errors of the independent variables. This is consistent with the findings from the random effects model presented in Appendix 11.

The valuation of those opting to give up time was dependent on the method of time valuation. In case this introduced bias into the model, two alternative approaches were considered: 1) excluding those who gave a time valuation from the analysis and 2) including a dummy variable for time into the equation (where those opting for a contribution in terms other than time were set as the reference case). These changes had no impact on the results described above as indicated by the lack of change in the signs and size of the coefficients as well as the standard errors.

Those opting for a monthly payment were willing to pay significantly more than those opting for less frequent methods of payment. This suggests that either those opting for monthly contributions were willing to pay more, or that they had underestimated the total amount that would be required under a monthly contribution. This highlights the importance of reminding respondents of the total amount they are committing to, to ensure they have understood the implications of the time frame of estimation.

**Table 21 Ordinary Least Squares Regression on Log Willingness-to-Pay<sup>58</sup> for Females**

Independent Variables	Full Form		Reduced Form	
	Coef.	Std. Err. (cluster=10)	Coeff	Std Error (cluster=10)
AGE	-0.05	0.02*** (0.02)**	-0.04	0.01***
AGE*CONTRACE	0.08	0.04* (0.05)	0.05	0.03*
LITERATE	-0.59	0.24** (0.23)**	-0.54	0.22**
ASSET	0.01	0.06	0.03	0.05 (0.07)
INTERVIEW	0.37	0.20* (0.22)	0.42	0.18** (0.16)**
COMPLIC	-0.03	0.26 (0.14)		
CONTRACE	-2.07	1.43 (1.59)	-1.26	1.14 (1.07)***
KIT	0.75	0.33** (0.30)**	0.78	0.27*** (0.20)***
ROLEGP	0.18	0.29 (0.24)		
ROLEFORM	-0.18	0.44 (0.29)		
ANCVISI	-0.12	0.06** (0.07)	-0.14	0.05*** (0.06)**
MEETMONT	-0.23	0.44 (0.53)		
GROUP	0.41	0.30 (0.31)		
NEWARI	0.29	0.30 (0.16)		
PROF	0.25	0.30 (0.26)		
INDO	0.25	0.30 (0.20)		
RISKHIGH	-0.23	0.21 (0.17)		
HTOTAL	-0.02	0.04 (0.06)		
LOGMED	-0.00	0.09 (0.08)		
_cons	6.72	0.87*** (0.69)***	6.77	0.49*** (0.45)***
Number of Observations	92		98	
F-statistics	1.75**		3.91***	
Adjusted R <sup>2</sup>	13.60		19.35	
Ramsey RESET test (p-value)	0.44		0.33	
Cook-Weisberg test (p-value)	0.74		0.27	
Vif score	6.17		8.77	
Normality test	0.96		0.81	

<sup>58</sup> The OLS on the full sample log(wtp+1) failed all the diagnostic tests.

When using a square root transformation of WTP, the model suffered from non-normality, although the direction and size of the effect of the independent variables did not differ significantly from the log-linear model.

The results of the OLS regression on a selection of independent variables for husbands are listed in Table 22 below. The adjusted  $R^2$  indicates a good fit for the data<sup>59</sup>. The sample size here is very small which means we cannot be confident about the reliability of the regression diagnostic tests which assume normality. However, the signs on the coefficients match closely with expectations. The wealth index had a positive and significant effect on WTP increasing WTP by over 20% for each increment on the wealth index. This positive relationship was also found in relation to the number of meetings attended (for wives) with each increment increasing WTP by over 190%. Husbands were willing to pay less for women who were already attending other groups, suggesting that they had taken the existence of substitutes into consideration. Age had the expected sign but was not significant.

Both full and reduced models were homoscedastic and normally distributed and the Ramsey RESET test failed to find evidence of misspecification in the models. The Vif score indicates that multi-collinearity was not a problem. The use of the robust cluster command to adjust for ward level effects had little effect on the standard errors of the coefficients.

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<sup>59</sup> One concern with the analysis, is that only those husbands that were present at home at the time of interviewing their wives were interviewed. This could result in sample selection or omitted variable bias, if these husbands differ systematically from husbands not at home, say through lower wealth (they are unemployed, younger or older and less educated). However, when comparing the asset index and the WTP of the wives of our sample of husbands, with those of the rest of the sample, there was no significant difference, suggesting that sample selection bias was not a problem.

**Table 22 Ordinary Least Squares Regression on Log Willingness-to-Pay for Husbands**

Independent variables	Full Form		Reduced Form	
	Coeff.	Std. Err. (cluster=4)	Coeff	Std error (cluster=4)
AGE	-0.03	0.02		
LITERATE	-0.08	0.44 (0.64)		
ASSET	0.22	0.10** (0.06)**	0.26	0.09** (0.08)**
INTERVIEW	0.77	0.35** (0.38)		
MEET	1.92	0.64** (0.71)*	2.17	0.69*** (0.76)*
GROUP	-1.02	0.43** (0.32)**	-1.06	0.38** (0.09)***
Cte	7.02	0.89*** (0.92)***	6.29	0.29*** (0.14)***
Number of Observations	18		18	
F-statistic	5.73***		7.37***	
Adjusted R <sup>2</sup>	0.63		0.53	
Ramsey RESET test (p-value)	0.95		0.52	
Cook-Weisberg test (p-value)	0.08		0.61	
Vif score	1.47		1.13	
Normality test (p-value)	0.25		0.60	

We ran a Tobit model on the pooled sample of women with  $\log(wtp+1)$  as the dependent variable. However, neither the full or reduced form of the regression passed the Ramsey RESET or conditional means normality tests, indicating that the model suffers from omitted variable bias and/or incorrect functional form. When the square root of WTP was used as dependent variable, the model failed the normality test but passed the Ramsey RESET test. The signs and significance levels for the coefficients were as observed for the OLS regression. These regressions are shown in Appendix 10. The number of censored values was very low, with only five such observations in the full model, and was therefore insufficient to estimate the spike in the distribution at zero which is needed for the Tobit model. As only one husband gave a zero value, the Tobit model was not run for husbands. A random effects model was used to adjust for the group hierarchy in the data. However, the random effects model results were no different from those obtained with the OLS (Appendix 11).

## 7.8 Discussion

The survey tool elicited high response rates in all stakeholder groups. Almost all those who were able to respond to the WTP question had a positive valuation for the women's group programme. On average individuals were willing to pay mean Rs 449 towards the intervention for its duration, with no significant difference between women's group members compared to female non-members. The inclusion of non-monetary payment options helped to increase the number of positive values elicited by 8%, although an overall preference for money as a method of contribution was reported. The number of non-respondents who were unable to give a WTP value was highest amongst those who were not members of the women's group, particularly those who were not a member of any other community group. Only 1% of all respondents did not understand the scenario.

The study found that non-health outcomes were indeed important to community members (both women's group members and non-members) influencing WTP values elicited in over 80% of cases. If mean WTP were 'washed out' of the non-health benefits, by setting the values provided by the 54 respondents who were valuing non-health outcomes only to zero, mean WTP would reduce substantially in all stakeholder groups by mean Rs 262 amongst husbands and by Rs 106 amongst women's group members. If the values given by those valuing both health and non-health benefits were also adjusted in this way, mean WTP would be likely to reduce even further.

Women's group members were better able to recognise multiple benefits than non-members (with a higher proportion (54%) indicating both health and non-health outcomes than female non-members (15%)). Women not attending meetings were more likely to value health effects only (27%) in comparison to both women attenders (10%) and men (10%). The emphasis on non-health benefits in 90% of male valuations suggests that they felt altruistically towards women (this could be reflective of something closer to pure rather than health-focused altruism).

WTP did not increase in relation to the range of benefits valued, i.e. those valuing both health and non-health benefits were not willing to pay more than those valuing health or non-health benefits separately. Those who were willing to pay for health benefits only

were in fact willing to pay the most<sup>60</sup>. However, this does not imply a failing of the scope test, which examines whether WTP varies with the level of the commodity in question [91], as individuals were not asked to value each type of benefit sequentially.

The absence of significant differences in the willingness-to-pay values obtained from women's group members compared to non-members suggests that non-use values were very important. Using behavioural data it was possible to ascertain that in 23% of cases the non-use values reflected altruism. The values given by the remaining 77% also potentially reflected option and passive use value.

The programme was valued most highly amongst those with less access to formal health care (demonstrated by their lower use of antenatal care) and therefore less ability to substitute women's groups for alternative health care options. It was also valued more highly by women with lower levels of literacy implying perhaps less knowledge of alternative health care options. Those who had benefited from and applied programme messages (demonstrated by the use of a safe delivery kit during the last delivery) were also willing to pay more. The policy implications are that such programmes generate greater welfare in areas where health service use is low and that they are valued more by groups with less options available to them.

The association between the asset index and WTP was positive and statistically significant for men ( $p < 0.01$ ). However, there was no association between income and WTP for the values given by women. One explanation is that the intervention was of greater value to women with less resources and therefore greater capacity to benefit from intervention messages. Values from husband were driven by altruism and it may be that in resource poor settings altruism is a luxury only those with income can afford.

An alternative explanation for the lack of significant effect of the income variable on WTP amongst females is that the household asset ownership was not a good proxy for female income. The use of a household income proxy as a measure of wealth status of women

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<sup>60</sup> This effect was significant when controlling for other variables in an OLS regression. When running a logistic regression to explore the reasons for choosing health only, none of the variables were significant, although those with complications in previous pregnancy, those who previously delivered in a hospital and those with high medical expenditure in the past year were positively correlated, but not significantly so.

relies upon women having equal access to the household budget and that the household resources reflect their own disposable income. However, evidence from Nepal shows this to not always be the case [352].

Another issue raised by carrying out interviews with both women and their husbands was how to control for differential ability to pay when dealing with members of the same household. Although respondents were instructed to consider their own budget constraint<sup>61</sup> they may have taken into consideration the budget of their partner (especially in the case of non-salaried women) which could result in overlap between what men and their wives are willing to pay (i.e. household WTP is not necessarily equal to the WTP of women plus men). This has implications for the aggregation of WTP (Chapter 9).

The inclusion of an interviewer dummy variable allowed us to check for interviewer bias. This was found to be significant for females and males. On further analysis, it transpired that one of the interviewers was more successful in bidding respondents up after their response to the initial open-ended question: there was no significant difference between original bids by interviewer, but the difference was significant when the difference in final bids was considered. The same interviewer was more highly educated and more confident. This suggests that interviewer effects are likely to be greater amongst those with less clearly formed preferences (in this cases non-users) and the confidence with which a bidding exercise is undertaken, assuming the more highly educated interviewer was more confident in eliciting values.

When assessing the determinants of WTP, the OLS regression on positive WTP values provided the best fit for the data. The bias from excluding zeros was very limited given that zero responses account for less than 10% of the total. The number of censored values was also insufficient to estimate the spike in the distribution (at zero) which is needed for the Tobit model. Group and ward-level effects were insignificant, which is likely to be due to the small number of within group observations.

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<sup>61</sup> 94% of the women reported that they work and have their own income at least seasonally (either waged labour or salaried) and are therefore contributing to the household budget and could pay out of their own resources. Of those that did not, one was a non-respondent, and three were willing to pay but only low values (<50 RS) in all but one case. This is consistent with DHS data for rural Nepal, indicating that 90% of women contribute finances to the household budget [353].

Overall, this chapter has shown that women's groups were valued by members as well as female and male non-members and that non-health benefits were important to each stakeholder group. However, the quantitative study does not provide us with much understanding of how individuals related the CV scenario to their local context nor of the thought processes that guided the formation of preferences and values. The following chapter presents the results of the group discussions prior to the individual interviews and will shed more light on these issues.

# **Chapter 8 Focus Groups and the Contingent Valuation Process**

## **8.1 Introduction**

In this study, focus group discussions were carried out with all stakeholders for two purposes. Firstly a series of focus groups were carried out to inform the design of the CV survey. This aspect of the study is reported in Chapter 6. In addition, focus groups were carried out alongside the CV survey to assist respondents in the CV process. This chapter presents the analysis of the combined set of focus group data in order to assist in understanding how individuals derived their willingness to pay valuations and to interpret the findings of the CV survey.

## **8.2 Decision-Making Processes Underlying Willingness-to-Pay**

The main themes raised by respondents in relation to the decision of how much they were willing to pay can be classified as economic, socio-political and institutional. Additional themes not fitting within these categories include altruism and cognitive ability to appreciate benefits.

Some of the themes matched with prior hypotheses about preference formation and willingness-to-pay based on the theoretical and empirical literature outlined in Chapters 2 and 4. Some challenged these hypotheses or stretched them beyond conventional boundaries. An overview of each theme and to what extent the underlying sub-themes complement or challenge economic theory are provided in Table 23. They are then discussed in turn and supported by quotes.

**Table 23 Framework of Themes Raised During Group Discussions**

Categories of Themes	Prior hypotheses	Sub-themes raised in group discussions		
		Consistent with prior hypotheses	Beyond hypotheses	Challenge hypotheses
Economic	<ul style="list-style-type: none"> <li>Individual WTP is driven by preferences for the commodity and based on an individual/household budget constraint</li> </ul>	<ul style="list-style-type: none"> <li>Mention source of income</li> <li>Mention affordability in relation to earnings</li> </ul>	<ul style="list-style-type: none"> <li>Perceived budget depends on ability to borrow</li> <li>Limited access to the household budget for women.</li> </ul>	<ul style="list-style-type: none"> <li>Evidence of mental accounting</li> <li>Limited ability to 'give up anything' when resources are very constrained</li> </ul>
Socio-political	<ul style="list-style-type: none"> <li>Payment should be made according to ability to pay</li> </ul>	<ul style="list-style-type: none"> <li>Mention payment according to ability to pay</li> </ul>	<ul style="list-style-type: none"> <li>Need to discuss as a group how much we are willing to pay</li> </ul>	<ul style="list-style-type: none"> <li>Determining what is a fair share contribution rather than my personal valuation</li> <li>Everyone should pay the same</li> </ul>
Institutional	<ul style="list-style-type: none"> <li>Institutions exist which collect revenue from household and enforce payments.</li> </ul>		<ul style="list-style-type: none"> <li>Community cohesion and empowerment builds trust in ability to collect money</li> </ul>	<ul style="list-style-type: none"> <li>Limited or no experience of revenue collection within the community – scepticism that it can work</li> </ul>
Cognitive ability	<ul style="list-style-type: none"> <li>People are able to understand and ascribe a positive value to things which are good for them</li> </ul>	<ul style="list-style-type: none"> <li>Adequate understanding of commodity benefits is critical to eliciting valid WTP</li> </ul>	<ul style="list-style-type: none"> <li>NGO presence creates expectations which may challenge the notion of WTP</li> <li>Difficulty conceptualising benefits given very low levels of education</li> </ul>	
Altruism	<ul style="list-style-type: none"> <li>Individual preferences are determined by selfish and potentially altruistic motives</li> </ul>	<ul style="list-style-type: none"> <li>Women are motivated by altruistic and selfish concerns</li> <li>Altruistic WTP is less than selfish WTP[219].</li> </ul>	<ul style="list-style-type: none"> <li>For social commodities such as women's groups altruistic concerns may predominate for group members.</li> </ul>	

## 8.2.1 Economic Factors

Two economic issues emerged during the group discussions when individuals related how much they were willing to pay to their own socio-economic context. These were: 1) the budget constraint and how the budget is defined; and 2) how poverty and access to capital impact on willingness and ability-to-pay particularly for women.

### 8.2.1.1. *Defining the Budget Constraint*

Conventional economic factors such as how much people can afford to give, and their available budget, entered into the discussion in almost all groups. These discussions shed light on how people perceive and define their budget.

A number of individuals (n=9) mentioned that they would raise money to pay through personal revenue generating activities: e.g. the sale of vegetables, animal farming, agricultural labour work and business. The reliance upon savings was not mentioned in any of the discussions perhaps reflecting the subsistence level budgets of respondents.

Others mentioned (n=4) that they or others could borrow money if they were not able to pay every month from their own resources, as illustrated by the quote below:

*'Yes that will be easier (Rs5-10 per month). And also if one does not have (one) can borrow since it is not too much'. (women's group member, Nibuwatar 1)*

This suggests that individuals may perceive a budget which is broader than their individual or even household income, based on their degree of access to credit<sup>62</sup>.

Evidence of mental accounting was also found (n=7). This occurs when respondents have a mental budget out of which payment is to be made [354]. The mental budget, for those who mentioned it, was based upon an amount which was sufficiently small as to not

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<sup>62</sup> It was not specified from where they would borrow, from husbands, or other community member or formal credit service – the latter is unlikely.

impact on other expenditure patterns. This was typically defined in terms of a cup of tea, a meal, or what could be misplaced or lost as shown in the quotes below:

*'Rs. 5-10 is not so big deal, it might get lost, have a cup of tea etc'. (women's group member, Bhaise 3)*

*'If Rs 5 can save our lives we will definitely do it. We spend money just eating. So, we can contribute Rs. 5 to run our programme.'* (women's group member, Bhaise 2)

*'Rs 5, 10 is not a big deal, it might get lost. If the programme helps us we are ready to contribute Rs 5/month'.* (women's group member, Bhaise 4)

The concern here is that the amount stated may not be related to how much respondents value the good, but instead on what they perceive they can give up without disrupting other expenditures [354]. This finding has been reported in studies in developed countries, but is likely to be attenuated in settings with very low levels of income. The limited discretionary component to income also minimises the extent of value that can be placed on goods.

#### **8.2.1.2. Willingness and Ability to Pay in Resource Poor Settings**

The budget is also constrained by the context, and some of the challenges of deriving willingness-to-pay estimates from extremely resource poor areas were alluded to during the group discussions. Despite valuing the groups, women mentioned they had very limited resources making it difficult for them to pay even the smallest amount (n=14). The main reason given for not being able to pay was a lack of income, or a limited source of revenue (e.g. labour work was specified in 3 wards, agriculture and lack of permanent income in a fourth) as supported in the quotes below:

*'We have got only hill land where we can not get enough product. So we could not earn money selling vegetables (e.g. vegetables are only for household use)'. (women's group member, Nibuwatar 8)*

*'We need to do labour work, so it is difficult to get money from the contractor. So, if she (wife) needs money I might not be able to give her money at that time'. (husband of non-attending woman, Nibuwatar 1)*

This led some respondents (n=3) to reject specific amounts put forward by the moderator of the focus groups:

*'To pay Rs. 10 each month we must have a good source of income'. (non attending woman from nearby, Nibuwatar 1)*

Although the intervention may have value to women they may not be able to contribute anything towards it due to resource constraints:

*'Women from some places might not contribute because of their economic condition though they are interested to contribute.'* (group facilitator, Bhaise)

An additional constraint to contributing money or time was the number of other women's groups operating in the community which also required a monetary<sup>63</sup> and/or time contribution. This illustrates further the limited availability of reserve cash or time to allocate to the consumption of 'non-essential'<sup>64</sup> commodities. Five respondents from three groups alluded to such commitments:

*'Contributing Rs 5 for the (existing MCH) fund is so difficult for us. So how can we collect for it'. (women's group member, Bhaise 4)*

*'All groups say the same. Everywhere we need to give money. Monthly, we need Rs 50 to give to various groups'. (women's group member, Nibuwatar 8)*

Together these points highlight the difficulty of valuing an intervention in communities with few economic resources (monetary, time or in kind). The inclusion of non-monetary payment options did not overcome this barrier for the poorest, as such contributions (time and grain) were also challenged during the discussions.

Income and time constraints were especially great for women. Indeed, the status of women within the household was also expressed as a reason for not being able to pay as they have only limited control over household resources:

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<sup>63</sup> Often the contribution was to a fund, where money could be invested.

<sup>64</sup> Non food or household.

*'It will be difficult for women because they don't have economic power in the house. If we talk with their husbands, father-in-law then it will be easier for us. Only talking with women is not strong enough. Their family member will say to them in how many groups do they need to give money?'* (group facilitator, Fakhel)

This supports the observation in Chapter 7 that female willingness-to-pay was often lower than that of their husbands. It also helps explain why the wealth index had no significant effect on WTP for women: little variation in income between women compounded by limited access to household resources.

Consequently, it is possible that women were considering their own discretionary budget rather than the household budget when deciding how much they were willing to pay. This is supported by dialogue between a husband of a woman attending meetings from Nibuwatar 6 ward and the moderator of the focus group when discussing the monthly contribution of money by women's group members towards the MCH fund. This husband indicates that his wife contributes to the MCH fund out of her own resources, without having to ask for his permission:

*Researcher: What do you think about the (MCH) fund how that fund can be used more wisely or do you think that that is their own fund and what ever they do does not matter?*

*Husband: 'How can we say our feeling because that is their money? But even if that is their money, if there is lots of money and we have got any problems they will help us. So we are happy that they are doing their job and they might help us.'*

*Researcher: 'Do they ask for money or do they manage by themselves?'*

*Husband: 'No, they do not say anything. They manage it. (...) It is all right. They manage within the home. We are happy that they are attending meetings and raising a fund and so we are letting them go.'*

So whilst women are constrained in terms of access to household resources, this dialogue supports the hypothesis that women do have access to their own, albeit limited, capital and may be willing and able to pay out of it.

Overall, whilst the group discussions indicated that individuals did consider where the money would come from when deciding on WTP, their values may have been anchored to small expenditures which would not disrupt the household budget and are unlikely to vary in response to small changes to the scenario. Furthermore, ability to pay is severely constrained by a context where many are wage labourers or subsistence farmers with very limited and unstable discretionary income. The perceived budget was influenced by capacity to borrow, and also by status within the home, women having less control over and access to household resources.

## 8.2.2 Socio-Political Factors

In addition to the economic considerations described above, a number of respondents introduced socio-political issues into the discussion in terms of how much should be contributed and how to reach a decision regarding contribution.

### 8.2.2.1. *Everyone Should Pay the Same*

In most groups respondents spontaneously started discussing rules for contribution, the most frequently mentioned was that everyone should pay the same amount. In line with economic theory, the moderator of the groups emphasised that people should pay what they want to pay according to their income and their preferences for the group. However, this was challenged by some individuals who felt it would be difficult to collect money if it was left to individual discretion because of free riding (n=11).

*'In my opinion, it should be same so that everyone will contribute it. Otherwise someone will give and some don't'.* (women's group member, Nibuwatar 5)

*'If we say it will be according to their wish then it will be very difficult to collect'.* (women's group member, Nibuwatar 5)

It was not intuitive to many respondents that they should pay according to their ability to pay, with four group participants asking questions to the moderator to clarify on what basis the payment was to be made: (e.g.) *'Is that (payment) depending upon our income?'* (women's group member, Bhaise 4).

However, payment according to ability to pay was supported as a payment mechanism by some respondents (n=8)<sup>65</sup>:

*'I think there should not be a rule this much you must pay. It depends upon economic condition and how much they want to give, so it varies. But women are saying that there must be (a set) rate how much we collect. I think it is for health so whatever (amount) will be ok'.* (women's group member, Bhaise 2)

Although only discussed in two groups, group participants appeared to feel more comfortable with a variable contribution<sup>66</sup> of grains and time rather than of money, as indicated in the following:

*'If we have free time we can give time otherwise we can give money'.*(women's group member, Bhaise 3)

#### 8.2.2.2. *Deciding How Much to Give*

Respondents from every group (41 respondents in total) suggested that rather than individuals deciding for themselves, the group should decide how much to pay. They also tended to speak for the community rather than themselves:

*'For that we need to have discussion in the group and I think we can do it. Now, (if you ask) only me, I cannot say that I can contribute'.* (women's group member, Daman 4)

*'I do not know what other people will think. I can't decide by myself.* (women's group member, Bhaise 2)

*'If we decide to do and start it then we can do it. If we unite to do this then we can do this. Unity makes anything possible'.* (women's group member, Nibuwatar 7)

*'We could not say it now. Some may be willing to pay and some may not'.* (women's group member, Bhimphedi 4).

Preference for group over individual 'price setting'<sup>67</sup>, could arise for a variety of reasons: for example from the belief that everyone *needs* to contribute in order to generate sufficient resources to run the intervention:

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<sup>65</sup> Those supporting this line of thought were more likely to be literate (in 62% of cases).

<sup>66</sup> According to individual resources.

*'Our contribution (referring to the women who are coming to the meeting) might not be enough. If all community people agree then we can do it'. (women's group member, Daman 8)*

It may also be a result of:

- the nature of the commodity (community-based groups) which has shared benefits across all group members;
- the study context, where individual identity is closely intertwined with community identity [355];
- the way money is already being collected for the MCH fund (for those groups which have one);
- the method of eliciting this information (i.e. through a focus group) which encourages people to think and talk as a group rather than as individuals.

### **8.2.3 Institutional Factors**

Related to the political issues of deciding how much to pay, an additional theme was the institutional mechanism for raising and collecting revenue, and specifically trust in the ability to collect funds. We begin by exploring the reasons for lack of trust and then highlight some consequences for people's interpretation of, and potential reaction to, the CV scenario.

Lack of trust in the ability to collect funds was voiced by those who had previous negative experiences of emergency fund management (women borrowing money and defaulting on repayment) (n=10):

*'(...) some have taken money from the fund and have not returned it and then they stop coming. (women's group member, Nibuwatar 8)*

*'All organisations make a group and ask them (for) money to make a fund. They will have treasurer and she will take money and other members will not (be) aware of it.' (husband of woman attending meetings, Nibuwatar 1)*

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<sup>67</sup> Or decisions of willingness-to-pay.

Those groups with no previous successful experience with funds or collection of money within the group (n=3) were also less likely to trust the fund collection mechanism:

*'We have collected money for ECD<sup>68</sup> centre and it was nearly Rs 200/person but later there was confusion and we have distributed it to concerned persons'. (woman attending meetings, Fakhel 9)*

In addition to past experience with revenue collection, community characteristics were also put forward as a reason for distrust towards collection of money<sup>69</sup>. Not surprisingly, scepticism was greater in communities with less cohesion due to difficulty generating resources or mobilising community members in such areas (n=3 groups):

*'I am not sure (that community people will contribute) because people from this village are not willing to pay money, for example (for the) drinking water project. We all had tap in our house but people did not give money to pay a guard so we have stopped supplying water. So, how can we expect that people will contribute money for (a) salary?' (women's group member, Daman 8)*

*'We can do it if all community unites to do (so). But sometime it gets difficult in the village. People blame each other and group just collapses.' (women's group member, Fakhel 9)*

*'People of this village are bit different so I don't trust that they will contribute. (laugh)' (women's group member, Nibuwater 7)*

Conversely, in communities which defined themselves by a stronger sense of cohesion and community identity, women were more confident about their ability to collect funds (n=2 groups):

*'75% will give. In this ward, it will be easy to convince people'. (women's group member, Bhimphedi 4)*

*'If we ask to help us no one will say 'No' in this community. It is easy to work here.' (women's group member, Daman 4)*

*'It is easy in this Gopali community' (women's group member, Daman 4)<sup>70</sup>,*

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<sup>68</sup> Early Childhood Development Centre. This is the place where MIRA women's groups met in Fakhel ward number 9 and when the group tried to collect funds, it failed and the money was reimbursed to contributors. The women's group members then changed their strategy to a stretcher.

<sup>69</sup> These characteristics are also likely to be responsible for the nature of past experience with revenue collection (either positive or negative).

<sup>70</sup> This last quote suggests that ethnic homogeneity may contribute to community cohesion although this could not be tested for.

Distrust in the ability to collect money has a number of consequences for the interpretation of the CV scenario which were discussed by groups. Some expressed concern that if women had to pay towards meetings they might stop coming to them:

*'I am just worried about how long they will do this. In the beginning they will say yes and later on they keep on dropping. When we started MCH fund there were so many women but later so many left the group. It might happen the same'. (group facilitator, Bhimpheidi)*

Alternatives to individual contributions were proposed by others (n=5) such as approaching the forestry committee or the local government office for funds:

*'We are also asking for other institute to help us. We have talked with forest committee, they appreciate our programme and the secretary of the VDC has also said that programme is good. So, they might help us.'* (women's group member, Bhaise 2)

This presents an interesting challenge to eliciting appropriate willingness-to-pay values. The objective of the women's groups was to empower women and facilitate their engagement with other organisations, helping them to get support for the community. Therefore, groups proposing to approach organisations for financial support appear to have learnt from the meetings and have been empowered. One would then expect them to associate greater benefits to the meetings and be willing to pay more for them. Yet, in practice, these respondents may actually be more likely to protest against payment, or to pay less, as they have identified alternative sources of funds to their own budget<sup>71</sup>.

Some group participants (n=5) were concerned that it would be difficult to continue the groups without MIRA support, and expressed scepticism that MIRA would in fact leave:

*'We think MIRA will help us in the future.'* (women's group member, Bhaise 2).

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<sup>71</sup> In the CV survey, the mean WTP of these women was RS 322, which is less than the full sample mean of Rs 392, but not significantly so.

Overall, the issue of trust in the ability to collect funds was an important factor influencing people's interpretation of the CV scenario during the group discussions. Willingness-to-pay is usually carried out in Western countries and payment is often elicited in relation to additional social security contributions or tax premiums. However, in contexts such as this one, where there is no effective institutional system for revenue collection to enforce payments, generating trust in the payment vehicle is a challenge facing CV researchers particularly in the context of possible free-riding. Community cohesion and level of group empowerment were found to be important factors promoting trust.

#### 8.2.4 Altruism

Another factor influencing people's WTP is the extent to which they are guided by altruistic compared to selfish motives. An issue raised by a number of women's group members during the group discussions was that the intervention promotes a sense of social responsibility and also attracts women who are more socially minded:

*'In another group, Women's Development, we are there because to get profit and to do some social work but we are in MIRA group (only) to serve society.'* (women's group member, Daman 4)

*'MIRA is related with health. I like it that's why I am in this group though I am not a MWRA because I have done family planning. I have got elder son age of 22. So later I might have daughter-in-laws. Now time has changed so we need to update ourselves. And sometimes I feel sad that women are not aware on those (health) issues. They are only looking at the present situation, not worrying about the future. Before I did not know about vaccination and we did not have such facilities too. When I (learnt) about that I have (started) teaching others what they need to do. And when they do not (want to learn) I feel angry.'* (women's group member, Bhaise 2)

This confirms that altruism is a factor influencing a women's group member's decision to join the group as well as the benefits derived. It is therefore likely to be reflected in their WTP, supporting the findings of Chapter 7.

The initial group discussion with a female who was not a member of the women's group (Nibuwatar 1 ward) indicated that she was indeed willing to pay towards the groups for purely altruistic reasons, but her altruistic willingness-to-pay was less than her selfish willingness-to-pay. In the example shown below, the woman initially thought she was

being asked to contribute towards an MCH fund that she could take a loan from. Once the moderator had clarified that it was only to support the women's group, with no direct benefit to her, she revised her valuation accordingly<sup>72</sup>.

*Researcher: The new fund will be for the group to conduct the meeting not to borrow from it.*

*Woman: Then I will give Rs 10 half yearly. I thought that was the same (emergency loan) fund so I was saying that I will contribute Rs 10 per month.*

*Researcher: Now do you understand? It is for the group to help them to conduct the meeting.*

*Woman: Yes, it's all right. So, (I) can't contribute each month if it's a help.*

*Researcher: That's ok. Now do you feel that you'll join the group also or you want to help but do not want to go to the meeting.*

*Woman: I will contribute but do not want to join the group.*

The above quotes indicate that women attending meetings may be doing so in order to help others, and that women not attending are willing to pay even if they cannot benefit directly from the intervention. This supports the findings of Chapter 7.

### **8.2.5 Capacity to Value and Understand Benefit**

Another issue that came out of the discussions was the extent to which individuals from extremely resource poor and largely illiterate settings are in a position to recognise the value of an intervention, even though it may have been of benefit to them. One of the factors governing perceptions of the programme was the way NGOs were seen by communities.

For some, there was an expectation that NGOs had come to help, to provide financial benefits, or other tangible (monetary or nutritional) gain. This challenges the notion of communities contributing towards an NGO project, particularly one with less tangible (i.e. non-economic) benefits. This is illustrated in the following quotes.

*'When we had the ward meeting, everyone was interested to be a member and also expecting that it will help us, give some incentives, but when they came to know it does not give anything and also it won't provide credit like Plan and Swabalamban they were not interested.'* (women's group member, Nibuwater 1)

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<sup>72</sup> In this case, the altruistic WTP was 17% of the original selfish one.

*'They used to compare our work with other organisations, like we did not build anything for them or did not give them anything like no medicines, did not make a health centre, did not help during delivery time (childbirth).(...) We explain to them about our programme like this is a research programme and we do not give anything for community people. Again they say why do you need to do research to sell (to) foreigners? (laugh)'* (group facilitator, Daman)

*'For example, last time there was a Plan meeting where they distributed snacks and later on when we had (the MIRA) meeting, people were saying that we've done 'eating' meeting last time and now we are doing 'non eating' meeting. So, from that we can understand their attitude.'* (group facilitator, Fakhel)

In one focus group it was suggested that the women's groups attract poor women and it is unreasonable to expect them to contribute<sup>73</sup>:

*'Rich people do not come to the meeting only poor people come to the meeting expecting some help.'* (women's group member, Bhaise 4)

Unless individuals are aware and appreciate the less tangible benefits of the women's groups, they will not be willing to pay, as shown in the following quotes:

*'And if that is the case people might say that we could not use that money so why should we give. So, people might not be interested'.* (women's group member, Bhaise 3).

*'If we talked about collecting fund for that purpose the meeting might not happen'.* (women's group member, Fakhel 9)

*'They (women) think that this programme is not for them but they are coming for us, to please us (the facilitator). There is (a) programme so lets go. They don't have inner feeling that this is for them. (The facilitator) is working for them. But they won't take it in that way. They feel that she is working because she has to work. So, if they need to contribute money to pay (for an)other person it will be difficult'.* (group facilitator, Fakhel)

How much people can contribute depended not only *'upon their economic condition'* but *'also if they are aware that it is regarding health and feel that it is necessary.'* (group facilitator, Bhaise)

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<sup>73</sup> However, this was not borne out in the analysis of CV data, as those attending meetings actually had a higher (mean and median) wealth index than those not attending both generally and in Bhaise4 ward in particular, although this was not statistically significant (Chapter 7).

Willingness-to-pay is presented as being directly related to awareness of benefits in the following example of the emergency loan fund:

*'Yes, now they are aware that the money is for themselves so they need to do this. Before, they were collecting Rs 5 but now they are collecting Rs 10 for the fund because they are saying that that money is for mother and infant health. In Basante also they are talking (in the) same (way) and also saying that even if MIRA leaves they need to continue the group'. (group facilitator, Nibuwatar)*

However, even when the benefits are recognised, individuals may still reject the notion of contributing towards something they already have in their community :

*'Now we have learnt something about health like how to give birth, we have come to know about diseases like pneumonia, jaundice etc. So, our group could not afford a job for anyone'. (women's group member, Bhaise 4)*

These themes illustrate that the value ascribed to the intervention and resulting willingness-to-pay for it will depend upon the perceptions about NGOs and their role in the community as well as the ability to recognise the benefits of the intervention.

### **8.3 Group versus Individual Valuation**

The previous section showed how group level data can be used to highlight the type of decision-making processes used by respondents when formulating their willingness-to-pay values. This section compares what individuals said in the group discussions with the responses given in individual interviews in order to:

- provide additional insight into reasons for individuals not being able to give a WTP value in the interviews;
- assess whether and how participation in the group discussion influenced individual WTP responses.

#### **8.3.1 Understanding Reasons for Not Giving a Willingness-to-Pay Value**

The focus group discussions were analysed to gain additional insight into why women were not able to respond to the willingness-to-pay question in the final survey. The group-based discussions involving these women were used to ascertain, where possible,

those who were just rejecting an aspect of the scenario rather than the intervention *per se* from those who had underlying zero valuations.

Three respondents demonstrated positive preferences during the group discussion, indicating that they would be willing to pay for the intervention. However, in the interviews they were unable to specify an amount. Key quotes from each respondent are presented in turn below:

*1- 'We want (the) programme to be continued and it is good for us as well. We can learn new things. If we do not have the programme we could not learn new things. (...) We can give time why not. Sometime if we have work only at that time we could not come to the meeting. Money will be easier for us (to give). Giving maize does not make any sense. If we have free time we can give time otherwise we can give money'. (women's group member, Bhaise 3, also a community health volunteer - FCHV)*

This quote indicates recognition of the benefits of the group and a preference for it to continue – supported by contributions of money or additional time. In the individual interview this woman re-emphasised the need to continue the intervention and again said she was willing to contribute money towards the learning and health aspects of the intervention. However, no explanation was given for her not being able to place a value on the intervention.

*2- 'MIRA helps to bring changes in women. We got facilities. (...) So, even if MIRA stops we will continue the programme. (...) Organisation does not give us money only guides us, we need to do by ourselves'. (women's group member Nibuwatar 8, also a TBA)*

This individual recognises that the intervention brings about positive change and should continue but does not specify the nature of change or dimensions of benefit. She also accepts the proposed scenario. In the individual interview this woman said she was willing to pay for the health aspects of the intervention and would contribute according to what others decide. Non-response here therefore appears to be a rejection of the concept of individual valuation.

3- '*Before the programme*) We did not know that we need to go to the hospital. (...) Yes, it is good for future generations. (...) To learn new things we need a person supporting us'. (women's group member, Bhimpedi 3)

This individual recognises the health and wider societal benefits, as well as accepting the scenario of contributing towards someone to continue the intervention. During the interview, this woman said she was willing to pay for the health and learning aspects of the programme but gave no indication of the reason for non-response.

Two women said they would be willing to pay a specified amount during the group discussion:

4- '*Rs 5, 10 is not a big deal it might get lost. If the programme helps us we are ready to contribute Rs 5/month.*' (women's group member, Bhaise 4)

The reasoning for payment put forward in the group discussion indicates mental accounting. Furthermore, this individual was talking in the plural as if trying to encourage others rather than necessarily giving her personal valuation. In the individual interview this woman said she was willing to pay for the learning aspect of the intervention but preferred to contribute later, if the intervention were to run smoothly.

5- '*I can give up Rs 10 / monthly.*' (women's group member, Daman 8)

This individual was the only group participant to specify an amount for payment during the group discussion and referred to herself in the singular (I can give) suggesting a personal valuation. In the individual interview, reasons for not giving a value were that she preferred to pay later and discuss with the budget holder. This appears to highlight some reservation about making a contribution.

One respondent indicated that they were not willing to pay anything:

6- '*I cannot contribute money.*' (women's group member, Bhaise 4)

In the individual interview this woman said she would contribute later, if the programme were to run smoothly, but could not say at the time of the interview how much she would give.

One individual indicated a potential willingness-to-pay during the group discussion whilst also pointing to a number of reasons why she did not feel she should pay.

*7- 'If we really need to do it by ourselves instead of Rs 5 we will collect Rs. 10. (...) It will be difficult for us. We need to get some benefit otherwise why do we give money'. (women's group member, Bhaise 4)*

In the interview this woman said that the organisation should support the group and challenged the scenario. This could be seen as a protest bid.

Overall, by combining the group and individual level data for those who were not able to value the programme in the individual interview, it was possible to ascertain that 6 out of the 7 missing bids had favourable attitudes towards the programme. Unfortunately, it was not possible to analyse reasons for non-response in this way amongst non-attending women and husbands due to the lack of group level data for this stakeholder group.

### **8.3.2 Group versus Individual Willingness-to-Pay**

Having analysed reasons for not being able to give a WTP value, this section now compares willingness-to-pay values elicited in the individual to that in the group setting, for those who were willing to pay a positive or zero amount (Table 24). The purpose was to see the impact of context on WTP. Values were only discussed in seven out of eleven of the focus group discussions. Table 24 shows that there was a fair amount of divergence between the values given in the two settings. Possible explanations for this are multi-fold. It could suggest that the context influences decision making variables with, for example, the value given in the group context reflecting a 'fair-share' value rather than individual preferences as discussed above, or what they thought they and others in the group should pay, rather than their own personal valuation. Or it could be that individuals use the time between the group discussion and interview to think further about how much to give, consulting with other household members and revising their estimates accordingly [228].

Estimates given in the group environment were generally lower than in the individual interview (although numbers were small), consistent with findings reported in [224]<sup>74</sup>.

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<sup>74</sup> Although in this study the group and individual approaches were run with different sets of individuals.

Those respondents whose proposed willingness-to-pay in the group setting was greater than the individual settings may be because they were adopting a more extreme value to distinguish themselves within the group context [224].

However, the group discussion did not capture everyone's views. Four of those respondents who gave the highest WTP values did not speak during the group discussion.

**Table 24 Willingness-to-Pay Values Elicited in Group and Individual Settings**

Ward	ID	WTP group (1)	WTP individual (2)	Difference (2-1)
Bhaise 3	WA5	330	550	220
Bhaise 4	WA1	165	-	-
Bhaise 4	WA7	165	0	-165
Bhimphedi 4	WA1	132	138 (time)	6
Bhimphedi 4	WA9	132	330	198
Daman 4	WA12	165	275	110
Daman 8	WA6	330	-	-
Nibuwatar 5	WA2	165	165	0
Nibuwatar 5	WA3	330	165	-165
Nibuwatar 5	WA4	330	330	0
Nibuwatar 5	WA6	66	198	132
Nibuwatar 7	WA2	165	869 (time)	704
		Overall mean (median)		
		207 (165)	302 (237)	104 (58)

In order to question if and how participation in the focus group discussion affected individual WTP, it was necessary to examine whether respondents who attended focus groups:

- were more likely to cluster their responses around a given number;
- were more likely to be able to come up with a number (fewer missing values).

Table 25 shows the values that were discussed in the group setting for women's group members and indicates how many group participants gave these same values in the subsequent individual interviews. Only 27% of the values given in the individual interviews with women's group members were the same as those discussed in the groups. Amongst women not attending meetings the proportion citing these same values was 6%. Furthermore, there was a high proportion of unique values elicited in individual interviews (little clustering) from those who attended the group discussions.

The rate of missing values for those who attended the focus group was 10% compared to 21% for those that did not attend group discussions. Whilst this could suggest that the group discussion might have helped respondents to formulate preferences, it could also be due to more familiarity with the good in question (these were women's group members).

The total group WTP would be significantly less if it were derived through group negotiation in which everyone paid an agreed amount in comparison to individual valuations (Table 25).

**Table 25 Comparison of Group and Individual WTP**

Ward	No. of Observations	Values discussed by group (per month)	Attendees at FGD					Female non-attendees at FGD							
			Freq. cited in interviews n (%)	Freq. < group value (incl. zero)	Frequency > group value	Freq. missing	No. of unique values in interviews	Mean WTP (group) <sup>75</sup>	Mean WTP (*)	No. of Observations	Freq. cited in interviews n (%)	Freq. < group value (incl. zero)	Frequency > group value	Freq. missing	No. of unique values in interviews <sup>76</sup>
Bhaise-2	5	Rs 5	2 (40%)	2 (40%)	1 (20%)	0 (0%)	4 (80%)	180	284 (165)	-	-	-	-	-	
Bhaise-3	6	Rs 5-10	1 (17%)	2 (33%)	2 (33%)	1 (17%)	6 (100%)	180-360	264 (330)	-	-	-	-	-	
Bhaise-4	11	Rs 5	0	3 (27%)	5 (45%)	3 (27%)	8 (73%)	180	355 (303)	18	1 (6%)	5 (28%)	9 (50%)	3 (17%)	11 (61%)
Bhimphedi-3	7	-	-	-	-	1 (14%)	6 (86%)	-	685 (415)	-	-	-	-	-	
Bhimphedi-4	9	Rs 2-4	3 (33%)	0	5 (56%)	1 (11%)	5 (56%)	72-144	196 (165)	-	-	-	-	-	
Daman-4	13	Rs 5	0	1 (8%)	11 (85%)	1 (8%)	9 (69%)	180	551 (435)	23	2 (9%)	2 (9%)	12 (52%)	7 (30%)	11 (48%)
Daman-8	6	Rs 10	3 (50%)	0	2 (33%)	1 (17%)	4 (67%)	360	693 (330)	12	0 (0%)	7 (58%)	3 (25%)	2 (17%)	8 (67%)
Fakhel-9	8	-	-	-	-	0	5 (62%)	-	257 (165)	17	-	-	-	2 (12%)	10 (59%)
Nibuwatar-5	7	Rs 2, 5, 10	5 (71%)	0	2 (29%)	0	4 (57%)	72-360	281 (165)	-	-	-	-	-	
Nibuwatar-7	7	Rs 2-5	3 (43%)	2 (29%)	2 (29%)	0	5 (71%)	72-180	281 (165)	-	-	-	-	-	
Nibuwatar-8	-	-	-	-	-	1 (10%)	5 (50%)	-	480 (220)	-	-	-	-	-	
Overall			17/64 (27%)	10/64 (16%)	30/64 (47%)	9/89 (10%)	61/89 (69%)				3/53 (6%)	14/53 (27%)	24/53 (46%)	14/70 (21%)	40/70 (57%)

\*The figures in brackets represent the mean values given by those who attended the group discussion.

<sup>75</sup> This was estimated by multiplying the value discussed in the group over the 33 month project period.

<sup>76</sup> Including missing values as a unique value.

## 8.4 Discussion

Group discussions were initially conducted with the aim of assisting the CV process, supporting preference formation and enabling individuals to discuss and raise questions prior to interview. Whilst serving as a successful means of stimulating discussion and preferences relating to WTP, group discourse also provided a wealth of data which helped to understand better the CV survey responses and put them into context.

The group discourse was insightful in terms of people's interpretation of the CV scenario and relevance to the local context. For example, the issue of trust in the ability to collect funds was an important factor influencing people's interpretation of the CV scenario. This is clearly very relevant in a context where there is no effective institutional system for revenue collection to enforce payments (such as a system of insurance or general taxation). The only means of collecting revenue is through such an informal community network. Community cohesiveness (which may be explained by ethnic homogeneity and previous positive experience of collecting and managing money within the group) appears to be important in promoting trust. Therefore, the generation of trust that others will pay, and that the money will be appropriately managed and used, is likely to be an important element in forming a credible scenario and promoting content validity in this context.

The information yielded through the group discussions also helped to interpret and understand some of the findings of the CV survey (Chapter 7). A variety of issues were raised which were relevant to understanding the relationship between income and willingness-to-pay observed within the sample. For example, the discussions confirmed that women have limited control over household resources, and therefore the household budget may not be an appropriate measure of capacity to pay. The discussions also lent support to the idea that the programme was valued more by more deprived groups as it was highlighted that the group was for 'poor women', or those with less ability to pay. Participation in the group discussion prior to the individual interview for women's group members may also have served to remove the income effect from people's valuations. Within groups, individuals emphasised the need for equality in payment (everyone paying the same) and whilst there was significant variation in the individual valuations that

followed, they may have been distanced from income through the discussion process. Although this does not explain the lack of income effect amongst female non-members.

The group discussions also highlighted that the boundaries between individual and community are somewhat ambiguous, particularly in relation to income. For example, the perceived budget depends not only on individual income, but also on capacity to borrow, which in the Nepali context depends on the level of community cohesion. This could be due to the life context of many communities in less developed countries which are not only defined by low levels of resources but also by group identity and preferences (group constituting family or village or ethnic group or caste).

The method of value elicitation also appeared to affect the way people constructed preferences. In the group context, people generally preferred to perform the valuation task collectively rather than individually. Discussion focused around what was appropriate for the group or the community, what they felt they 'ought to do', given shared beliefs and commitments, rather than 'what situation will benefit me most as an individual'[225], p214-5. The WTP values discussed within the group setting reflected a notion of a fair share contribution, given the ability to pay of poorer community members rather than individual preferences. Participation in a focus group prior to individual interviews also seemed to make people more aware of group issues, but did not stop them from forming individual values thereafter. It also gave them time to reflect and debate a variety of issues: both anticipated and unanticipated by the researcher. The time given 'to think' was only a day, and a longer period would have facilitated further discussion with family and other community members, possibly strengthening valuations.

Sen raises the question of whether preferences are a good basis for resource allocation [53, 356]. Concerns were raised during the group discussions that WTP might not present an accurate measure of benefits when people value the intervention but are not able to pay anything<sup>77</sup>; or where individuals are unable to recognise the benefits to themselves and participate in meetings simply 'because it is there' - people only valuing the benefits they perceive. None-the-less all but the very poorest were able to give values as indicated in

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<sup>77</sup> Time and grain contributions do not get round the problem completely, as the poorest tend to face greater constraints on their time (greater responsibilities at home; dependent on wage labour).

Chapter 7. Potentially of greater interest is that those who benefited the most (the most empowered) were able to devise self-sustaining scenarios which avert the need for them to contribute. This issue and the challenge it presents to the use of the CV method alongside community development programmes is returned to in the last chapter.

Overall, group discussions combined with individual interviews can be insightful in terms of the institutional context and decision processes underlying people's values, and also providing the individual-level data necessary for estimating total economic value. The next chapter presents the results of the economic evaluation and considers their methodological and policy implications.

# Chapter 9 Economic Evaluation

## 9.1 Introduction

While cost-benefit analysis is a common form of economic evaluation across other sectors of the economy (e.g. environment, transport, education), its application in the health sector has been more limited, with cost-effectiveness analysis predominating. Furthermore, despite increasing research into the validation of willingness-to-pay as a measure of the benefit of health interventions, very few cost-benefit analyses that have been carried out in the health sector have used willingness-to-pay as a measure of intervention benefit. The distinction between cost-benefit (CBA) and cost-effectiveness analysis (CEA) has been the subject of ongoing debate in the health economics literature [357] [358]. Phelps argued that the two approaches are equivalent and lead to the same health care resource allocation decisions [357]. Donaldson, however, argues that the two methods are addressing different questions, CEA informing on the least costly way of achieving a given objective, and CBA informing on whether the objective is worth achieving (improves social welfare) [358].

This chapter begins by presenting the estimates of the cost of the women's group intervention and health outcomes in terms of neonatal mortality and life years saved. Estimates of the total economic value of the intervention in terms of aggregate willingness-to-pay then follow. The incremental cost-effectiveness ratio and the net benefits are then illustrated. The results of a sensitivity analysis on costs and health and monetary outcomes are then presented and are followed by a discussion of the findings.

## 9.2 Intervention Costs

The average annual cost of facilitating a women's group was estimated at Rs 8301 (Table 26 (from Borghi et al. 2005 [314], shown as Appendix 5). Supervision activities added an average annual Rs 15,337<sup>78</sup> per group and administration costs Rs 4080. A series of one-off activities over the duration of the intervention (including the design and production of

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<sup>78</sup> Nepali Rs 75.55 = US \$ 1 (average exchange rate for period 2001-2004).

the picture card game and the training on how to set up mother and child health funds and group participatory evaluations) cost a total Rs 2,982,487. The average annual cost of the women's group intervention as a whole was Rs 4,930,544. Local personnel costs represented 53% of the total cost, international technical assistance costs constituted a further 28% of the total, equipment 7%, with supplies and rent both constituting an extra 2%.

The women's group intervention cost an average Rs 57 (US \$ 0.75) per capita per year, or Rs 156 (\$2.07) per capita for the duration of the intervention [314]. The average annual cost per married woman of reproductive age was Rs 331 (US \$4.38); or Rs 911 (\$12.06) for the duration of the intervention.

**Table 26 Cost of the Women's Group Intervention in Nepali Rs (2003)**

Activity	Unit	Average total cost per unit*	Total cost during intervention period (%)
<b>Start-up</b>		-	<b>24,976 (14)</b>
<b>One-off</b>			
Picture card game			
Production of card sets†	Picture card set	1,209	23,874 (<1)
Design and training		-	1,063,215 (8)
Mother and child health fund training per group‡	Women's group	8,613	953,139 (7)
Participatory evaluation per group	Women's group	8,235	918,159 (7)
Capacity building		-	24,100 (<1)
<b>Total one-off</b>			<b>2,982,487 (22)</b>
<b>Recurrent</b>		<b>Average annual cost per group</b>	
Facilitation of women's groups		8,311	2,539,387 (19)
Supervision of women's groups		15,337	4,897,907 (36)
General administration		4,080	1,252,241 (9)
<b>Total recurrent</b>		<b>27,727</b>	<b>8,689,534 (64)</b>
<b>Total</b>			<b>13,558,959 (100)</b>

\*Figures are rounded to the nearest decimal place.

†Total of 20 sets of cards used for women's groups: one for each facilitator and eight replacement packs covering loss or damage.

### 9.3 Health Outcomes

Within the trial period, 2,899 live births took place in the intervention area and 3,226 in the control area [1]. The neonatal mortality rate was 26.2 per 1000 in intervention compared to 36.9 per 1000 in control clusters (adjusted odds ratio 0.70 [95% CI 0.53-0.94]), a difference of 10.7 per 1000 [1]. Therefore, an estimated 30.9 (95% CI 5.4 - 56.4) neonatal deaths were averted. On the basis of life expectancy alone, this equates to an estimated 1804 life years saved, and - once discounted at 3% - to 852 life years saved [314], Appendix 5.

### 9.4 Aggregation of Willingness-to-Pay

#### 9.4.1 Choice of Methods

As outlined in Chapter 6, prior to aggregating WTP values and in order to select the appropriate method of aggregation, it was necessary to consider:

- the nature of non-respondents<sup>79</sup> (those who could not give a valuation for the programme);
- to what extent the sample is representative of the target population (i.e. married women of reproductive age in the intervention area);
- how to deal with husbands;
- whether to make adjustments for equity.

This section begins by addressing each of these issues and then draws conclusions as to the most appropriate method of aggregation for this study.

A logit model was used to assess whether the characteristics of those with missing bids were significantly different from those giving a positive WTP value (Table 27)<sup>80</sup>. Amongst the sample of females, those with a missing bid were likely to be significantly

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<sup>79</sup> As we saw in Chapter 7, those giving zero values were genuine zeros and therefore not considered to be non-respondents.

<sup>80</sup> Given strong support for the reduced model, only this is presented in the Table. Bivariate associations between respondent characteristics and being willing to pay a positive amount, a zero amount or not giving a value are shown in Appendix 9.

older and to have spent significantly more on health care in the past years. They were also more likely to be from smaller households and to live further away from the meeting place. They were less likely to be a member of another women's group. Age was the only variable that was also significantly negatively associated with willingness-to-pay. As those giving missing values were likely to be older it follows that their implicit valuation of the programme is likely to be lower than average WTP.

**Table 27 Determinants of Missing Bids (Reduced Logit Models)**

Variables	Reduced Form - females only		Reduced Form - full sample	
	Coef.	Std. Err.	Coef.	Std. Err.
AGE	0.07	0.04**	0.05	0.03
GROUP	-1.28	0.62**	-0.96	0.54*
HTOTAL	-0.36	0.14**	-0.25	0.11**
LOGMED	0.58	0.27**	0.66	0.25***
HUSBAND			0.94	0.73
FARAWAY	1.40	0.65**	1.17	0.65*
NEARBY			-0.96	0.54
_cons	-7.57	2.48***	-6.94	2.18***
N		132		157
Lr CH2		30.45***		32.91***
hatsq		-0.18		0.28
Hosmer-Lemeshow		5.19		8.85
Positive predictive value		86.36%		83.44%

Those with missing bids were dealt with in two ways: 1) they were replaced by the sample mean (or median) and 2) re-coded to zero, based on the conservative assumption that their valuation was zero<sup>81</sup>.

<sup>81</sup> An alternative way of dealing with potential sample selection bias from missing bids would have been to run a Tobit model with sample selection or a Heckman model to see the effect of excluding outliers and missing bids. However, given that the number of missing bids was relatively small, and that these were not obviously non-random this was not done.

In terms of sample representativeness, the only variables to differ significantly ( $p < 0.05$ ) between the sample and the population of women were:

- the proportion of women's group members, which was higher in the female sample than the population of the intervention area (Table 28);
- the proportion of non-members living near the meeting place within each ward was also higher in the sample than at the ward level; and
- the ethnic mix of the sample, which was predominantly Newari followed by Tibeto-Burmese, whereas Tibeto-Burmese ethnicity was predominant in the population.

However, none of these variables impacted significantly on WTP.

**Table 28 Representativeness of Observed Data**

Variable	Sample females	of Sample males*	of Total population of MWRA in intervention area
Member of the MIRA women's group	57%	8%	8%
Non-member from nearby	46% of all non-members		19%
Newari ethnicity	23	24	4
Professional caste	13	18	7
Tibeto-Burmese ethnicity	43	39	62

\* Data relates to their wives.

There was no significant difference between the sample and the population for each of the proxy variables for wealth considered<sup>82</sup>. Using the Demographic & Health Survey (2001) [309], literacy rates were found to be comparable between the sample of husbands and that of men in rural areas of Nepal.

Overall then, the sample was considered to be representative of the population for aggregation in all respects which had a significant effect on WTP. Therefore, an unadjusted mean value transfer was justified as a method of aggregation. In order to

<sup>82</sup> However, when comparing asset ownership in the sample with that reported for rural Nepal as a whole in the DHS (2001), ownership of assets in the sample was much higher [309]. This may be due to temporal difference in data collection (2001 vs 2005).

provide a more conservative estimate, the unadjusted median was also used. To adjust for the over-sampling of women not attending meetings but living nearby the meeting place, a weighted mean transfer was also employed.

A further issue in the aggregation process was whether or not to include the values given by husbands. In Chapter 7, all husbands said they thought the women's groups should continue and a majority were willing to pay towards it. Their willingness-to-pay was often higher than that of their wives. Chapter 8 provided further evidence that women do have their own, albeit limited, budgets and can pay out of them, which strengthens the case for including the values given by husbands in the aggregation process. However, to allow for the remaining uncertainty regarding which budget was used (individual or household), the following three scenarios were considered in the analysis that follows:

- 1) only include the valuation of females;
- 2) only include the valuation of husbands (differentiating between husbands of users and non-users), assuming that their WTP already includes that of females;
- 3) include the valuation of both husbands and females (or the WTP of the couple), assuming they each considered their individual budget constraints in line with welfare economic theory.

Consideration was given to the association between wealth and WTP, the direction and the strength of preference across wealth groups, in order to determine whether or not to include equity weights.

In Chapter 7 a positive association between wealth as measured by the asset index and WTP was shown, although for females the association was not statistically significant. Those in the poorest wealth group were more likely to have given a zero value than those in higher wealth groups ( $p < 0.05$ ) (Table 29). However, the proportion willing to pay a positive amount was fairly uniform across wealth groups. When examining strength of preference (WTP) within wealth groups, the number of observations was small. The data suggest that there was no significant difference in WTP across wealth groups for women's group members. However, for female non-members and males, the least poor were willing to pay significantly more than the poor (RS 295 versus RS 598) for females ( $p < 0.01$ ) and RS 310 versus RS 1,251 for men ( $p < 0.05$ ) respectively.

Applying the equity weights described in Chapter 6, the weight used was found to have different effects on WTP per wealth group. The inverse proportional income weighting shifted the balance in favour of the poorest amongst female non-members and equalised WTP values between the highest and lowest wealth groups amongst men (Table 29). Weighting values amongst the lowest wealth group by a factor of two equalised WTP values between the highest and lowest wealth groups amongst female non-members and overall but was not sufficient to equalise values amongst men. In the sensitivity analysis, each of the three weighting approaches were applied to the population of women not attending meetings and husbands, assuming that a third fall into each of the three wealth groups in the population (as is the case for the full sample).

**Table 29**      **Distribution of Preferences and Strength of Preference by Wealth Group**

	Poorest	Middle	Least Poor
<b>Women's group members</b>	<i>n=20</i>	<i>n=17</i>	<i>n=24</i>
% zeros	11%	8%	0%
% willing to pay a positive amount	80%	81%	92%
Mean unweighted WTP in Rs	425	350	499
<b>Female non-members</b>	<i>n=25</i>	<i>n=16</i>	<i>n=19</i>
% zeros	10%	0%	0%
% willing to pay a positive amount	76%	87%	63%
Mean unweighted WTP in Rs	295	525	558
Inverse proportional weight	765	342	261
Factor 2 – weight to poorest	589	525	558
Factor 1.5 - weight to poorest	442	525	558
<b>Husbands</b>	<i>n=8</i>	<i>n=9</i>	<i>n=11</i>
% zeros	14%	0%	0%
% willing to pay a positive amount	75%	44%	73%
Mean unweighted WTP in Rs	310	399	1,251
Inverse proportional weight	537	258	586
Factor 2 – weight to poorest	621	399	1251
Factor 1.5 - weight to poorest	466	399	1251
<b>All</b>	<i>n=53</i>	<i>n=42</i>	<i>n=54</i>
% zeros	11%	5%	0%
% willing to pay a positive amount	77%	77%	78%
Mean unweighted WTP in Rs	348	413	660
Inverse proportional weight	650	254	303
Factor 2 – weight to poorest	696	413	660
Factor 1.5 - weight to poorest	522	413	660

#### 9.4.2. Total Economic Value

Table 30 presents the aggregated total WTP for each of three methods of aggregation used: unadjusted median values; unadjusted mean; and weighted mean. The impact of assuming a zero value for all non-respondents is also indicated.

The first row of Table 30 shows the most conservative approach where median WTP was used and a zero value assigned to those with missing bids. If the aggregation population was limited to women's group members, total WTP for the intervention was estimated at: Rs 240,000 (US \$ 3,177). If husbands were added, this figure more than doubled increasing to Rs 600,000 (US \$ 7,941). If the values of women who are not members of the group were added, total willingness-to-pay increased 13-fold for females (from Rs 240,000 to Rs 3,107,000) ; roughly 8-fold for males (Rs 360,000 – 2,932,000) and 10-fold for females and males (Rs 600,000 6,039,000). The inclusion of the values of women not attending meetings increased total willingness-to-pay by a factor of between 5 to 15 when the other methods of aggregation were used.

The highest estimate of total economic value was obtained when the unadjusted mean was used for aggregation. Total WTP then doubled for women's group members (Rs 428,000 (US \$5,665), increasing to Rs 1,663,000 (US \$22,012) when husbands were added. When women not attending meetings were added the total increased to Rs 6,014,000 (US \$79,603) for females; Rs 12,947,000 (US \$171,370) for females with husbands.

**Table 30 Total Economic Value of Women's Groups in Nepali Rs**

Aggregation method	WTP per unit***			Total discounted WTP in 000 RS		
	Female only	Male only	Female + Male	Female only	Male only	Female + Male
<b>Stakeholders</b>						
<b>Median (0*)</b>						
Values of users	220	330	550	240	360	600
Values of non-users	215	193	407	2,867	2,573	5,439
<i>Total value</i>				3,107	2,932	6,039
<b>Median</b>						
Values of users	275	990	1,265	300	1,080	1,380
Values of non-users	316	330	646	4,226	4,410	8,637
<i>Total value</i>				4,526	5,490	10,016
<b>Unadjusted Mean (0*)</b>						
Values of users	350	755	1,105	382	824	1,205
Values of non-users	395	332	666	4,469	4,431	8,900
Values of non-users				4,851	5,254	10,106
<i>Total value</i>						
<b>Unadjusted Mean</b>						
Values of users	392	1,133	1,525	428	1,236	1,663
Values of non-users	418	426	844	5,587	5,696	11,283
<i>Total value</i>				6,014	6,932	12,947
<b>Weighted mean (0*)</b>						
Values of users	350	**	1,105	382	**	1,205
Values of non-users	305		632	4,072		8,503
<i>Total value</i>			672	4,454		9,708
<b>Weighted mean</b>						
Values of users	392	**	1,525	428	**	1,663
Values of non-users	406		832	5,429		11,126
<i>Total value</i>				5,857		12,789

\* (0) missing bids are coded to zero.

\*\* Cannot weight husbands by distance (near/far from meeting place) due to limited sample size. Instead, figures from the unweighted analysis were used for men.

\*\*\* Unit is either individual or couple

## 9.5 Economic Evaluation

### 9.5.1 Cost-Benefit Analysis

#### 9.5.1.1 Base Case Analysis

Using the estimates of total economic value and comparing them to the cost data presented earlier, the following net benefits and benefit-cost ratios were derived (Table 31). So as not to overcrowd the table, only the extreme cases of median (non-respondents coded to zero) and unadjusted mean (non-respondents valued at the mean) are presented.

In the base case analysis, none of the aggregation methods yielded positive net benefits or a benefit cost ratio greater than one. Costs outweighed benefits by between Rs 612,000 and 13,319,000 (US \$8,101 – \$176,294) depending on the method and unit of aggregation and whether the values of female non-members were included in the calculation. The unadjusted mean aggregation including values from all three stakeholders (women attending meetings, those not attending and husbands) yielded the largest estimate of total benefit.

**Table 31 Key Cost-Benefit Results**

	Stakeholders	In 1000 Rs	Net benefit (Benefit – Cost)	Net benefit (benefit/cost)
Cost		<b>13,559</b>		
Total Benefit	Females	240	-13,319	0.02
Median (0*)	+non-use values	3,107	-10,452	0.23
	Males+females	600	-12,959	0.04
	+non-use values	6,039	-7,520	0.45
Total Benefit	Females	428	-13,131	0.03
Unadjusted Mean	+non-use values	6,014	-7,545	0.44
	Males+females	1,663	-11,896	0.12
	+non-use values	12,947	-612	0.95

At the unit level, the cost per MWRA was estimated at Rs 911 compared to mean WTP of Rs 403. There were 14 MWRA's (9% of the total) who reported a willingness-to-pay above Rs 911<sup>83</sup>.

#### *9.5.1.2 Sensitivity Analysis*

Costs were fairly robust to changes in most parameters. The largest effects were noted when: a 6% discount rate was applied to costs (total cost falling to Rs 13,324,300) and when the proportion of administration costs allocated to the project was reduced from 40% to 10% (total cost falling to Rs 12,230,034) (Appendix 5).

Assumptions regarding the method of aggregating WTP had a significant effect on the estimates of total economic value obtained. Table 32 shows the impact of assumptions in relation to an aggregate population comprised only of women's group members, and the unadjusted mean aggregation. The results were most sensitive to whether or not the values of female non-members were included. The second most significant variable was the unit of aggregation: either male or female or both. By comparison, the aggregation method and the method of dealing with non-respondents had a far smaller effect on total economic value. The inclusion of equity weights affected the values of female non-users and husbands to a relatively limited extent. Total WTP including female non-users increased by between 8-31% depending on whether the inverse weighting or factor 2 weight for the poorest were used respectively. Total WTP including husbands increased by between 2-45% when these weights were used.

When the values associated with non-health benefits were set to zero, aggregate WTP fell by between Rs 116,000 (US \$1,535) (females only) to Rs 6,520,000 (US \$86,300) (females, males and female non-members), representing respectively a 27% to 50% reduction in aggregate WTP. When the value of time was set to zero for those opting for a time contribution, total willingness-to-pay fell by 19%.

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<sup>83</sup> Mean WTP was RS 1,384. Median WTP was 1,477.

**Table 32 Impact of Assumptions on Results (women's group members unweighted mean)**

Parameters	Assumptions	Total WTP in Rs (000s)	% divergence from base case (Rs 428,000)
Dealing with non-respondents	<i>Drop non-respondents*</i>	428	
	Include non-respondents as zero values	382	-11%
Aggregation method	<i>Unadjusted mean*</i>	428	
	Median	300	-30%
	Weighted mean <sup>Ⓐ</sup>	-	-3%
Unit of aggregation	<i>Use female WTP*</i>	428	
	Use male WTP	1,236	+189%
	Use male + female WTP	1,663	+289%
Non-use values	<i>Exclude non-use values*</i>	428	
	Include non-use values	6,014	+1,305%
Non-health benefits	<i>Included in valuation*</i>	428	
	Set to zero	312	-27%
Value of time	<i>Value time using foregone wage*</i>	428	
	Value time for those giving up time as zero	348	-19%
Discount rate	<i>Discount benefits @ 3%*</i>	428	
	Undiscounted benefits	440	+3%

\*Base-case assumptions

& in relation to non-members

### 9.5.1.3 Economies of Scale

If the intervention were to be replicated elsewhere in Nepal, start-up costs could be economised and technical assistance could be provided by local instead of international staff. By removing the start-up costs associated with the women's group intervention and replacing the technical assistance costs with that of a local project manager, the total cost would fall to Rs 8,882,942 (US \$117,577).

The women's group intervention is also likely to benefit from significant economies of scale. The district-wide annual costs in a population of 400,000 were estimated at Rs 10.3

million (US \$135,704) in plain districts and Rs 12.2 million (US \$161,095) in mountain districts. This equates to Rs 23 (US \$0.30) and Rs 30 (US \$0.40) per capita per year or Rs 62-83 (US \$0.82- \$1.10) per capita for the duration of the intervention.

The total economic value of the intervention would then increase to between Rs 2.9 million (US \$38,411) for women's group members (under conservative assumptions) to Rs 5.9 million (US \$77,882) (unadjusted mean). However, the WTP value to female non-members alone would amount to Rs 22.6 million (US \$299,055). Even under the most conservative assumptions net benefits would be positive if non-use values are included.

## **9.5.2 Cost-Effectiveness Analysis**

### *9.5.2.1. Base Case Analysis*

The cost per newborn infant born during the study period was Rs 1701 (US \$22.51). The incremental cost per newborn life saved was Rs 438,266 (US \$5801) or Rs 15,941 (US \$211) per life year saved (Table 33) [314].

### *9.5.2.2 Sensitivity Analysis*

Although the trial was not powered to detect a significant difference in maternal mortality, a reduction was observed (69 versus 341 per 100,000) (adjusted odds ratio 0.22 [95% CI 0.05-0.90] [1]. Inclusion of maternal outcomes reduced the cost per life year saved to Rs 13,221 (US \$175).

If the reduction in neonatal mortality risk were sustained beyond the time frame of the trial to future pregnancies of the current cohort of women, the cost-effectiveness ratio would fall to between Rs 8,311 - 10,955 (US \$110 - \$145) per life year saved, with a constant reduction in neonatal mortality risk and a 50% lower rate of reduction respectively.

Overall, the cost-effectiveness ratio varied from Rs 6271 (US \$83) to Rs 17,830 (US \$236) per life year saved in response to changes in most parameters (Appendix 5). The only exceptions were the cases when benefits were discounted at 6%, and where the intervention's effectiveness in reducing neonatal mortality was less than that observed

during the trial. When the lower limit of the 95% confidence interval for the difference in neonatal mortality was used the intervention became less cost-effective, the cost per life year saved increasing nearly five-fold.

**Table 33 Key Cost-Effectiveness Results**

Women's group intervention	
<b>Total cost (Rs)</b>	<b>13,558,994</b>
<i>Difference in number of neonatal deaths (control – intervention)</i> <sup>[1]</sup>	30-94
Cost per neonatal death averted (Rs)	438,235
<i>Life years saved per death averted</i>	27.54
<i>Total life years saved</i>	852
Cost per life year saved (Rs)	15,914

### 9.5.2.3 Economies of Scale

Given the potential reduction in cost resulting from taking the intervention to scale, the cost-effectiveness ratio would fall to between Rs 9,444 – 11,257 (US \$125-149) per LYS depending on topography were the intervention to be scaled-up to a larger population.

## 9.6 Methodological Implications

There are two methodological issues that are raised by this study both in terms of the measurement of aggregate benefits and total costs.

Whilst the cost-effectiveness ratio was fairly robust to changes in key parameters, the ratio of benefits to costs was extremely sensitive to whose values were included in the aggregation process, the inclusion of non-user benefits increasing total economic value more than 10-fold. The difference between aggregate use versus non-use values is even higher than estimates from studies in other sectors. For example, in the transport sector it was reported that the value for a statistical life in a 'caring society' was between 10-40% higher than a purely selfish society [98] and non-use benefits were estimated to be 6-times greater than use values in an environmental economics study [359]. The significance of

non-use values is likely to be due to the combined effect of the context (community-minded) and the intervention (community-based).

Equity issues were not a concern for women's group members as there was no significant difference in the direction or strength of preference between wealth groups. This may be due to the method of estimating wealth as discussed in the next chapter, or the method of eliciting values for women's group members. For female non-members and husbands the poor were willing to pay significantly less than the other wealth groups, and this was adjusted for by a variety of equity weights.

The aggregation findings are important in that they highlight the significance of different methods of aggregation on overall results. However, there is currently little guidance available within the health economics literature on aggregation rules for cost-benefit analysis. Issues of equity have been discussed [43] but, as far as we are aware, the question of whose values to include and the method of aggregation have not yet been addressed. Indeed, very few studies were found that went on to use WTP estimates within a CBA. Whilst such a debate has been carried out within the environmental sector, the relevance of these issues to the health sector also needs to be discussed. These results show that this is an important issue, particularly for programmes which are likely to have significant externalities. Further studies are required to assess whether non-use values are consistently high for other interventions and in other socio-economic contexts.

The method of valuing technical assistance and the scale of implementation had a significant effect on total costs. Whilst it is common place to value foreign inputs at actual prices in recognition of the likely effect that this involvement will have on programme effectiveness in the initial stages of implementation, it may raise the budget beyond levels that can be reasonably matched by the willingness-to-pay of local populations. Furthermore, the estimation of WTP was carried out against a scenario of local control and participation (NGO funds coming to an end). The replacement of expatriate costs with local equivalents reduced the total cost by 20% (similar to findings reported elsewhere, 21% [360]), significantly reducing the discrepancy between costs and benefits, although costs still outweighed benefits except when male and female values were added together and non-use values were included. There is also the issue that

benefits may reduce when costs reduce in this way, the trial setting and presence of foreign staff serving perhaps to motivate and raise standards. This was adjusted for in the CEA (assuming a 50% reduction in effectiveness) but it is unclear what the effect, if any, on WTP might be.

## 9.7 Policy Implications

Final judgement about whether or not to allocate resources to a given intervention is dependent on a set of decision rules which are themselves specific to the type of economic evaluation undertaken.

### 9.7.1 Cost-Effectiveness Analysis

For cost-effectiveness analysis, the first step of prioritisation is based on comparing an intervention's incremental cost-effectiveness ratio (ICER) with a cost-effectiveness 'threshold' value, which defines a maximum acceptable ICER and implicitly places a monetary value on relevant outcomes, in this case, life years saved. Empirically, some studies have used annual per capita income<sup>84</sup> as the 'threshold' value [361]. The World Bank proposed a lower threshold, suggesting that interventions with a cost-effectiveness ratio below US \$197 per DALY averted (2004 prices<sup>85</sup>) were 'attractive' investments for governments and represented good value for money [121]. A threshold of twice per capita gross national income is used for example by the National Institute for Clinical Excellence, when recommending which interventions should be funded by the NHS [362] [363]<sup>86</sup>.

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<sup>84</sup> This is consistent with the human capital approach to valuing a statistical life, or the marginal benefit to society of saving a life, in terms of the present value of expected future earnings.

<sup>85</sup> Original estimate in 1993 prices was US \$150 per DALY.

<sup>86</sup> However, the use of gross national income as an approach to valuing outcomes has been criticised by some as being too narrow, ignoring broader welfare gain [364], although this author also criticises the use of WTP to value outcomes and does not offer a practical alternative. Evans instead proposes a global welfare function, with a global WTP for saving lives, however, it is not specified how this would be operationalised (ibid). In the same vein, a recent study proposed that only looking at the health-related impact of vaccines would undervalue them in relation to alternatives [365]. This study suggested that the impact of improved health on economic growth also be measured, by estimating the long-term effects of averted illness on physical, emotional and cognitive development and including improved educational performance for children and greater productivity.

Using national income as a threshold, and bearing in mind the estimated per capita gross national income in Nepal is US \$260 [306], our estimate of cost per life year saved (US \$211) falls below this value, as do most of the results obtained in the sensitivity analysis<sup>87</sup>, suggesting the intervention is cost-effective. The available budget should then be used to implement the most cost-effective interventions up to the point until resources are depleted.

The final decision as to whether this investment represents good value for money requires consideration of alternative uses of resources. A study by Bang and colleagues evaluated an intervention in India using village health workers supervised by physicians to manage and treat neonatal illness at home reported an average cost of \$151 per neonatal death averted (including stillbirths) [366]. However, administration costs, technical assistance, and start-up costs were excluded. Furthermore, costs were only estimated for the final years of the intervention, when they were probably lowest. More generally, addition of community-based interventions to promote neonatal health has been estimated to cost between US \$100 to \$ 257 in India [367].

Another study examined the cost of providing services through the government health system in Guinea where the cost of prenatal and delivery care provision at health centres was estimated at US \$136 per life year saved (inflated to 2004 prices) [368]. Inclusion of essential newborn care within facilities has been estimated to cost between US \$11-26 in India, although it is recognised that a substantial initial investment would be required to make the provision of such care feasible [367]. Such supply side interventions are likely to offer limited coverage in the Nepalese context, however, where it was estimated that US \$0.67 per capita of the general population would be needed to increase coverage of facility-based obstetric care to 20%, increasing to US \$3.03 for the 90% level of coverage targeted for 2015 [369]. Given, the geographic, financial, and cultural barriers that separate women from health facilities in Nepal and many parts of South Asia, a

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<sup>87</sup> We assume there is little difference between YLS and DALYS. Mills & Shillcutt also found that there was little difference between YLL and DALYs (as the former predominated in the calculation of the latter – there were few morbidity effects) [361].

community-based intervention may be a more realistic, affordable and potentially efficient use of resources than trying to provide institutional care to all women.

The problems of transferring findings from other settings are well recognised. However, only two other cost-effectiveness analyses were identified from within Nepal which compared costs with a final measure of outcome. One study targeting malaria control estimated the cost per life year saved at between \$6 and \$1034 (2004 prices) depending on assumptions [370]. Another study estimated the cost of cataract surgery at between \$4-28 (2004 prices) [371], although it is not clear whether the costs of hospital construction were included in this estimate.

### **9.7.2 Cost-Benefit Analysis**

For cost-benefit analyses, if benefits exceed costs, the intervention can be said to be welfare enhancing: society is better off with the programme in place [372]. The magnitude by which benefits exceed costs indicates the size of welfare gain and can be used to compare projects. The available budget then helps to choose between competing interventions which are welfare enhancing.

Using WTP derived by a CV survey to value the welfare effects of the intervention, this chapter found that costs exceeded benefits under the initial assumptions. However, if the intervention were to be taken to scale and non-use values are included, even under the most conservative estimates, benefits would exceed costs by a large amount. Furthermore, the use of WTP as a measure of benefit provided a measure of the extent of underestimation in welfare that would have resulted from only considering health benefits. The effect was to reduce aggregate WTP by between 27 to 50%.

The difference between costs and benefits in the base case analysis may be explained by the combined effect of expatriate inputs in the analysis of costs and a variety of factors which may have constrained benefits. In settings such as rural Nepal, respondents are constrained both in terms of the values they can give (very limited resources) and potentially also the benefits they perceive. This contrasts with findings reported elsewhere [364] that the value of life years saved using the national income approach will be much less than the value derived using the WTP approach (based on existing estimates for

developed and developing countries). In such instances total WTP may underestimate the value of social benefits, as found in a study in Nicaragua [263], where the economic value placed on improving the quality of natural water sources by local residents was relatively modest compared to costs.

Furthermore, whilst respondents clearly valued the non-health aspects of the groups, their WTP was not fully informed about the exact level of mortality reduction in the scenario, although they were told that the intervention's objective was to reduce neonatal and maternal mortality. The possible implications of this for WTP is discussed in the final Chapter.

A last point is that we did not consider benefits beyond the area of the intervention. It could be that the intervention inspires non-use values amongst people living beyond the intervention area (e.g. elsewhere in the district), and potentially the entire country population. However, the elicitation of such values would present challenges, in terms of ensuring respondents understood that they were valuing other women attending groups rather than the option of the intervention being set up locally. Furthermore, such a value, if it exists, is also more likely to reflect pure altruism than a more 'focused' kind of altruism as advocated by Jones-Lee [98]. Given that those living further away were generally willing to pay less than those living nearby (Chapter 7), it is also likely that WTP would decline and the rate of missing bids would increase with distance.

There have been few other studies using the CV method to estimate WTP for health care interventions in Nepal. A study of WTP for cataract surgery amongst the visually impaired in Kathmandu valley also found that there was a significant difference between values given by women compared to men, despite women being more seriously affected by the condition (mean for women US \$2.3 (Rs 174) versus US \$13 (Rs 982) for men per operation). A study of household WTP for delivery care options estimated that most women (56%) preferred to give birth at home, in the absence of complications, with only a third of all women preferred to deliver at a comprehensive obstetric facility [327]. On average women were willing to pay up to Rs 733 (US \$9.70); median Rs 500 (US \$6.62) for a delivery at home with a trained attendant. Those who preferred to deliver at a comprehensive essential obstetric care facility (one-third) were willing to pay Rs 4,886

(US \$64.67) on average. Willingness-to-pay for a basic obstetric care facility was much lower: Rs 1,452 (US \$19.22). However, in each of these cases, WTP was strongly influenced by perceived cost and closely mirrored the actual costs of care seeking. Furthermore, in order to compare with the current intervention, information on costs and a CBA is also required. It is likely that given the nature of these interventions, non-use values will be lower.

## **9.8 Conclusion**

Cost-effectiveness analysis overlooks the intervention's non-health benefits as well as the value to members of society with no potential health gain which are significant for communities, and hence does not value all potential social benefits. WTP offers a means of valuing these benefits, however in order for them to inform resource allocation decisions, WTP values need to be included in a CBA and aggregation issues need to be addressed by researchers. This chapter has shown that the choice of whose values to include and the method of aggregation have a very significant effect on outcomes. There has been extensive debate surrounding the methods of CEA in the health sector and numerous guidelines setting out acceptable assumptions and methodological approaches. Such debate is urgently required in relation to CBA, in order to reach agreement on the most acceptable method of presenting results in terms of cost and outcomes and reaching consensus on the relevance of non-use values, especially for interventions where these are likely to be significant.

## **Chapter 10      Discussion and Conclusions**

This final chapter of the thesis provides both a synthesis of the key findings and a reflection on the methods that were used in this study. In doing so it highlights the implications of this research and makes recommendations for future research in this field.

### **10.1 Overview of Key Findings and Reflection on the Methods Used**

#### **10.1.1 Feasibility of Carrying Out a Willingness-to-Pay Survey to Value a ‘Social’ Intervention in a Low Income Setting**

One of the primary objectives of this research was to test the feasibility of administering a CV survey to evaluate a community-based participatory intervention in a resource poor context with low levels of literacy. Whilst an increasing number of health-related CV studies have been carried out in low income countries, these have essentially been to inform the pricing of a commodity or a cost sharing strategy. This study is, as far as we are aware, the first in a low income setting to use WTP to estimate the social value of a programme for a CBA within the health sector. This raised challenges in terms of:

- how to pose the survey questions in order to maximise respondent understanding, elicit meaningful values and minimise non-response;
- ensuring respondents were able to quantify their preferences in monetary terms given very limited resources.

This section examines the content and construct validity of the measure derived and highlights issues in relation to the application of these validity tests in a low income context.

##### *10.1.1.1      Content Validity*

Qualitative methods proved extremely valuable in the process of survey design, giving insight into how much respondents were likely to know. This enabled the demarcation of ‘health’ and ‘non-health’ benefits and ensured the resulting survey was relevant to the study context.

Whilst the focus groups were guided initially by preconceptions of which approach might work, ultimately the process was led by the group participants and their reactions to different question types. It would have been very difficult to anticipate many of the scenario design issues without this process. Although some of the issues could have been addressed through survey pre-testing, the focus group context allowed for a variety of aspects of the survey to be explored at the same time. Participation in the focus groups helped to train and convince interviewers of the meaning and feasibility of the CV approach and gave them a sense of ownership over the resulting survey tool as they had been actively involved in the design process. It was also an important means of introducing them to the community and ultimately gaining a degree of acceptance.

The survey tool elicited high response rates in all stakeholder groups possibly reflecting the success of the focus groups. Despite their limited resources, almost all those who were able to respond to the WTP question had a positive valuation for the programme. The inclusion of non-monetary payment options helped to increase the number of positive values elicited by 8%, although an overall preference for money as a method of contribution was reported. Only 1% of respondents reported a lack of understanding of the valuation question. Non-responses generally reflected a lack of trust in the payment vehicle (the method of collecting money) and/or the hypothetical nature of the scenario (women's groups being run by the community rather than the NGO).

The importance of trust in the payment vehicle in eliciting appropriate values and avoiding strategic behaviour (such as non-response) was emphasised during the group discussions. However, in settings where formal revenue collecting institutions (such as a system of insurance or general taxation) do not exist, the only means of collecting revenue is through such an informal community network. In such cases, the extent of trust and prior-positive experience with that network is likely to have significant bearing on how people respond to WTP questions, particularly for interventions such as this which require an ongoing contribution from individuals. Therefore, the generation of trust that others will pay, and that the money will be appropriately managed and used, was found to be an important element in forming a credible scenario. A failure to account for and promote the factors that build trust when eliciting WTP values is likely to reduce the content validity of responses. In our setting, community cohesiveness (which was explained by ethnic

homogeneity and previous positive experience with collecting and managing money within the group) was highlighted as being important in promoting trust. Whilst it was possible to identify communities with and without 'trust' by use of the qualitative data derived from the group discussions, this variable was only available *ex-post* (during the analysis stage of the research) and therefore was not available for all communities.

Qualitative methods can clearly add much to the design of CV surveys in low income countries and elsewhere, particularly when dealing with complex commodities [156]. They can also be used in the design of discrete choice experiments. However, the process of data collection, transcription, data entry and analysis takes time. Thus sufficient time and resources need to be factored in to allow for this process of research.

#### *10.1.1.2 Construct Validity and Determinants of Willingness-to-Pay*

In addition to content validity, construct validity was also explored in the study by assessing whether WTP had the expected relationship with key variables. This helped to characterise exactly how the intervention was perceived and valued by women and also raised a number of questions in terms of the appropriateness of the income measure.

The women's group intervention generated greater welfare in areas where health service use was low and was valued more by groups with less options available to them. There was no significant effect of income on WTP for females. Further work is required to show whether participation in the group discussion prior to the individual interview served to remove the income effect from the valuations of women's group members, reducing the overall level of effect for women as a whole. An important avenue for future research in low income country settings would also be to validate the household asset index against discretionary income of women to confirm whether or not it offers a reasonable estimate of their access to cash. If the household index is found to be a poor proxy for female discretionary income, it may be necessary to explore the use of female-centred assets (e.g. saris, bangles in the Nepali context) or to obtain a measure of female-specific consumption. Alternatively, the objective could be to derive some measure of the 'sharing rule' or to what extent females have access to and control over the household economy. A last point is that, given that the actual perceived budget may stretch beyond household

resources (as discussed in Chapter 8), it would also be helpful to capture some measure of access to external (community) resources, or capacity to borrow money. This information could be elicited during the interview process.

The negative association between education and WTP might be explained by the greater capacity to benefit of those with less education. Alternatively, using a game theoretical framework and drawing from the findings of Chapter 8, it could be interpreted as the ‘sucker’s payoff’, whereby the less educated through naivety end up paying, whereas the better educated are more able to think up alternative ways of generating revenue to sustain the group that do not require them to pay.

Given the importance of trust in the credibility of the scenario, researchers using the donation mechanism to elicit WTP values should in the future aim to identify variables that are likely to be related to trust and emphasise them in the scenario description to improve content validity. They should also attempt to measure them during the CV survey so as to include them as independent variables in the regression analysis.

One of the novelties of this research was the attempt to adjust for hierarchical clustering through the use of a random effects model. Although, in this case, no clustering effect was detected this is likely due to the small within group sample size. However, there is scope for the use of such methods of analysis of CV data in the future when interviewing individuals from the same household, or for group type interventions such as this one.

### **10.1.2 Do Community-based Interventions have Significant Non-Health Outcomes and is the Contingent Valuation Method Appropriate for Valuing these Outcomes?**

The rationale for exploring the use of WTP was the concern that by focusing on health outcomes as the measure of benefit, we would potentially miss a whole range of additional process or non-health outcomes resulting from the programme. During the preliminary discussions, learning and knowledge generation and sharing were identified by women to be key programme outputs. In addition, the development of community strategies, particularly the emergency loan fund, were emphasised to be of significant value to all concerned (even husbands), not only for the associated sense of financial security (‘if I need a loan I can take it’) but also because it provided a sense of achievement and

community development. Our quantitative findings also supported this view, with over 80% of respondents being willing to pay for non-health benefits and 42% exclusively. This shows that non-health benefits were clearly important and were valued by individuals. Failure to value these benefits would underestimate welfare effects substantially.

However, the study design did not allow for the assessment of the relative value of non-health effects compared to health effects. In order to do so it would have been necessary either to ask respondents for their WTP for each specific type of benefit<sup>88</sup> [84], or have undertaken some form of conjoint analysis using discrete choice, rating or ranking methods, forcing respondents to trade between different attributes [11]. This would have provided a relative valuation for each attribute. Whilst such approaches can and should be tested in future studies elsewhere, the feasibility of either approach was highly questionable in the study context. During the pilot study respondents were asked to rank the reasons why they were willing to pay in order of importance in line with Ryan (1996) [10] but this was later discontinued as respondents found it very difficult to carry out such a ranking exercise. Given the relative simplicity of ranking compared to valuing or trading between attributes, these methods were deemed to have been too difficult for respondents and were therefore not used. One of the challenges to the use of the discrete choice approach in relation to this type of intervention also lies in finding a means of specifying and effectively communicating levels for each attribute (some of which are quite abstract and difficult to break down into numerical figures).

Within this study, health and non-health outcomes were not quantified within the scenario. In terms of non-health outcomes, such as learning or social gathering, the main difficulty was the lack of means of measuring and presenting outcomes to respondents on a quantitative scale. In terms of the health outcomes, the main reason was that the economic study was carried out concurrently with the trial and thus effectiveness data were unavailable. Therefore it was not possible to communicate these data to the community.

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<sup>88</sup> Although this runs the risk of the embedding effect.

Finding mechanisms to deal with the lack of effectiveness data is an issue which will increase in prominence if willingness to pay studies are promoted as a means of conducting economic evaluation alongside trials.

A way round this may have been to present alternative risk scenarios to different sub-groups to see if and how preferences responded to risk data. However, this would have required a much larger sample size, and is likely to have been rejected on ethical grounds as it may have lead to misconceived ideas of the intervention's effectiveness and potential confusion within communities. An additional concern was respondent ability to understand such data given low levels of formal education. The presentation of raw probabilities would have been inappropriate. The 'community' approach discussed in Chapter 4 is likely to offer the most promising means of data presentation in such settings: total community level effect in terms of deaths averted. In the current study, this would have equated to roughly ten neonatal deaths averted per year or a total of 33 deaths for the programme duration in a population of 14,884 married women of reproductive age and almost 3,000 births. There are still two concerns, however, with this approach. The first is ensuring that 'the community' (in this case 14,884 women) is communicated clearly and is meaningful to respondents. It assumes people feel a sense of altruism and awareness of others beyond their own village and that they can conceive of such large numbers<sup>89</sup>. The second is that, to a non-statistical audience, such numbers may seem small and possibly trivial. On the other hand, in the absence of such information, individuals are likely to overestimate risk. Determining to what extent these issues are a problem and how they can be overcome are important areas for future investigation.

The effect on results of excluding the intervention effects from the CV scenario will depend on the extent to which an individual's baseline assessment of the intervention effect is greater or smaller than actual effect. In terms of health outcomes, past pregnancy experience is likely to influence individual risk assessment and this was estimated and tested for in the regression analysis. The effect was insignificant for females and men. So the absence of health-related data is unlikely to have affected the valuations of respondents with previous complications.

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<sup>89</sup> Whilst more appropriate in the context, the presentation of ward level results would not have been statistically accurate.

Overall the findings show that individuals are willing to pay for non-health outcomes and these had an important effect on the overall welfare derived from community-based participatory programmes. Further research is needed to explore the feasibility of asking people to trade between non-health and health outcomes in order to ascertain the relative value of each. It would also be interesting to explore to what extent, if any, people's willingness-to-trade between different type of outcomes varies from low to high income country settings. In low income country settings, further research into the feasibility and most appropriate methods of communicating intervention effects in terms of risk and probabilities is urgently required, particularly for events such as maternal and neonatal mortality that are relatively infrequent.

### **10.1.3 Does the Contingent Valuation Method Offer a Means of Valuing Externalities from Social Interventions and are these Potentially Important for Cost-Benefit Analysis?**

A further issue that this research addressed was the valuation of externalities. There has been little discussion by health economists of 'non-use' values and their relevance in the assessment of WTP. Unlike environmental commodities which are typically public goods with a well recognised use and non-use value, health economists have been more sceptical of the relevance of non-use values to health care [246]. Users or the general population have generally been interviewed to elicit 'use' values. A handful of studies made explicit efforts to assess the non-use values of programmes in relation to altruism, or caring externalities (e.g. [123] [373]), but this was generally for reasons of equity or methodological development rather than for the valuation of (positive or negative) externalities within a CBA framework.

In relation to a community-based participatory programme such as this one, it was initially hypothesised that there would be potential benefits and disbenefits to a range of stakeholder groups who were not directly participating in the programme. The existence of disbenefits was, however, not borne out in the preliminary focus group discussions prior to the start of the survey. Husbands expressed strong caring externalities which it was felt should be captured and measured within the analysis, as did female non-users who also expressed passive use value (their learning from those attending).

The absence of significant differences in the willingness-to-pay values obtained from women's group members compared to female non-members suggests that non-use values were very important. The inclusion of these values also had a dramatic effect on the estimates of total welfare presented in Chapter 9 and altruism was an important component of the value of the programme to non-users.

On the basis of the preliminary discussions with women not attending meetings and the findings of other studies [123] [374], it was expected that altruistic WTP would be less than selfish WTP, and that the values of women not attending meetings would be less than that of women attending meetings. There are a number of explanations as to why this was not so in this study. One of the reasons could be that participation in the group discussion prior to the CV survey reduced the values given by women's group members, as it gave them more time to think, formulate preferences and reflect upon available resources. This has been found in other studies using group-based approaches (e.g. [224]). In the other studies of altruism, respondents have first been asked to give their own selfish valuation for a commodity and then their altruistic valuation for someone else. It could also be that an initial 'selfish' valuation reduced the available budget for the altruistic valuation. A final explanation is that part of the WTP value elicited from non-users was driven by a passive use or option value and/or a 'warm glow' effect which is common amongst donation mechanisms, reflecting the moral satisfaction from giving.

A limitation of the study is that it was not possible to address the question of the relative value in terms of WTP of different components of non-use value (altruism in relation to passive use value, option values and warm glow). Two simple approaches could be employed in the future to address this question. One would be to ask respondents for the reasons why they were willing to pay (their motivations) through a series of appropriately defined closed ended questions (e.g. 'would you attend meetings in the future?'). This would also enable the assessment of the impact, if any, of 'warm glow' effects on WTP estimates. A concern with this approach in relation to option value in this particular context is the risk of yeah-saying, whereby respondents may feel that they are expected to say 'yes'.

An alternative approach would be either to offer different elicitation formats (respectively eliciting altruism, option or other non-use value) to different sub-samples, or to present respondents with a series of questions [155]<sup>90</sup>. However, it is not clear that within the study context, the difference between these payment scenarios would have been easily understood although this approach has worked well in higher income countries.

The group discussions also indicated that non-members were not the only ones to express altruism, women's group members were in some cases driven to attend meetings for altruistic motives and a desire to serve the community; a social conscience, rather than purely selfish motives. Fifteen percent of women's group members were attending meetings and were willing to pay for them because of, at least in part, altruistic motives.

The study also has implications for the estimation of household WTP. Husbands overall were found to reflect positively on the programme, and their values were generally greater than those of their wives and reflected to a great extent the non-health aspects of the programme. The difference between male and female valuation challenges the unitary model of household behaviour that underlies CV studies and predicts both values to be the same. However, in practice, individuals from the same household can have different preferences and it can be of interest to try and capture this, as was the case in this study. The inclusion of male values in the aggregation of WTP had a dramatic effect on total economic value, being the second most significant variable to impact on results in the sensitivity analysis. This raises the question of the appropriate measure of a couple's WTP and whose values should be included in a CBA.

A number of lessons were learnt in this respect during this research. If males and females are interviewed separately, it is important to ensure that respondents consider their own budget constraint. In this study, whilst respondents were instructed to do so, they may have also taken into consideration the budget of their partner (especially for women who had no independent source of income) which could result in overlap between what men and their wives were willing to pay. Furthermore, researchers should take care to ensure

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<sup>90</sup> An example of a question to elicit option value would be: How much would you pay to attend in the future? or; How much would you pay to support the group for other women? (to elicit altruism); Do you feel that you benefit from this programme? How much would you pay for these indirect benefits to yourself? (passive use value).

the budget specification is conditional on payments made by the other party, as recommended by Bergstrom [375]. An alternative approach would be to interview males and females separately and then together and compare their individual versus collective valuations [376]. The concern with eliciting a collective valuation immediately is that one or other valuation might dominate (in the context of this study, women might have been reluctant to voice their preference and valuation in the presence of their husband).

Overall, our results suggest that externalities were indeed important for this type of intervention and had a dramatic effect on the total benefit estimates. In terms of the generalisability of these findings, it is likely that the magnitude of non-use values will be a function of the level of community cohesion and shared identity. This will determine the extent of information diffusion amongst individuals within the community. For example, the passive use values derived in this context may not be relevant for an intervention of a similar nature in the UK, where individuals lives are less entwined, limiting the extent of information sharing. Because of the feeling of a shared lot, the potential for altruistic sentiment (in terms of income sharing) may be higher in lower income settings, although weighing against this tendency is the constraint of limited resources and meeting basic needs. Further research in all settings should be directed at identifying the precise nature of non-use benefit, and the relative role and value of each type of non-use value for such programmes, and begin to build consensus within health economics as to the conditions for their inclusion in CBA. Furthermore, additional work on the WTP of households as economic units is also necessary to account for power relations within them and the possibility of differences in preferences amongst members.

#### **10.1.4 What is the Relative Role and Value of Group Discourse in the Contingent Valuation Process?**

One of the novelties of this research was the use of mixed methods for eliciting WTP. Whilst this approach is on the increase in other sectors, it has only recently begun to be discussed by health economists, and there is no evidence so far of implementation by CV analysts in the health sector as part of the survey process<sup>91</sup>.

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<sup>91</sup> One of the challenges is in getting such studies published and ensuring they meet with methodological conventions of both economists and qualitative researchers.

Group discussions offered an effective means of stimulating discussion and preferences relating to WTP prior to the administration of the individual survey tool. The information contained in the discussions was insightful as to how preferences, budget and willingness-to-pay translate in a very different cultural context, and in relation to a 'social' commodity (i.e. a women's group). Within the group, participants evaluated the WTP exercise, identifying and pinpointing a range of challenges. Highlighted were differences in interpretation and thus valuable insights were gained into the adaptation of the survey questions to the local context. The group approach also offered the means of tailoring the information provided to the needs of different individuals.

Within the group, participants were better able to take into consideration the broader social and institutional structure within which the commodity was produced/used and addressed relevant equity issues (Who is deserving? Who can pay? And who cannot?). The groups were not originally intended to elicit WTP values, just to give participants the time to think through and discuss the CV scenario and ask questions. However values were spontaneously proposed and discussed by participants. The discourse around the proposed values suggested that they were determined by community rather than individual-level variables, such as a notion of what is 'fair' or acceptable to the community, taking into consideration the ability to pay of the lower socio-economics groups. Preference formation in this context was apparently motivated by a concern for others and social aspects of the programme; findings consistent with other studies using group discourse in the environmental sector [178] [231].

There was no apparent 'anchoring' of individual valuations around the values discussed in the group setting, i.e. individual values given by those participating in discussions were no less dispersed or centred on the values discussed in the group context than were the values given by those who did not attend the discussions. However, the study design did not allow for testing of the precise effects of the group environment on subsequent individual WTP values. So it was not possible to gauge if subsequent valuations were free of income effects because of the group discussion, and whether the discussion and added 'time to think' resulted in lower values than would otherwise have been derived. Furthermore, due to limitations in time and resources, group discussions were only conducted with women's group members and not with non-members. The reason for this was the relative ease of

gathering women's group members together as they were already used to meeting on a monthly basis. However, this meant we could gain only limited insight into the thought processes underlying non-use values. Also, non-users had potentially a greater capacity to benefit from the group discussion due to potentially greater difficulty in understanding the survey. Ideally, group discussions should form a part of future research of this kind and be used alongside the valuation of other types of interventions to see whether the kinds of information yielded is a function of the nature of the commodity being valued. As people within this study knew each other and were also already benefiting from the commodity in question, this may have facilitated the exchange and increased 'rapport'. Nevertheless there is evidence from other studies that the formation of groups with individuals who did not know each other can work well (e.g. [224]).

Overall, the group approach offers great potential in terms of complementing individual CV surveys. Dolan raises the question of 'whether people are able to detach their own interests as private individuals from the wider interests of society?' [234], p 549. The research described in this thesis suggests that they can and the context in which they are asked to do so impacts on how they think about and answer WTP questions.

### **10.1.5 Individual Willingness-to-Pay and Preferences: an Accurate Measure of Welfare Change?**

The study provided some insight into the issue of preference elicitation in resource deprived settings and the capacity of individuals in such settings to value goods, which has been the subject of some discussion in the literature (e.g. [356]). The qualitative data placed some emphasis on the issue of whether women had the capacity to value the intervention, in terms of accurately perceiving its benefits. However, there was no evidence from the individual surveys that women who were not able to give a positive WTP value did not have preferences and that the values derived did not reflect these preferences. Furthermore the awareness of programme benefits was discussed at length and evidenced in the preliminary focus group discussions.

Whilst there are likely to have been some women who were unable to recognise the benefits to themselves and participated in the group simply 'because it was there', it is likely that these women still had preferences and that the intervention generated some

welfare. If they were participating by giving up their time, this indicated some positive effect. These women may have been more likely to give a zero value or have been less able to give a reason for being willing to pay (only four women's group members fell into such a category). Furthermore, this issue is not unique to the study context and likely to be true of many other settings, although it is probably more of an issue for community-based (as opposed to clinical) health programmes. Indeed, people have different reasons for participating in programmes and will derive different levels of benefits. Providing the opportunity to discuss these issues as a group prior to the survey is likely to help respondents construct preferences and, by asking questions as to the reasons for being willing to pay, more information can be derived as to the nature of individual preferences.

In some ways a more challenging issue that came out of the study was the potential for the values given by those who benefited the most (the more empowered) to be affected by the extent of perceived alternative resource generating scenarios. This boils down to a rejection of the scenario, not dissimilar from those responding that 'others should pay' when asked to pay more in tax contributions to the NHS. This reaction is likely to be associated with a more 'socially minded' individual rejecting in some sense the imposition of a market mechanism upon the provision of a public or quasi-public good.

However, these possible reactions to the CV scenario on the part of certain individuals does not imply that individual preferences and values should be disregarded or delegated to someone else. Interviewing men in place of women, for example, would not be a solution given the potential differences in preferences and access to budgets found in this study. Nor would the elicitation of WTP of the donor community seem to be justified. What relevance would foreign preferences and interests have to an intervention they will never experience, and a population they may have no familiarity with?

One way around these concerns is to financially empower those with preferences (in this case women), to ensure their values can be adequately expressed in monetary terms, by presenting them with a budget [377] (e.g. out of US \$5000 how much would you spend on?) But would this provide values that could be meaningfully used for CBA? It would retain the notion of constrained choice but as an artificially constrained one! If women are not familiar with being in a position to allocate resources, it could also lead to protests or

misguided allocations based on perceptions of how much their husband would give rather than on their own allocation.

### **10.1.6 Where now for Cost-Benefit Analysis?**

Despite the increase in the number of WTP studies in the health sector, most have focused on testing the validity and reliability of the method and very few have gone on to use these values in a CBA.

The process of using WTP data in a CBA is not straightforward and this thesis has shed light on some of the empirical challenges that are faced when attempting to extrapolate sample values to a larger population and deciding whose values to include. This study has shown that the methods used, and assumptions underlying the calculation, can have a major effect on the results obtained. There is plenty of scope for further research in this field, and a pressing need for serious debate and discussion as to how to move forward. Only then can guidelines be agreed to ensure consistency and comparability across study methods.

## **10.2 Conclusions**

This thesis has examined the use of the contingent valuation method to value a community-based programme in rural Nepal. It has demonstrated that whilst these tools can be feasibly used, such approaches require serious adaptation and a willingness of the researcher to understand and immerse themselves into the local culture and environment. This was done by use of qualitative methods both prior to and during the research process, capitalising on the nature of the commodity which operated at community level. As the importance of process evaluations alongside community-based interventions becomes increasingly recognised, there may be scope for health economists to draw from and build these studies into the design of their tools in the future.

Although it is clearly important to have standard tools for economic evaluation, using instruments that are likely to be misunderstood, or are based on constructs which are not locally relevant, is likely to generate misleading and erroneous data. Ultimately

researchers need to recognise that they carry some degree of responsibility to communicate ideas properly and ensure that research is acceptable and relevant to those for whom they are being conducted. In a sense then, the role of the researcher is to act as intermediary between the methods and the context, both respecting the methodological rigour of the tools whilst also being receptive to the need to adapt the tools where relevant to the local setting. It is not always possible to anticipate all of these issues *ex-ante*, but at the very least, a reflective and open approach will allow for the identification and reporting of findings which can then be used to fine-tune the methods for future application and bring us closer to an understanding of the human and social phenomena we seek to measure through them.

This study has shed light on some of the complexities underlying preferences in a low income setting and in relation to a complex commodity. By attempting to apply the CV method to this context, the study unveiled a host of methodological issues which have to date received little to no attention in the health economics literature. By seeking to find answers both from the communities themselves and from the available evidence in other sectors, this study has demonstrated the feasibility of their application to such a context. In order to move towards a more just and internationally relevant approach to social welfare measurement, recognition that preferences and welfare are both specific to and determined by context is critical. This study serves as a reminder of this simple truth which is all too easily lost sight of as national boundaries collapse and we move steadily closer towards a more 'globalised' world.

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## Appendix 1 Review of Willingness-to-Pay studies from low income settings

Table A 1.1 Review of Willingness-to-Pay studies from low income settings in the health sector

Author	Country	Intervention	Target group	Method of survey administration	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Forsythe et al. 2002 [1]	Kenya	Voluntary counselling and testing (VCT) for HIV/AIDS	519 VCT clients	In-person interviews	Iterative payment card (visual)	Out-of-pocket payment (OOP) – money	Not assessed	Assess WTP for VCT, and feasibility of user fees	Household monthly expenditure	
Bonu et al. 2003 [2]	Tanzania	Improved quality of lower level health services	General population: 5,184 respondents	In-person interviews	Binary choice bidding game	OOP - money	Construct validity through Heckman's 2-step model. Clustered SE	Assess regressiveness of user fees	Not specified	Found that women's WTP significantly less than males
Hanson et al. 2005 [3]	Zambia	Improved quality of care in the hospital	600 households from the general population	In-person interviews	Discrete choice experiment use pictures	OOP-money	Construct validity through random effects probit	Assess factors influencing demand for health care	Asset index 3 quintiles	
Morey et al. 2003 [4]	Nepal	4 different proposals for improving malaria treatment	695 individuals diagnosed with malaria interviewed within 2 weeks of diagnosis	In-person interviews	Not specified	OOP-money	Not assessed	Assess determinants of provider choice in rural Nepal	Household expenditure	WTP positively associated with expenditure

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Frick et al. 2003 [5]	Tanzania	Azithromycin treatment of trachoma	394 households with pre-school children who already had treatment	In-person interviews	Iterative bidding process.	OOP - money	Construct validity by means of ordered probit	Assess WTP for the next trachoma treatment	Use tin roof and female headed household and education as income proxy	Income positively related to WTP
Walvaren 1996 [6]	Tanzania	District hospital services	500 outpatients and 293 inpatients at three district level hospitals, & 1500 households within the catchment area of hospitals	In-person interviews	Open-ended	OOP-money as user fees	Look at WTP by income group. No regression analysis. Compared stated WTP with actual expenditure	Assess WTP insurance versus user fees for selected hospital services, and exemption criteria.	Total household expenditure per week	Females prefer insurance method of payment rather than user fees No association between household expenditure and WTP
Bishai et al. 2004 [7]	Uganda	A new AIDS vaccine	1,344 households (HIV negative population)	In-person interviews	Single bounded dichotomous choice	OOP-money	Probit regression to assess construct validity	Assess hypothetical WTP for a new vaccine and sensitivity to efficacy	Asset index – not continuous	Presented efficacy figures using visual aids and shows how low education affects understanding. Positive income effect in high wealth group only

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Masiye & Rehnberg 2005 [8]	Zambia	A higher quality malaria treatment programme in health facilities	300 households from general population	In-person interviews	Payment card	OOP-money through a health insurance scheme	Construct validity using interval regression	Estimate aggregate economic value of malaria treatment	Self-reported income	Men willing to pay more but not significantly so. Income has positive and highly significant effect
Habbani et al. 2006 [9]	Sudan	Improved quality of care	460 households from general population	In-person interviews	Take it or leave it	OOP-money	Logistic regression and OLS regression for construct validity	Estimate WTP for improved quality care.	Monthly income and key assets	Income associated with WTP
Wiseman et al. 2005 [10]	Tanzania	Monotherapy versus combination therapy for malaria treatment	180 patients recruited from hospital with children on treatment (RCT)	In-person interviews	Iterative bidding game with open-ended follow-up	OOP money	NA	Inform drug pricing strategy	Asset index using PCA	No effect of asset index on WTP
Duong et al. 2005 [11]	Vietnam	Different options for delivery care	396 women who were pregnant or had given birth in the last year and 196 men	In-person interviews	Payment card technique	OOP money	Bivariate associations between WTP and key variables	Assess preferences and WTP for different delivery care options	Family income	No significant difference in WTP between women and husbands, could be due to price effect. No income effect for women

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Lewallen et al. 2006 [12]	Tanzania	Cataract surgery	56 males and 52 females (not specified if from same households)	In-person interviews	Open-ended	OOP-money	Check for bivariate associations between WTP and key variables	Assess WTP for cataract surgery in Tanzania	Ownership of certain assets.	WTP to 'see again'. Assume WTP implies ATP. No difference in WTP between males and females. Asset ownership associated with WTP
Onwujekwe et al. 2005 [13]	Sudan	Different methods of malaria prevention	720 households from general population	In-person interviews	Iterative bidding game	OOP-user fees	Construct validity was assessed by the Tobit model	Determine demand for different methods of malaria prevention by socio-economic status	Asset index and monthly food expenditure and household production.	Males WTP sig. more than females. Positive association with asset index and WTP (upper and lower quintiles)
Onwujekwe et al. 2003 [14]	Nigeria	Insecticide treated bed nets for malaria prevention	900 households or their representatives from the general population	In-person interviews	Bidding game (BG) Structured haggling (SH) Binary with follow-up (BWFU)	OOP-money	Logistic regression on determinants of actually paying	Compare WTP with actual payments (criterion validity)	Food cost of household and assets	BWFU higher mean WTP, then SH then BG. No diff. in actual payment. Assets sig. predictor of actual payment

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Onwujekwe & Uzochukwu, 2004 [15]	Nigeria	Insecticide treated bed nets for malaria prevention amongst the poor	900 households from the general population	In-person interviews	Open-ended (OE) and binary with follow-up (BWFU)	OOP money	Heckman model. Whilst construct validity was high, criterion validity low to medium	Compare OE and BWFU formats to elicit altruistic WTP (payment for the poor) for ITNs	Food cost of household and assets	57% were WTP for the poor. Males WTP more. More people with OE were actually prepared to pay than BWFU.
Onwujekwe et al. 2004 [16]	Nigeria	Insecticide treated bed nets for malaria prevention	900 households from the general population	In-person interviews	Structured haggling (SH) compared to bidding game (BG) and BWFU	OOP-money	FGD with consumers and interviews with net sellers for content validity Compare stated & actual payments:	Assess content and criterion validity of SH, BG & BWFU		SH was the most content valid and highest level of criterion validity
Onwujekwe 2001 [17]	Nigeria	Insecticide treated bed nets for malaria prevention	800 households from the general population	In-person interviews	Bidding game (BG) and binary with follow-up (BWFU)	OOP money	OLS regression for construct validity	Comparing BG and BWFU in terms of construct and criterion validity	Annual expenditure on school fees	BG > WTP than BWFU (could be due to income diff). BG higher predictive validity. Income not sig. Men WTP > female WTP

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Onwujekwe et al. 2004 [18]	Nigeria	Combination therapy	600 households from the general population	In-person interviews	Bidding game and structured haggling	OOP money	OLS regression for construct validity	Estimate WTP and cost-benefit ratio by socio-economic status	Index compiled including assets and food expenditure with 5 quintiles	Index has significant effect on WTP
Mathiyazhagan 1998 [19]	India	Rural health insurance scheme (hypothetical)	Interview males and females from same household (1000 households) from general population	In-person interviews	Open-ended	OOP-money as premium payment	Consider binary regression on factors determining being WTP.	Inform premium setting and determine preference for what should be included in the benefits package	Occupation	Occupation positive effect on WTP.
Dong et al. 2003 [20]	Burkina Faso	Community health insurance scheme	800 households, 480 rural and 320 urban from general population	In-person interviews	Iterative bidding game and take-it-or-leave-it. Payment card dropped during pilot.	OOP-money as premium payments	OLS and logistic regressions for construct validity	Determine acceptable premium levels of community insurance scheme	Cash income and expenditure for past 6 months; animal & agricultural value; total health expenditure in past month	BG values a third higher than TIOLI Household WTP 3 times more than individual WTP. Income proxies had significant positive effect for individual WTP not for household WTP

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Dong et al. 2003 [21]	Burkina Faso	Gender effect on WTP for community-based health insurance	1178 men and 1236 women in 800 households	In-person interviews	Iterative bidding game	OOP-money as premiums	OLS regression by gender for construct validity	Assess the effect of gender on WTP	Respondent cash income in past 6 months and 6 month expenditure	No sig difference in WTP by gender if literate, difference sig if not. Education not associated with WTP for women. Income sig for men, borderline significant for women
Dong et al. 2005 [22]	Burkina Faso	Community-based health insurance	800 households from general population	In-person interviews	Iterative bidding game	OOP-money as premiums	Present mean and median WTP by expenditure quintiles	To reduced inequalities in enrolment for community-based health insurance	Respondent cash income in past 6 months and 6 month expenditure	Individual and household WTP higher in higher expenditure quintiles
Asenso-Okyere et al. 1997 [23]	Ghana	National health insurance scheme	164 urban and 142 rural households from general population	In-person interviews	Iterative bidding game	OOP-money as premium for household of 5 people.	Ordered probit model for construct validity	Inform premiums for national health insurance scheme.	Total household expenditures in past year	Income has positive effect on WTP
Amin & Knondoker 2004 [24]	India	Childhood diarrhoea treatment	250 parents with two children from general population	In-person interviews	Iterative bidding game with open-ended follow-up	OOP-money	Doesn't specify type of regression model used.	Estimate household WTP based on mean WTP between parents	Household monthly income	Income has positive effect on WTP

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Bhatia & Fox-Rushby 2002 [25]	India	Insecticide treated mosquito nets for malaria prevention	1200 respondents from general population	In-person interviews	Iterative bidding game	OOP-money	Nothing on validity and no regression analysis or measures of association	Estimate WTP for ITNs	Per capita monthly income; livestock ownership (% bulls/cows); ownership of irrigated land; type of house	Qualitative methods for survey design
Mujinja et al. 2004 [26]	Tanzania	Insecticide treated mosquito nets (ITN) for malaria prevention	501 respondents (250 males, 251 females) from general population	In-person interviews	Dichotomous choice with an open-ended follow-up	OOP-money	Look at association between being WTP and gender and own and childhood malaria. No regression. 2-week interval test-retest for reliability	Estimate WTP for ITN by gender	Average monthly income of respondent	No significant difference between mean WTP of males and females. No significant difference in altruistic WTP by gender. Females have 50% of male income
Sauerborn et al. 2005 [22]	Burkina	Hypothetical malaria vaccines: for mothers and for children	2,326 adults (800 households) from general population	In-person interviews	Bidding game	OOP-money	OLS regression for construct validity	Elicit adult preferences (age>20 years)	Individual 6-monthly cash income; individual 6-month cash expenditure	WTP significantly greater for maternal vs childhood vaccine. Male WTP > than female. Income borderline sig (<0.1)

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Weaver et al. 1996 [27]	Central African Republic	Quality improvements at health facility level	1263 households from general population	In-person interviews	Referendum scenario (dichotomous choice)	OOP money to health facility (user fee)	Censored logit likelihood function for construct validity	Price setting for user fees in health facility	Monthly household consumption	Greater WTP in rural than urban areas
Mills et al. 1994 [28]	The Gambia	Insecticide treated mosquito nets (ITN) for malaria prevention	2 key informants from 53 villages.	In-person interviews	Open-ended	OOP money	NA	Address financing options for ITNs	NA	Explore existing methods of revenue collection w/n villages to identify best (and most trustworthy) way of contributing.
Wang'ombe 1984 [29]	Kenya	Community health workers (CHW) and health facilities versus health facilities only	254 individuals	Health facility records	NA	NA	NA	Observe use patterns and associated costs to infer consumer surplus from change in policy and compare with costs	NA	
Brandling-Bennett et al. 2005 [30]	Cambodia	Telemedicine visit	63 individual users of clinic	In-person interviews	Open-ended assumed (not specified)	OOP-money as user fees	NA	Assess satisfaction and WTP for telemedicine visit	NA	

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Masud, et al. 2003 [31]	Pakistan	Cost sharing scheme for provision of primary health care	600 households from the general population	In-person interviews	Open-ended question format	OOP-money as user fees	Looks at proportion being WTP by income group. No regression analysis.	Look at willingness-to contribute to cost sharing scheme in terms of fee for service or prepayment	Asset index	WTP marginally influenced by income. WTP dependent upon drug availability.
Naing, et al. 2000 [32]	Myanmar	ICT test kit for malaria	750 patients with malaria at health centre using kit; 250 attending CHW; (ex-post); 380 (ex-ante) had symptoms in the past 6 months	In-person interviews	Iterative bidding game (3 bids)	OOP-money as user fees	OLS regression for construct validity Test-retest for reliability	Ex-post and ex-ante WTP for test kit to inform national pricing strategy	Individual average monthly income and main occupation	Ex-post WTP significantly higher than ex-ante WTP (use value higher than option value). WTP significantly associated with income in all cases.
Asfaw & Braun, 2004 [33]	Ethiopia	WTP premiums for CHI	550 households from general population	In-person interviews	Double-bounded dichotomous choice	OOP-money as premiums or labour/time contribution	Bivariate probit model. Test consistency of responses using likelihood ratio test	Estimate willingness-to-pay premiums for hypothetical community insurance scheme	Annual farm and non-farm income	87% willing to contribute labour. Income significant positive predictor of WTP

**Table A 1.2 Selected studies in the environmental sector**

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Danso et al. 2006 [34]	Ghana	WTP for composted municipal waste	700 farmers and other users from urban areas	In-person interviews	Dichotomous choice with open-ended follow-up	OOP-money	Probit analysis FGD used to cross check validity of interviews	Estimate WTP for 50 kg sack of composted municipal solid and faecal waste	Annual farm household income (both on and off farm)	No difference between gender. Income positive predictor
Ahmad et al. 2005 [35]	Bangladesh	Arsenic-free drinking water	2700 households from the general population	In-person interviews	Closed-ended dichotomous choice	OOP-money charges for different water connections	Multinomial logit for determinants of preference for different types of water connection	To estimate the economic value of arsenic free drinking water in rural Bangladesh	Household income; occupation of household head	WTP is a positive function of income
Ninan, & Sathyapalan 2005 [36]	India	Participatory biodiversity conservation	125 households - coffee growers	In-person interviews	Dichotomous choice method	Giving up time	Logit regression for construct validity	Determine preferences in relation to biodiversity conservation and willingness-to participate	Monthly income of respondents	Found negative association with education and willingness to give up time

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Swallow & Woudyalew 1994 [37]	Ethiopia	Tsetse control for cattle	180 households from tsetse control area	Information provided 2-4 weeks before interviews by brochure and slide presentation with discussions	Open-ended question format	OOP-money to a fund for replacing materials or labour time to support activities	Simultaneous equation model factors affecting willingness-to-contribute money/labour	Assess prospects for greater local involvement in tsetse control	Occupation of household head (farm or non-farm)	12% only money, 26% only labour and 59% both Those working off-farm less willing to give up labour
Shyamsundar & Kramer 1996 [38]	Madagascar	Measures to protect forests in the Mantadia national park	351 households living around the national park	In-person interviews	Dichotomous choice question format	Baskets of rice (WTA compensation)	Probit regression for construct validity	Estimate willingness-to accept compensation for loss of access to forest through conservation efforts.	Annual coffee production in kgs.	Income proxy not sig, this is explained by the fact that some groups did not have any coffee plants. Included locational dummies
Johnson et al. 2004 [39]	Nicaragua	WTP for community watershed management	153 households from communities within micro-watershed	In-person interviews	Iterative bidding game in 5 stages (declining values)	OOP-money	Ordered Probit model for construct validity.	Estimate economic value of improving local watershed services	Occupational status	No significant effect of gender on WTP. Occupation positively related but not significant

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Mekonnen 2000 [40]	Ethiopia	WTP for community forestry	480 households from general population	In-person interviews	Dichotomous choice with open-ended follow-up	Option of paying cash or kind, most responded in cash	Maximum likelihood estimation, Tobit with sample selection	Estimate the value of community forestry in rural areas	Household income per annum. Value of livestock owned Number of trees owned Land owned	Site dummies added to regression Income positive and significant and trees owned Males WTP more than females. WTP aggregated
Kamuanga et al. 2001 [41]	Burkina Faso	A tsetse control programme	261 households from the general population	In-person interviews	Iterative bidding, current cost to households used as starting bid	Money; labour; money & labour	Criterion validity for labour contributions Construct validity using maximum likelihood estimation and simultaneous equation models	Compare stated and actual WTP for tsetse control	Revenue from cattle sales and	Focus groups and pilot carried out. Larger household size more likely to contribute only time. 44% contributed time as stated.

Author	Country	Intervention	Target group	Method of survey admin	Question format	Payment vehicle	Validity	Objective	Income measurement	Other observations
Hadker et al. 1997 [42]	India (urban)	Maintenance and preservation of the Borivili national park	494 respondents from general population	In-person interviews	Double dichotomous bids varied for low, middle and high income respondents, followed by open-ended.	Pay money per month for 5 years or give up time per year towards autonomous agency responsible for preservation	Information brochure with photos provided for content validity. OLS and log likelihood regressions for construct validity. Adjusted for embedding effect and starting point bias.	Assess WTP for preservation of national park in Mumbai.	Net monthly income	25% protest bids. Differentiate between use and non-use values. 28% give up time. Income elasticity almost zero but significant. Extrapolate to whole of Mumbai, and compared with cost
Altaf & Hughes 1994 [43]	Burkina Faso	Improved sanitation services (wastewater disposal; on-site and off-site sanitation)	593 household heads from the general population	In-person interviews	Iterative bidding game, 3 iterations followed by open-ended question	Payment (monthly) of higher rent to owner (for renters). Owners could recover some of the charge through tenants	Ordered probit model to assess construct validity	Determine household demand for improved urban sanitation services	Average monthly household expenditure exclusive of rent; quality of house; whether owned or not	Mean WTP was 4% of monthly household income. Positively related to SES variables

## Appendix 2 Design of Survey Tool – Focus Group Discussion Guides

### VALUATION OF WOMEN'S GROUPS DISCUSSION GUIDE 1

#### Women Attending Meetings

1. Have you played the picture card game?
2. Can you tell us how you selected the strategy?
3. Have you used the strategy?
4. Have you seen the video in the community?
5. Could you tell us how you feel about coming to the women's group meetings each month?
6. You have all attended some meetings and this takes time. What makes you decide to keep going there?
7. What do you like/enjoy about the meetings?
8. What do you dislike/find problematic about the meetings?
9. Think about how you feel during and after the meetings. Please describe any changes that would make the meetings feel better / easier for yourself and your household.

*Summarise the discussion and say how helpful it has been. Thank the participants very much for their time.*

#### Husbands

1. Can you tell us what you know about the women's groups and what you think they are about?

*Provide picture (fig 1) and talk through them briefly filling gaps in knowledge*



*Figure 1 Photograph of women's group members playing the picture card game*

*This is a picture of a women's group meeting which takes place once a month. Here you can see women playing the picture card game. This helps them to identify problems and solutions for mother and newborn health. They talk together as a group with a local lady who has been trained in these issues. They set up strategies such as a fund for pregnant women or stretchers to improve transport to the hospital.*

2. How do you feel about your wife going to the meetings?
3. What do you like about her attending?
4. What concerns you about her attending?
5. Have you experienced any changes in your life, either positive or negative, as a result of your wife attending?
6. Do you think these meetings are a good thing and should continue or would you be happier if they stopped? - Why? *Try and get a feel for how strongly they feel about it.*

7. Please describe any changes that would make the meetings feel better / easier for yourself and your household.

*Summarise the discussion and say how helpful it has been. Thank the participants very much for their time.*

#### **Non-Attending Women**

1. Why don't you go to the meetings?
2. Did you know about them? *Please describe (see Husband guide)*
3. Did you have enough time to go there?
4. Did you feel shy about going there? – If so, Why?
5. Have you heard any bad things about the meetings? If so, please describe
6. Do you know the facilitator? Do you like her?
7. Do you feel worried about the health of mother and newborn? -why?
8. Do you feel like you know how to manage complications and don't need more information? – How did you get this knowledge?
9. How would your husband feel about you going to the meetings?
10. How would your Mother-in-law feel about you going there?
11. Would you have liked to go to the meetings if they were closer / if your husband let you go? – why?
12. How do you feel about other women from your community going to the meetings?
13. Do you think these meetings are a good thing and should continue or would you be happier if they stopped? - Why?

*Summarise the discussion and say how helpful it has been. Thank the participants very much for their time.*

## VALUATION OF WOMEN'S GROUPS DISCUSSION GUIDE 2

*Begin by an introduction to the meetings, discussion of main activities of the groups.*

1. Now we would like you to tell us, how *important* do you think these things are to you and to your community? Why are they important?

*Now we would like to try and measure how much the women's group intervention is worth to you. We would first like you to think about other things in your community that are important to you.*

2. Do you all go to the *dhaami* (traditional healer)? Try and imagine your life without the *dhaami*. How would you feel? Now we will give each of you 10 stones and each stone means how important the *dhaami* is. So for example, 10 stones means he is so important you could not survive without him, your life depends on him, and 0 stones, means his presence is not important at all and he makes no difference to your life. Now we would like each of you individually to decide how many stones you feel the *dhaami* is worth to you.

*Instruction to Moderator: Wait 2-3 minutes then ask everyone to say how many stones they put.*

3. There is one school in your village. How long has it been there? Who sends their children to school there? Is the presence of this school important to you? Using the same stones think how important is it to you, how many stones?

*Instruction to Moderator: Wait 2-3 minutes. Ask everyone to say how many stones they put and rank the school compared to the dhaami and justify. Make sure that everyone who thinks the school is more important put more stones.*

4. You are already contributing your time to attend the meetings and some money to an emergency fund. Now I want you to measure the importance of the women's groups in your life or in the community. I will give you 10 stones and each stone means how important the women's groups are.. Here, we mean how important are they by giving up something/contributing something. Are you prepared to give something up?

*Instructions to Moderator: Wait 2-3 minutes. Ask everyone to say how many stones they put. Make sure that everyone has understood.*

### CONTRIBUTION SCENARIO

5. Now if there is no longer any financial support for the project and the facilitator is also not coming and if you need to contribute to continue the group are you willing to do it?
6. If we ask you to pay towards the facilitator's salary would you be willing to do that?
7. What would you feel about giving up some money or some food grains which are available in your home?
8. How would you feel about giving up food grains instead of money? Compared to money what would be easiest for you to give up and why?
9. How often would you feel you could make this contribution like each month, half yearly or yearly or once?
10. Are you confident that you can make that contribution?
11. Right now you do not need to decide. We just wanted to know how much this intervention worth to you and whether are you ready to contribute or not.

### COMPENSATION SCENARIO

12. If the project team had to stop giving support and the groups stopped running, your village would lose those things you said you felt were important to you. In the same way as if your buffalo died you would no longer have milk. To compensate you for this loss, imagine we were to give you extra rice each month or some money.
13. What would you prefer (grains, money)? Why?
14. Now think, how much extra rice would you need every month to make you feel exactly the same as you do now with the groups (not better off nor worse off – the same)?

*Give them time to discuss as a group and ask questions. If they have trouble answering, continue below:*

15. For example, would you say that if you had an extra mana of rice per month but the meetings stopped you would feel the same as you feel now with the meetings? *If no, double the amount. If yes, halve the amount Continue until they feel the same as they do now.*

*Summarise the discussion and say how helpful it has been. Thank the participants very much for their time.*

## Appendix 3 CV Survey Tools

**Economic Evaluation of MIRA Programme  
Final Survey Questions – Willingness-to-Pay  
Mothers who Attend Meetings  
Group Discussion – Question Guide**

### Introductions

Namaste! My name is Daya and (Deepa says her name). We are doing a study of the MIRA programme. This means the monthly women's meetings concerned with health of mothers and babies. These meetings have been running in your ward now for 3 years. We are not from the MIRA office. We have one friend called Jo, she is a student from England and we are here to help her with her study of MIRA programme. As part of the study we want to find out how important these MIRA meetings are to different people in your village, so we would like to talk to you and your husbands as well as women who don't come to the meetings.

First we would like to have a group discussion about the MIRA programme with you all and another day to ask each one of you some individual questions in your home.

The discussion today will take maximum one hour. The individual interviews will take a maximum of 30 minutes.

### Consent and Confidentiality

Your answers and any information you give us will be confidential, that means we will not share with anyone else anything that could identify you like your name or your address.

If you do not want to participate or do not have time, please tell us and we will not continue. If you do decide to participate, you can tell us to stop the interview at any time, or not give us answers if you do not feel comfortable with the questions. We would like to record this discussion.

Would you like to participate in our study?

- a. Yes
- b. No

How many women's groups operate in your area?

We are interested in the MIRA mothers group and will ask you some questions about these meetings.

Where does the meeting take place?

Do you play picture card game in each monthly meeting?

What do you think about this game?

And what do you feel when you are playing with other groups?

I heard you also have an MCH fund / stretcher / you make delivery kits – how do you feel about that?

Who looks after the fund/stretcher and how do you manage it?

Who makes the kits and how are they distributed?

Have you seen the MIRA video?

What did you think about it?

Now we would like you to tell us, how important do you think the programme, and all these things you just described, is to your life and to your village as a whole?

Why is it important?

MIRA has been funding female facilitators to attend mothers group for 3 years. Now, MIRA's financial support may reduce or stop and group members themselves need to decide whether to continue running or stop the meetings. In your opinion, do you think it is better if these meetings continue or should they stop?

One way the meetings could continue without the current level of support from MIRA, is for people from the village to contribute money or grains that would be used to pay a salary to someone to run the meeting, like VDCF does now, or to train a woman from your village to run meetings and to produce materials like the picture cards. Would you be ready to contribute some money every month to such a fund so that the meetings can continue for women? If you contribute grains they will be converted to money afterwards. You could not use this money, it would be used to support the meetings. The amount you say depends on your income and your feelings about the programme. The amount can be big or small or nothing at all.

Would it be easier for you to give money or grains that would be exchanged for money?

If neither, would you be prepared to give up time to support the groups?

The contribution would be for a 3 year period, you also need to think how often would you prefer to contribute: monthly, 3 monthly, 6 monthly, yearly etc.

Please take time to think about this and discuss between yourselves, and ask any questions you like to help you answer.

Later today or tomorrow, we would like to ask each of you individually what is the maximum you would be prepared to contribute each month to supporting the group. You have different experience of the programme and you have different budget, so the amount each person says may be different and can be large or small, that is why we want to ask you separately. The amount you say will just tell us how valuable the programme is to you.

*Summarise the discussion and say how helpful it has been. Arrange individual interviews.*

**Economic Evaluation of MIRA Programme  
Final Survey Questions – Willingness-to-Pay  
Mothers who Attend Meetings  
Individual Interviews**

**Introductions**

Namaste! My name is Daya and (Deepa says her name). Today we would like to ask you some more questions about the MIRA groups and how you feel about them and also some questions about your household. The interview will take a maximum of 30 minutes.

**Consent and Confidentiality**

Your answers and any information you give us will be confidential, that means we will not share with anyone else anything that could identify you like your name or your address.

If you do not want to participate in this individual interview or do not have time, please tell us and we will not continue. If you do decide to participate, you can tell us to stop the interview at any time, or not give us answers if you do not feel comfortable with the questions.

Would you like to participate in this interview?

Yes

No

1. How long have you been coming to the MIRA meetings?
  - a. Since the beginning – before picture card game
  - b. Since the picture card game started – before the fund started
  - c. Since the fund was started
  
2. How many meetings have you attended?
  - a. All or nearly all of them
  - b. More than 10
  - c. Less than 10
  
3. How much walking time is the meeting place from your home? \_\_\_\_\_ minutes
  
4. Did you contribute any money to the fund?
  - a. Yes – how much in total? \_\_\_\_\_ N Rs
  - b. No
  
5. Do you go to any other women's groups a part from MIRA?
  - a. Yes
  - b. No (go to 9.)
  
6. Which ones?
  - a. Plan
  - b. Forestry group
  - c. Swambalamba
  - d. Other (please write name)
  
7. *In your opinion, compared to these other women's group meetings (give names), are MIRA meetings*
  - a. *More important*
  - b. *Equally important*
  - c. *Less important*
  
8. Why? (use codes from below)

9. What do you like most about the MIRA activities? (please tick where necessary)

1. Learning, gaining knowledge
2. About pregnancy and childbirth
3. It is for women
4. Improves health / saves lives
5. We can get help
6. Social gathering
7. The strategy (fund, stretcher, delivery kit)
8. Because others joined
9. Picture card game
10. Training helping others
11. Video
12. Other (specify)
13. Don't know

10. For 3 years, MIRA has been supporting VDCFs to attend mothers group. MIRA's financial support may soon reduce or stop and at that time you will need to decide whether to continue running or stop the meetings in the future. In your opinion, do you think it is better if these meetings continue when MIRA leaves or should they stop?

- a. Continue
- b. Stop - Why? – go to next section on general questions.

11. *One way the meetings could continue without the current level of support from MIRA, is for people from the village to contribute money or grains that would be used to pay a salary to someone to run the meeting, like VDCF does now, or to train a woman from your village to run meetings and to produce materials like the picture cards. Would you be ready to contribute some money every month to such a fund so that the meetings can continue for women? If you contribute grains they will be converted to money afterwards. You could not use this money, it would be used to support the meetings. The amount you say depends on your income and your feelings about the programme. The amount can be big or small or nothing at all. Are you ready to give money or grains to support the programme? As we explained before, you could not use this fund, it would be used to support the meetings.*

- a. Yes
- b. No – why not? Go to end of the section

12. Would it be easier for you to give money, grains or time?

- a. Money
- b. Grains
- c. Time

13. The contribution would allow the programme to run for a period of 3 years. How often would you prefer to contribute?

- a. Once every month
- b. Once every 3 months
- c. Twice a year
- d. Once a year
- e. Once for the whole 3 years

14. How much is the maximum you could you give?

\_\_\_\_\_Rs                      \_\_\_\_\_mana

If money

15. If more than 10 Rs, ask: could you pay 5 Rs more? Yes/No

If less than 10 Rs, ask: could you pay 1 Rs more, until reach maximum. Yes/No

If grains

16. Could you give half mana more?

- a. Yes

b. No

Continue until reach maximum

17. Why are you prepared to give this amount to support the group?
- a. So that I can continue sitting with women, learning new knowledge and increasing my confidence
  - b. To improve mother and baby health and reduce the number of mothers and/or babies dying
  - c. Both a. and b.
  - d. Other \_\_\_\_\_ (Specify)

**General Questions**

1.1 Who is the head of household in your home?

1.2 Where did you deliver your last child?

- a. Home
- b. Facility (go to 1.4)

1.3 Who helped you with delivery?

- a. TBA
- b. FCHV
- c. Other health staff
- d. Relative
- e. No-one

1.4 Did your attending the MIRA meetings influence your choice of place of delivery/attendant?

- a. Yes
- b. No

1.8 Do you plan to have any more children?

- a. Yes
- b. No

1.9 In your opinion, how many mothers and babies suffer from health problems in your village?

- a. Many
- b. Moderate
- c. Few – none
- d. Do not know

2.0 How much walking time is the nearest health centre or hospital from your home?

2.1 Are you literate?

- a. Yes
- b. No

2.2 How many years of formal education do you have?

2.3 Do members of your household work on your own or your family's agricultural land?

2.4 In your dwelling is there (*tick as appropriate – multiple choice*)

<i>Item</i>	<i>Yes</i>	<i>No</i>
Electricity		
A radio		
A television		
A bicycle		
A telephone		

2.5 What is the principal household source of drinking water?

Sources	Tick as appropriate (single choice)
Piped drinking water in residence	
Public faucet (piped)	
River, canal or surface water for drinking	
Other source of drinking water (specify)	

2.6 What is the principal type of toilet facility used by members of your household?

Facility	Tick as appropriate (single choice)
Uses a pan as a latrine	
Bush, field as latrine	
Pit latrine	
Ventilation Improved Pit latrine	
Other type of latrine (specify)	

2.7 In your dwelling how many rooms are there in total (other than kitchen)?

2.6 Do you do any paid job?

- a. Yes – which?
- b. No

2.7 Do you sell any produce?

- a. Yes
- b. No

2.8 On average how much money do you bring to the household per month?

\_\_\_\_\_ N Rs

2.9 Does your husband do any paid job?

- a. Yes – which?
- b. No

3.0 Does he sell any produce?

- a. Yes
- b. No

3.1 On average how much money does he bring to the household per month?

\_\_\_\_\_ N Rs

3.2 Does your son do any paid job?

- a. Yes
- b. No

3.3 Does he sell any produce?

- a. Yes
- b. No

3.4 On average how much money does he bring to the household per month?

\_\_\_\_\_ N Rs

*Thank them for their time*

**Economic Evaluation of MIRA Programme  
Final Survey Questions – Willingness-to-Pay  
Mothers who did not attend Meetings  
Far Away Sector**

**Introductions**

Namaste! My name is Daya and (Deepa says her name). We are doing a study of the MIRA programme. This means the monthly women's meetings concerned with health of mothers and babies. These meetings have been running in your ward now for 3 years. We are not from the MIRA office. We have one friend called Jo, she is a student from England and we are here to help her with her study of MIRA programme. As part of the study we want to find out how important these MIRA meetings are to different people in your village, we are talking to women who go to meetings and those who don't, like yourselves and if possible we would like to talk to your husband. We would like to know your feelings about the programme and how important you think it is for women in your community.

The interview will take a maximum of 30 minutes.

**Consent and Confidentiality**

Your answers and any information you give us will be confidential, that means we will not share with anyone else anything that could identify you like your name or your address.

If you do not want to participate or do not have time, please tell us and we will not continue. If you do decide to participate, you can tell us to stop the interview at any time, or not give us answers if you do not feel comfortable with the questions.

Would you like to participate in our study?

- a. Yes
- b. No

1. Have you ever been to a MIRA mother's group meetings?
  - a. Yes to a ward meeting
  - b. Yes to a mother's group meetings
  - c. No to both the above (go to 3)
2. How many meetings did you attend?
3. Do you know where the meetings are held?
  - a. Yes
  - b. No (go to 5)
4. How much walking distance is this from your home? \_\_\_\_\_ minutes (validate with VDCI or WE)
5. What do you know about the mothers groups? (*if necessary add some or all of the following and show pictures*)
  - a. Monthly meeting of women in a given place
  - b. A woman trained by MIRA (*give name*) runs the meetings and sometimes the FCHV comes
  - c. During the meeting discuss problems and solutions of mother and baby health
  - d. Play the picture card game
  - e. Created a fund for emergency health care

6. They organised a video show here too, did you see the video?
- Yes
  - No
7. Why didn't you come/ did you stop coming to the MIRA meetings?
- Too far
  - Not enough time
  - Family member did not want us to go
  - Too many other meetings
  - No more children
  - Don't like VDCF
  - Don't like other group members
  - Didn't know about the meetings
  - Other (specify)
8. How important do you think the MIRA mothers groups are for other women in your community?
- Very important
  - Moderately important
  - Little or no importance – why? (go to 10)
9. Why do you think they are important for these women?
10. How many women's groups do you go to?
11. Which ones?
- Plan
  - Grameen
  - Swambalamba
  - Other (specify)
12. Why do you attend these groups and not MIRA?
13. Although you do not attend these meetings, do you think these meetings should continue being held monthly for other women in the area without MIRA support, or do you think they should stop?
- Continue
  - Stop – Why? – go to General Questions section
14. Would you attend the MIRA meetings if they were nearer to your home?
- Yes
  - No (go to 16)
15. What is the maximum time you would travel (walking) from your home to go to the MIRA meeting? \_\_\_\_\_ minutes
16. In order to continue without MIRA support, the women's group members are considering to collect money or grains from the community that would be used to pay a salary of a person who will come to run the meeting or to train a woman from village to run meetings and to produce materials like the picture cards, would you be ready to contribute some money or grains to such a fund so that the meetings can continue for other women? If you contribute grains they will be converted to money afterwards. What you contribute would not be for yourself, but to support those women who go to meetings.
- Yes
  - No – Why? – go to next section
17. Would it be easier for you to give money or grains or time?
- Money
  - Grains
  - Time

The amount you say depends on your income and your feelings about the programme. It can be big or small or nothing at all.

18. The contribution you give would allow the programme to run for a 3 year period. How often would you prefer to make the contribution?

- a. Every month
- b. Every three months
- c. Every six months
- d. Every year
- e. Once for three years

19. How much is the maximum you could you give?

\_\_\_\_\_Rs                      \_\_\_\_\_mana

If money

20. If more than 10 Rs, ask: could you pay 5 Rs more?

If less than 10 Rs, ask: could you pay 1 Rs more, until reach maximum.

If grains

21. Could you give half mana more?

- a. Yes
- b. No

Continue until reach maximum

22. Why are you prepared to give this amount to support the group?

- a. So that they can continue learning new knowledge, increasing their confidence, and sharing new knowledge with other women
- b. To improve mother and baby health and reduce the number of mothers and/or babies dying
- c. Both a. and b.
- d. Other \_\_\_\_\_ (Specify)

23. How difficult did you find it to answer the contribution question

- d. Not at all
- b. Quite difficult
- c. Very difficult

### General Questions

*Now we would like to ask you some general questions about your household.*

1.1 Who is the head of household in your home and what is your relationship to that person?

1.2 Where did you deliver your last child?

- a. Home
- b. Facility (go to 1.5)

1.3 Who helped you with delivery?

- a. TBA
- b. FCHV
- c. Other health staff
- d. Relative
- e. No-one

1.4 Did your attending the MIRA meetings influence your choice?

- 1.5 Do you plan to have any more children?  
 a. Yes  
 b. No
- 1.6 In your opinion, how many mothers and babies suffer from health problems in your village?  
 a. Many  
 b. Moderate  
 c. Few – none  
 d. Do not know
- 1.7 How much walking time is the nearest health centre or hospital from your home?
- 1.8 Are you literate?  
 a. Yes  
 b. No
- 1.9 How many years of formal education do you have?
- 2.0 In your dwelling is there (*tick as appropriate – multiple choice*)

Item	Yes	No
Electricity		
A radio		
A television		
A bicycle		
A telephone		
A motorcycle		
A car or truck		

- 2.1 What is the principal household source of drinking water?

Sources	Tick as appropriate ( <i>single choice</i> )
Piped drinking water in residence	
Well in residence	
Public faucet (piped)	
Well with handpump in yard/plot	
Public well with handpump	
Traditional public well	
River, canal or surface water for drinking	
Other source of drinking water (specify)	

- 2.2 What is the principal type of toilet facility used by members of your household?

Facility	Tick as appropriate ( <i>single choice</i> )
Flush toilet	
Uses a pan as a latrine	
Bush, field as latrine	
Pit latrine	
Ventilation Improved Pit latrine	
Other type of latrine (specify)	

2.3 What type of fuel does your household mainly use for cooking?

Fuel type	Tick as appropriate (multiple choice)
Electricity	
LPG / Natural Gas	
Biogas	
Kerosene	
Coal / lignite	
Charcoal	
Firewood / Straw	
Dung	
Other (specify	

2.4 In your dwelling how many rooms are there in total (other than kitchen)?

2.5 Do you do any paid job?

- c. Yes – which?
- d. No

2.6 Do you sell any produce?

- c. Yes
- d. No

2.7 On average how much money do you bring to the household per month?

\_\_\_\_\_ N Rs

2.8 Does your husband do any paid job?

- c. Yes – which?
- d. No

2.9 Does he sell any produce?

- c. Yes
- d. No

3.0 On average how much money does he bring to the household per month?

\_\_\_\_\_ N Rs

3.1 Does your son do any paid job?

- c. Yes
- d. No

3.2 Does he sell any produce?

- c. Yes
- d. No

3.3 On average how much money does he bring to the household per month?

\_\_\_\_\_ N Rs

*Thank them very much for their time*

**Economic Evaluation of MIRA Programme  
Final Survey Questions – Willingness-to-Pay  
Mothers who did not attend Meetings  
Nearby Sector**

**Introductions**

Namaste! My name is Daya and (Deepa says her name). We are doing a study of the MIRA programme. This means the monthly women's meetings concerned with health of mothers and babies. These meetings have been running in your ward now for 3 years. We are not from the MIRA office. We have one friend called Jo, she is a student from England and we are here to help her with her study of MIRA programme. As part of the study we want to find out how important these MIRA meetings are to different people in your village. So we are talking to women who go to meetings and those who don't, like yourselves, and if possible we would like to talk to your husband. We would like to know your feelings about the programme and how important you think it is for women in your community.

The interview will take a maximum of 30 minutes.

**Consent and Confidentiality**

Your answers and any information you give us will be confidential, that means we will not share with anyone else anything that could identify you like your name or your address.

If you do not want to participate or do not have time, please tell us and we will not continue. If you do decide to participate, you can tell us to stop the interview at any time, or not give us answers if you do not feel comfortable with the questions.

Would you like to participate in our study?

- a. Yes
- b. No

1. Have you ever been to a MIRA mother's group meetings?

- a. Yes to ward meeting
- b. Yes to mothers group meetings
- c. No to both the above (go to 3)

2. How many meetings did you attend?

3. Do you know where the meetings are held?

- a. Yes
- b. No (go to 5)

4. How much walking distance is this from your home? \_\_\_\_\_ minutes

5. What do you know about the mother's groups? *(if necessary add some or all of the following and show pictures)*

- a. Monthly meeting of women in a given place
- b. A woman trained by MIRA *(give name)* runs the meetings and sometimes the FCHV comes
- c. During the meeting discuss problems and solutions of mother and baby health
- d. Play the picture card game
- e. Created a fund for emergency health care

6. They organised a video show here too, did you see the video?

- a. Yes
- b. No

7. Why didn't you come/ stop coming to the MIRA meetings?
  - a. Too far
  - b. Not enough time
  - c. Family member did not want us to go (who?)
  - d. Too many other meetings
  - e. No more children
  - f. Don't like VDCF
  - g. Don't like other group members
  - h. Did not know about the meetings
  - i. Other (specify)
  
8. How important do you think the MIRA mothers groups are for other women in your community?
  - a. Very important
  - b. Moderately important
  - c. Little or no importance – why? (go to 10)
  
9. Why do you think they are important for these women?
  
10. How many women's groups do you go to (other than MIRA)?
  
11. Which ones?
  - a. Plan]
  - b. Forestry group
  - c. Swambalamba
  - d. Other (specify)
  
12. Why do you attend these groups and not MIRA?
  
13. MIRA has been supporting women's groups for 3 years but their support may end soon. Although you do not attend these meetings, do you think these meetings should continue being held monthly for other women in the area without MIRA support, or do you think they should stop?
  - a. Continue
  - b. Stop – Why? – go to next section
  
14. In order to continue without MIRA support, the women's group members are considering to collect money or grains from the community that would be used to pay a salary of a person who will come to run the meeting or to train a woman from village to run meetings and to produce materials like the picture cards, would you be ready to contribute some money or grains to such a fund so that the meetings can continue for other women? If you contribute grains they will be converted to money afterwards. The amount you say depends on your income and your feelings about the programme. It can be big or small or nothing at all. What you contribute would not be for yourself, but for to support those women who go to meetings.
  - a. Yes
  - b. No – Why? – go to next section
  
15. Would it be easier for you to give money or grains or time?
  - a. Money
  - b. Grains
  - c. Time
  
16. The contribution you give would allow the programme to run for a 3 year period. How often would you prefer to make the contribution?
  - a. Every month
  - b. Every three months
  - c. Every six months
  - d. Every year
  - e. Once for three years

17. How much is the maximum you could you give?

\_\_\_\_\_ Rs \_\_\_\_\_ mana

If money

18. If more than 10 Rs, ask: could you pay 5 Rs more?

If less than 10 Rs, ask: could you pay 1 Rs more, until reach maximum.

If grains

19. Could you give half mana more?

e. Yes

f. No

Continue until reach maximum

20. Why are you prepared to give this amount to support the group?

a. So that they can continue learning new knowledge, increasing their confidence

b. To improve mother and baby health and reduce the number of mothers and/or babies dying

c. Both a. and b.

d. Other \_\_\_\_\_ (Specify)

21. How difficult did you find it to answer the contribution question

a. Not at all

b. Quite difficult

c. Very difficult

### General Questions

*Now we would like to ask you some general questions about your household.*

1.1 Who is the head of household in your home and what is your relationship to that person?

1.3 Where did you deliver your last child?

a. Home

b. Facility (go to 1.6)

1.5 Who helped you with delivery?

a. TBA

b. FCHV

c. Other health staff

d. Relative

e. No-one

1.6 Did your attending the MIRA meetings influence your choice?

1.5 Do you plan to have any more children?

a. Yes

b. No

1.6 In your opinion, how many mothers and babies suffer from health problems in your village?

a. Many

b. Moderate

c. Few – none

d. Do not know

1.7 How much walking time is the nearest health centre or hospital from your home?

1.8 Are you literate?

a. Yes

b. No

1.9 How many years of formal education do you have?

2.0 In your dwelling is there (tick as appropriate – multiple choice)

Item	Yes	No
Electricity		
A radio		
A television		
A bicycle		
A telephone		
A motorcycle		
A car or truck		

2.1 What is the principal household source of drinking water?

Sources	Tick as appropriate (single choice)
Piped drinking water in residence	
Well in residence	
Public faucet (piped)	
Well with handpump in yard/plot	
Public well with handpump	
Traditional public well	
River, canal or surface water for drinking	
Other source of drinking water (specify)	

2.2 What is the principal type of toilet facility used by members of your household?

Facility	Tick as appropriate (single choice)
Flush toilet	
Uses a pan as a latrine	
Bush, field as latrine	
Pit latrine	
Ventilation Improved Pit latrine	
Other type of latrine (specify)	

2.3 What type of fuel does your household mainly use for cooking?

Fuel type	Tick as appropriate (multiple choice)
Electricity	
LPG / Natural Gas	
Biogas	
Kerosene	
Coal / lignite	
Charcoal	
Firewood / Straw	
Dung	
Other (specify)	

2.4 In your dwelling how many rooms are there in total (other than kitchen)?

2.5 Do you do any paid job?

- e. Yes
- f. No

2.4 Does your husband do any paid job?

- a. Yes
- b. No

2.5 Does you son do any paid job?

- a. yes
- b. No

2.6 Do you sell any produce/vegetables?

- a. Yes
- b. No

2.9 On average how much money comes to the household per month?

\_\_\_\_\_ N Rs

*Thank them for their time*

**Economic Evaluation of MIRA Programme  
Final Survey Questions – Willingness-to-Pay  
Husbands of Women who Attend Meetings**

**Introductions**

Namaste! My name is Daya and (Deepa says her name). We are doing a study of the MIRA programme. This means the monthly women's meetings concerned with health of mothers and babies. These meetings have been running in your ward now for 3 years. We are not from the MIRA office. We have one friend called Jo, she is a student from England and we are here to help her with her study of MIRA programme. As part of the study we want to find out how important these MIRA meetings are to different people in your village, we are talking to women who go to meetings and those who don't, and their husbands, like yourself. Your wife comes regularly to the meetings and we would like to find out how you feel about these meetings, how important you think they are for your wife and for other women in your community.

The interview will take a maximum of 30 minutes.

**Consent and Confidentiality**

Your answers and any information you give us will be confidential, that means we will not share with anyone else anything that could identify you like your name or your address.

If you do not want to participate or do not have time, please tell us and we will not continue. If you do decide to participate, you can tell us to stop the interview at any time, or not give us answers if you do not feel comfortable with the questions.

Would you like to participate in our study?

- a. Yes
- b. No

1. What do you know about the MIRA mothers groups? *(if necessary add some or all of the following and show pictures)*
  - a. Monthly meeting of women in a given place
  - b. A woman trained by MIRA *(give name)* runs the meetings and sometimes the FCHV comes
  - c. During the meeting discuss problems and solutions of mother and baby health
  - d. Play the picture card game
  - e. Created a fund for emergency health care
  - f. Don't know anything
2. They organised a video show here too, did you see the video?
  - a. Yes
  - b. No
3. Compared to other women's groups, how important do you think the MIRA mothers groups are for your wife and other women in your community?
  - a. Very important
  - b. Moderately important
  - c. Little or no importance – why? – Go to 5.
4. Why do you think they are important for these women?
5. MIRA has been supporting VDCFs to attend mothers group for 3 years. Now, MIRA will soon stop its financial support and women themselves need to decide whether to continue running or stop the meetings. In your opinion, do you think it is better if these meetings continue for your wife and other women when MIRA leaves or should they stop?
  - a. Continue
  - b. Stop – why? Go to next section.

6. In order to continue without MIRA support, the women's group members are considering to collect money or grains from the community that would be used to pay a salary of a person who will come to run the meeting or to train a woman from village to run meetings and to produce materials like the picture cards, would you be ready to contribute some money or grains to such a fund so that the meetings can continue for other women? If you contribute grains they will be converted to money afterwards. What you contribute would not be for yourself, but for to support those women who go to meetings.

- a. Yes
- b. No – Why? – go to next section

7. Would it be easier for you to give money or grains or time?

- a. Money
- b. Grains
- c. Time

8. The contribution would allow the programme to run for a period of 3 years. How often would you prefer to make the contribution?

- a. Every month
- b. Every three months
- c. Every six months
- d. Every year
- e. Once for three years

*The amount you say depends on your income and your feelings about the programme. It can be big or small or nothing at all.*

9. How much is the maximum you could you give?

\_\_\_\_\_Rs                      \_\_\_\_\_mana

If money

10. If more than 10 Rs, ask: could you pay 5 Rs more?

If less than 10 Rs, ask: could you pay 1 Rs more, until reach maximum.

If grains

11. Could you give half mana more?

- a. Yes
- b. No

Continue until reach maximum

12. Why are you prepared to give this amount to support the group?

- a. So that my wife can continue sitting with women, learning new knowledge, increasing her confidence, and sharing new knowledge with others
- b. To improve mother and baby health and reduce the number of mothers and/or babies dying
- c. Both a. and b.
- d. Other \_\_\_\_\_ (Specify)

13. How difficult did you find it to answer the contribution question

- a. Not at all
- b. Quite difficult
- c. Very difficult

### General Questions

*Now we would like to ask you some general questions about yourself and your household*

1.1 How old are you?

1.2 In your opinion, how many mothers and babies suffer from health problems in your community?

- a. Many
- b. Moderate

- c. Few – none
- d. Do not know

1.3 How much walking time is the nearest health centre or hospital from your home?

1.4 Are you literate?

- a. Yes
- b. No

1.5 How many years of formal education do you have?

1.6 On average how much money comes to the household per month?

\_\_\_\_\_ N Rs

*Thank them for their time*

**Economic Evaluation of MIRA Programme  
Final Survey Questions – Willingness-to-Pay  
Husbands of Women who Did Not Attend Meetings**

**Introductions**

Namaste! My name is Daya and (Deepa says her name). We are doing a study of the MIRA programme. This means the monthly women's meetings concerned with health of mothers and babies. These meetings have been running in your ward now for 3 years. We are not from the MIRA office. We have one friend called Jo, she is a student from England and we are here to help her with her study of MIRA programme. As part of the study we want to find out how important these MIRA meetings are to different people in your village, we are talking to women who go to meetings and those who don't, and their husbands, like yourself. At present, your wife does not come to the meetings and we would like to find out how you feel about these meetings, how important you think they are for women in your community and why you think your wife does not come.

The interview will take a maximum of 30 minutes.

**Consent and Confidentiality**

Your answers and any information you give us will be confidential, that means we will not share with anyone else anything that could identify you like your name or your address.

If you do not want to participate or do not have time, please tell us and we will not continue. If you do decide to participate, you can tell us to stop the interview at any time, or not give us answers if you do not feel comfortable with the questions.

Would you like to participate in our study?

Yes

No

1. Do you know anyone who has attended these meetings?
  - a. Yes
  - b. No
  
2. Do you know where these meetings are held?
  - a. Yes
  - b. No
  
3. What do you know about the MIRA mothers groups? *(if necessary add some or all of the following and show pictures)*
  - a. Monthly meeting of women in a given place
  - b. A woman trained by MIRA *(give name)* runs the meetings and sometimes the FCHV comes
  - c. During the meeting discuss problems and solutions of mother and baby health
  - d. Play the picture card game
  - e. Created a fund for emergency health care
  - f. Nothing
  
4. They organised a video show here too. Did you see the video?
  - a. Yes
  - b. No

5. In your opinion, why didn't your wife come/ did your wife stop coming to the MIRA meetings?
  - a. Too far
  - b. Not enough time – household responsibilities
  - c. I did not want her to go
  - d. Other family member did not want her to go (which?)
  - e. Too many other meetings
  - f. She will not have any more children
  - g. Don't like VDCF
  - h. Don't like other group members
  - i. Doesn't know about the meetings
  - j. Other (specify)
  
6. Compared to other women's groups, how important do you think the MIRA mothers groups are for other women in your community?
  - a. Very important
  - b. Moderately important
  - c. Little or no importance
  
7. Why do you think they are important for these women?
  
8. MIRA has been supporting VDCFs to attend mothers group for 3 years. Now, MIRA will soon stop its financial support and women themselves need to decide whether to continue running or stop the meetings. Although your wife has not been attending the meetings, in your opinion, do you think it is better if these meetings continue for other women in the community when MIRA leaves or should they stop?
  - a. Continue
  - b. Stop Why? Go to next section
  
9. Would you support your wife to attend the MIRA meetings if they were nearer to your home and took less time?
  - a. Yes
  - b. No (go to 11)
  
10. What is the maximum time you would allow your wife to spend at the meeting per month \_\_\_\_\_ minutes
  
11. In order to continue without MIRA support, the women's group members are considering to collect money or grains from the community that would be used to pay a salary of a person who will come to run the meeting or to train a woman from village to run meetings and to produce materials like the picture cards, would you be ready to contribute some money or grains to such a fund so that the meetings can continue? Grains will be converted to money afterwards. This money would not be for you or for your wife, but just to support the salary of women to run the mothers groups for other women in the community.
  - a. Yes
  - b. No – Why? – go to next section
  
12. Would it be easier for you to give money or grains or time?
  - a. Money
  - b. Grains
  - c. Time
  
13. The contribution would allow the programme to run for a period of 3 years. How often would you prefer to make the contribution?
  - a. Every month
  - b. Every three months
  - c. Every six months
  - d. Every year
  - e. Once for three years

The amount you say depends on your income and your feelings about the programme. It can be big or small or nothing at all.

14. How much is the maximum you could you give?

\_\_\_\_\_Rs \_\_\_\_\_mana

If money

15. If more than 10 Rs, ask: could you pay 5 Rs more?

If less than 10 Rs, ask: could you pay 1 Rs more, until reach maximum.

If grains

16. Could you give half mana more?

- a. Yes
- b. No

Continue until reach maximum

12. Why are you prepared to give this amount to support the group?

- a. So that my wife can continue sitting with women, learning new knowledge, increasing her confidence, and sharing new knowledge with others
- b. To improve mother and baby health and reduce the number of mothers and/or babies dying
- c. Both a. and b.
- d. Other \_\_\_\_\_ (Specify)

13. How difficult did you find it to answer the contribution question

- a. Not at all
- b. Quite difficult
- c. Very difficult

### General Questions

*Now we would like to ask you some general questions about yourself and your household*

1.1 How old are you?

1.2 In your opinion, how many mothers and babies suffer from health problems in your community?

- a. Many
- b. Moderate
- c. Few – none
- d. Do not know

1.3 How much walking time is the nearest health centre or hospital from your home?

1.6 Are you literate?

- c. Yes
- d. No

1.7 How many years of formal education do you have?

1.6 On average how much money comes to the household per month?

\_\_\_\_\_ N Rs

*Thank them for their time*

**Economic Evaluation of MIRA Programme  
Final Survey Questions – Willingness-to-Pay  
Women's Group Facilitator**

**Introductions**

Namaste! Today we would like to ask you some more questions about the MIRA groups, especially ward no. 4 and how you feel about. The interview will take a maximum of 60 minutes.

**Consent and Confidentiality**

Your answers and any information you give us will be confidential, that means we will not share with anyone else anything that could identify you like your name.

If you do not want to participate in this individual interview or do not have time, please tell us and we will not continue. If you do decide to participate, you can tell us to stop the interview at any time, or not give us answers if you do not feel comfortable with the questions.

Would you like to participate in this interview?

- a. Yes
- b. No

How long you have been facilitating the MIRA mothers group meetings in this VDC?

In ward XX, how many people usually come to the meeting?

Is there a lot of variation in the size of the groups in different wards?

Does the FCHV come to the meeting in this ward?

- a. Yes – Is she helpful in the meeting? What is her role in the meeting?
- b. No - Why doesn't she come to the meeting?

Do you think the MIRA mothers group programme has worked well in this ward?  
Why? Why not?

How do you feel about the participation of mothers in the meeting?

Do you feel that they are learning? Why / why not?

Have you seen any positive changes in the women?

Do you think these changes will be sustainable over time (continue into the future)? Why? Why not?

In your opinion, what makes a good group / helps a group to work well?

Do the group members know that Mira support may end soon?

Do they talk about how do they work afterwards?

What about in this ward, what do they say?

What do you think what will happen later on if you stop going to the meeting, could they manage to continue the meetings?

We are asking women about whether they would be willing to contribute towards the salary of a facilitator to run the meetings if MIRA's support ends. For that there will be a fund where they need to contribute some money what they wish to, there is not any set amount and time. Do you think they could manage this, that they would be willing to contribute?

## Appendix 4 Measurement of Socio-Economics Status

### Development of an Asset Index

Asset indices have a number of advantages compared to income or total expenditure as measures of socio-economic status including: avoiding seasonality, being less prone to measurement error or misreporting; being less time consuming. As a consequence they have gained increasing popularity in recent years [44] [45]. During piloting work, households had difficulty responding to income and expenditure questions and so the asset approach was selected. The assets chosen were those obtained from the Nepal DHS, combined with additional questions posed during the project surveillance survey. The construction of asset indices assumes that households have homogenous preferences for assets and that households face the same asset prices.

Generation of the index requires an assumption about individual weights for each asset. To decide which assets to include in the index two approaches were considered:

- 1) The World Bank approach consists of adding all available assets on which data are available<sup>1</sup>, regardless of the extent of variation between households (pc3).
- 2) Alternatively, assets can be selected on the basis of the extent of loading in factor analysis [46]. For the latter, we kept those variables with factor loading (1<sup>st</sup> factor) higher than 0.30 (pc2).

Weights for each variable in the index were derived using principal component analysis (PCA). The weights were based on the first principal component which results in maximum discrimination between households, with assets which vary most between households (or are more unequally distributed) being given the most weight [44, 47]. To create the index, the scoring coefficient derived through PCA is multiplied by the standardised value of the variable, calculated by subtracting the mean of the variable from the score (0 or 1) and dividing by the standard deviation of that variable, as shown in Equation 1 [46]. The index thus produced has a mean of zero across all households. PCA scores were not adjusted for household size as the benefits of all of the assets were available at the household rather than individual level.

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<sup>1</sup> Ownership of bicycle, motorbike, bus or truck were dropped as less than 1% of households reported ownership of these items. Ownership of fan was dropped as dependent on geographic location more than wealth (plain versus hill).

The asset index derived from principal component analysis is for each household ( $A_j$ ) based on the formula:

$$A_j = f_1 \times (a_{j1} - a_1) / (s_1) + \dots + f_N \times (a_{jN} - a_N) / (s_N)$$

where  $f_1$  is the “scoring factor” for the first asset derived from PCA,  $a_{j1}$  is the  $j$  th household’s value for the first asset and  $a_1$  and  $s_1$  are the mean and standard deviation of the first asset variable over all households.

### **Descriptive Analysis of the Asset Index**

The asset indicators included in the indices can be grouped into the following categories: housing structure (number of rooms, materials of housing construction); household access to utilities (electricity, telephone); household access to sanitation (main source of drinking water; main source of toilet); livestock ownership; main occupation of household head; and ownership of consumer durables.

Table A 4.1 provides the mean, standard deviation and scoring weights for each asset under both approaches to index development. The ratio of the scoring weight to the standard deviation of an asset (for dichotomous variables) indicates the amount by which the index changes when a respondent answers ‘yes’ as compared to ‘no’ in relation to the specific asset.

When all assets are included (approach 1) the first principal component (PC) accounts for 19% of the total variation across the 21 asset indicators. When only the 14 assets which had a factor loading value above 0.30 were included in the index, the first PC accounts for 26% of the variation.

The scoring weights are positive for most assets, apart from livestock ownership, getting drinking water from the river, using a bush or field as a toilet, being a wage labourer, and house construction with wood or branches: all of which have negative coefficients.

Owning a camera raises the overall asset indices by the largest amount, followed by owning an iron, while getting drinking water from a river has the largest negative effect on the index. There is a wide range of average levels of asset ownership or prevalence across the sample population with 81% of households having electricity and only 3% owning a camera.

**Table A 4.1 Mean and Standard Deviation of Variables Included in Indices**

Variable	N	Mean	Std Dev	All assets (pc3)		Assets with factor loading>0.30 (pc2)	
				Weight	Weight/ std dev	Weight	Weight/ std dev
No. of cows/bulls#	149	2.168	2.355	-0.118	-0.050		
No. of buffalo/buffalina#	149	0.416	0.806	-0.055	-0.068		
No. of goats#	149	3.966	4.596	-0.162	-0.035		
No. of pigs	149	0.054	0.226	-0.177	-0.783	-0.171	-0.757
No. of rooms#*	155	2.406	1.658	0.264	0.159	0.286	0.172
River as principal source of drinking water*	159	0.038	0.191	-0.174	-0.911	-0.169	-0.885
Piped tap as principal source of drinking water*	159	0.623	0.486	0.121	0.249		
Bush as toilet*	155	0.277	0.449	-0.249	-0.555	-0.260	-0.579
Pit/VIP as toilet*	155	0.142	0.350	0.089	0.254		
House made out of wood/branches	149	0.060	0.239	-0.175	-0.732		
Biogas/kerosene/lpg as fuel*	164	0.165	0.372	0.259	0.696	0.283	0.761
Principal household occupation is wage labour	149	0.174	0.381	-0.217	-0.570	-0.220	-0.577
Principal occupation is salaried/business	149	0.094	0.293	0.128	0.437		
Household has electricity*	164	0.805	0.398	0.329	0.827	0.334	0.839
Household has radio*	164	0.683	0.467	0.221	0.473	0.237	0.507
Household has TV*	163	0.417	0.495	0.320	0.646	0.330	0.667
Household has sewing machine	140	0.056	0.230	0.182	0.791	0.197	0.857
Household has cassette player	140	0.201	0.402	0.258	0.642	0.274	0.682
Household has camera	140	0.028	0.165	0.239	1.448	0.268	1.624
Household has clock	140	0.201	0.402	0.282	0.701	0.313	0.779
Household has iron	140	0.076	0.267	0.289	1.082	0.321	1.202
Eigenvalue associated with first component				3.94		3.61	
Share of variance associated with first component				18.76		25.81	
Number of variables used				21		14	

\*Indicates data from DHS. Other variables collected from surveillance study in 2001?

As husbands generally came from the same household as women (except in 3 cases, where wives were not interviewed), the asset was developed for a sample of 166 (196-30). The estimates obtained were then transferred to husbands.

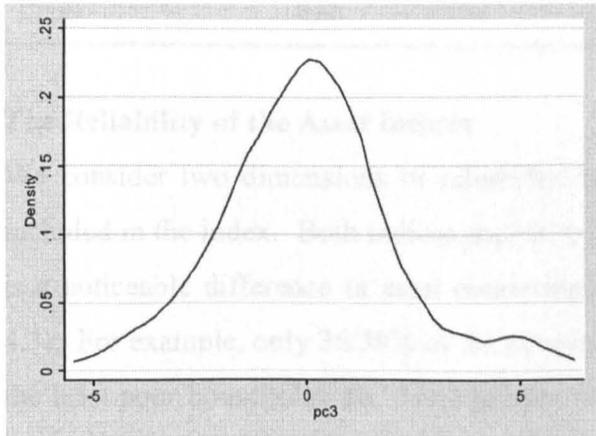
@ Cows and bulls combined into variable: 'bovine'; buffalo and buffalina combined into variable: 'Buff'.

Note: all variables are dummies apart from number of rooms, bovine, goat and buff. Omitted type of drinking water source is public tap. Omitted type of fuel is firewood. Omitted type of latrine is pan. Omitted type of principal employment is agriculture. Omitted type of housing material is cement or mudstone/brick.

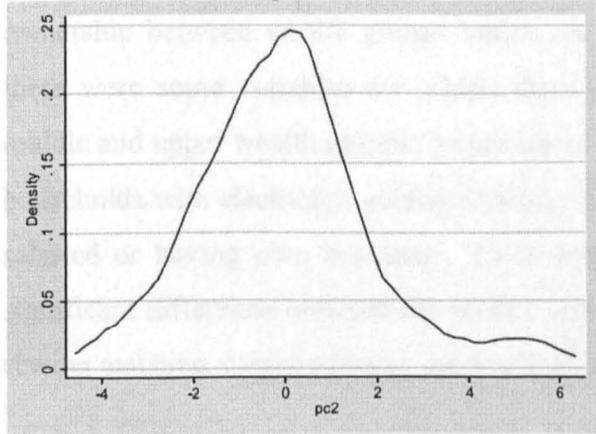
# Continuous variables. Cow/bull range from 0-9; buffalo/buffalina from 0-3; goats from 0-27.

By plotting the probability density function of the asset indices, we can consider to what extent they suffer from problems of truncation (if there are not asset indicators which allow a differentiation between the poor and the very poor or the rich and very rich) or clumping (if an insufficient number of asset indicators are used, households will be clumped together in a small number of groups). There was no evidence of clumping for either indices and only very limited truncation to the left (poor) on the index based on assets with higher factor loading.

**Figure A 4.1 Probability Density Function of Index based on Inclusion of all Assets for which Data were Available.**



**Figure A 4.2 Probability Density Function of Index based on Inclusion of Assets with Factor Loading Greater than 0.30.**



## Creation of Wealth Terciles

The indices were split into terciles of equal size representing the lowest, middle and upper wealth groups respectively for each asset index (Table A 4.2) The difference in the average index between the poorest and least poor is 3.89 and 3.69 units respectively.

**Table A 4.2 Cut-off Points for Wealth Terciles**

	All assets included (approach 1)		Assets with high factor loading (approach 2)	
Lowest	-4.87	-0.77	-4.02	-0.71
Middle	-0.74	0.65	-0.71	0.63
Upper	0.66	5.70	0.66	5.82

## The Reliability of the Asset Indices

We consider two dimensions of reliability: internal coherence and robustness to assets included in the index. Both indices appear to be internally coherent in the sense that there is a noticeable difference in asset ownership between resulting wealth terciles (Table A 4.3). For example, only 36/39% of the poorest households have electricity whilst 100% of the least poor households do. Nine percent of the poorest households get drinking water from a river versus 0% of least poor. Fifty five (57%) percent of the poorest households use a bush or field as a toilet versus 5%-7% of the least poor. Ownership of all durable goods increases by wealth tercile. Most variables demonstrate differences in average ownership between wealth groups which are statistically significant ( $p < 0.1$ ). However there were some variables for which there was no significant difference between the middle and upper wealth groups: ownership of cows/bulls/buffalo, radio, the proportion of households with electricity, getting drinking water from a river, having a pit latrine, being salaried or having own business. There were some variables for which there was no significant difference between the middle and lowest wealth groups: ownership of goats, sewing machine, cassette player, camera, and iron.

**Table A 4.3 Means by Wealth Tercile (Lowest=poorest; Upper=least poor)**

Variable	Means by Tercile					
	All assets			Assets with factor loading>0.30		
	Lowest	Middle	Upper	Lowest	Middle	Upper
Number of cows/bulls	2.80	1.75	1.65			
Number of buffalo/buffalina	0.57	0.39	0.30			
Number of goats	5.61	4.20	2.21			
Number of pigs	0.16	0.02	0.00			
Number of rooms	1.39	2.27	3.28	1.36	2.23	3.35
River as principal source of drinking water	0.09	0.02	0.00	0.09	0.02	0.00
Piped tap as principal source of drinking water	0.52	0.57	0.84			
Bush as toilet	0.55	0.23	0.05	0.54	0.20	0.07
Pit/VIP as toilet	0.02	0.20	0.21			
House made out of wood/branches	0.14	0.05	0.00			
Biogas/kerosene/lpg as fuel	0.00	0.16	0.40	0.00	0.14	0.42
Principal occupation is wage labour	0.36	0.14	0.02	0.36	0.14	0.02
Principal occupation is salaried/business	0.05	0.05	0.19			
Household has electricity	0.39	0.95	1.00	0.36	0.98	1.00
Household has radio	0.32	0.84	0.88	0.34	0.80	0.91
Household has TV	0.05	0.34	0.86	0.02	0.39	0.84
Household has sewing machine	0.00	0.02	0.16	0.00	0.02	0.16
Household has cassette player	0.05	0.11	0.49	0.05	0.09	0.51
Household has camera	0.00	0.00	0.09	0.00	0.00	0.09
Household has clock	0.00	0.18	0.44	0.00	0.14	0.49
Household has iron	0.00	0.00	0.26	0.00	0.00	0.26

The asset index produces a similar classification when either asset index is used. 95% of those classified as being in the lowest tercile in the index created from those assets with high factor loading were the same as those derived from the index of all assets. For the middle tercile the figure is 84% and 88% for the upper tercile. No households classified as poor by one index were classified as being in the upper wealth tercile by the other

index. Another way to evaluate the robustness of the asset indices is to consider the extent of rank order correlation between them. Spearman's correlation coefficient indicates that the asset scores obtained from both approaches are highly correlated: 0.975 ( $p=0.00$ ).

**Appendix 5 –Economic Assessment of a Women’s Group  
Intervention to Improve Birth Outcomes in Rural Nepal**

## Economic assessment of a women's group intervention to improve birth outcomes in rural Nepal

Josephine Borghi, Bidur Thapa, David Osrin, Stephen Jan, Joanna Morrison, Suresh Tamang, Bhim Prasad Shrestha, Angie Wade, Dhama S Manandhar, Anthony M de L Costello

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See *Lancet* Online  
 for webfigure

We did a cost-effectiveness analysis alongside a cluster-randomised controlled trial of a participatory intervention with women's groups to improve birth outcomes in rural Nepal. The average provider cost of the women's group intervention was US\$0.75 per person per year (\$0.90 with health-service strengthening) in a population of 86 704. The incremental cost per life-year saved (LYS) was \$211 (\$251), and expansion could rationalise on start-up costs and technical assistance, reducing the cost per LYS to \$138 (\$179). Sensitivity analysis showed a variation from \$83 to \$263 per LYS for most variables. This intervention could provide a cost-effective way of reducing neonatal deaths.

Of the 4 million neonatal deaths worldwide every year, most occur in developing countries.<sup>1</sup> In Nepal, the burden of neonatal mortality is especially high, and over 90% of births take place at home without a trained attendant.<sup>2</sup> Because of geographic and financial realities, achieving a substantial increase in institutional deliveries is unlikely to be feasible in the short-term.<sup>3</sup> Interventions promoting changes in practices at home and in the community might therefore be more realistic, locally relevant, and cost effective.

In a cluster-randomised controlled trial in Makwanpur district, Nepal, we assessed the effect of facilitators working with women's groups to develop strategies for improvement of maternal and neonatal health.<sup>4</sup> We showed the intervention's effectiveness, achieving a 29% reduction in neonatal mortality and a substantial reduction in maternal mortality during 33 months.<sup>4</sup> In view of resource scarcity, the question remains of whether this intervention represents good value for money. We therefore did a cost-effectiveness

analysis comparing the women's group intervention with current practice. We also examined resource requirements for programme expansion.

Table 1 defines the main intervention activities for the economic analysis. 12 female facilitators who were based locally worked in the intervention area, each responsible for a population cluster covering 60 km<sup>2</sup> and an average population of 7000. Facilitators convened monthly meetings with women in coordination with the local community health volunteer responsible for health promotion activities. Health-service strengthening activities, including essential newborn care training for all government health staff and provision of basic supplies and equipment, were done in both intervention and control areas for ethical reasons.<sup>4</sup>

We estimated the additional provider costs of these activities compared with current practice, from November, 1999, to October, 2003 (webfigure). The providers were the organisation implementing the

	Description of inputs
Start-up	Ethnographic study, training of staff, introduction to communities and design of the intervention process and manual, Audit of health facilities
One-off	
Picture cardgame	Design, plotting, printing of cards, training facilitators and design of accompanying manual (includes time of expatriate staff)
Training on mother and child health fund	Design, translation, and printing of manual, training session given to facilitators (includes time of expatriate staff)
Preparation and implementation of the group's participatory evaluation	Design, translation, and printing of manual, training session given to facilitators (includes time of expatriate staff)
Capacity development of staff involved in the women's group intervention	Computer skills and language training
Health-service strengthening in the intervention area	Training to hospital workers, primary health care and community-based workers, other health system support, and general administration Equipment and supplies provided to health facilities and community health workers
Recurrent	
Facilitation of women's groups	Time of facilitators, writing of field office; time spent going house to house to mobilise women; support given by women's group intervention staff to health facilities
Supervision of women's groups	Time of expatriate staff member, 1 manager of the women's group intervention, 5 supervisors, 1 local project manager and the director of MIRA supporting the intervention Transport and overheads for supervision meetings
General administration	Includes time and resources associated with all administrative staff, other than driver and vehicle
MIRA= Mother and Infant Research Activities.	

Table 1: Description of project activities

intervention (Mother and Infant Research Activities) and local government. We obtained financial cost data from the project accounts. Donated items were valued at current market prices to indicate full economic value. To estimate the cost of project activities, we allocated staff time through monthly activity records and discussions with the project team. Transport-related expenditure was allocated with vehicle log books. Capital costs were converted into yearly expenditure, and start-up costs were treated as capital costs with an estimated life of 10 years. All costs were discounted at 3% per year to estimate their present value and converted to 2003 US dollar prices (US\$1=75.55 NRs).

The main outcome was the neonatal mortality rate (deaths in the first 28 days per 1000 livebirths) measured over 33 months. LYS were estimated from local life expectancy at birth (58.3 years) and were also discounted at 3%. Cost-effectiveness was defined as the cost per neonatal death averted and the cost per LYS. We examined the effect of variations in uncertain variables on the incremental cost per LYS through a series of one-way sensitivity analyses. Variables tested were: exchange rate; proportion of time spent by administrative staff supporting the intervention; discount rate; statistical error in the trial evidence on the number of neonatal deaths averted; the inclusion of maternal life years saved; and the number of deaths that could be averted in the same cohort of women during their remaining reproductive life (webtable 1).

111 women's groups were active during the trial period. The average annual cost of facilitating a group was \$110. Supervision activities added an average annual \$203 per group and administration costs added \$54 (webtable 2). A series of one-off activities cost a total of \$39 477. Personnel represented the largest cost component (70% of the total). On average, \$12 503 was spent yearly training health staff and providing medical supplies and equipment in the

12 intervention clusters, costing an average of \$1042 per cluster (webtable 3).

Within the trial period, 2899 livebirths took place in the intervention area and 3226 in the control area.<sup>4</sup> In the intervention area an estimated 30.9 (95% CI 5.4–56.4) neonatal deaths were averted, which equates to an estimated 1804 LYS, and—once discounted at 3%—to 852 LYS (table 2). The cost per LYS was \$211 (\$251 with health-service strengthening).

Were the intervention to be replicated elsewhere in Nepal, start-up costs would reduce and technical assistance could be provided by local staff. The cost per LYS would then fall to \$138 (\$179 with health service strengthening). The cost-effectiveness ratio varied from \$83 per LYS (\$99 with health-service strengthening) to \$236 (\$280) in response to changes in most variables (webtable 4). Exceptions occurred when benefits were discounted at 6%, and when neonatal mortality reduction was set at the lower end of the confidence interval observed during the trial.

Our results are probably conservative for several reasons. If maternal life-years saved are included, the cost per LYS falls to \$175 (\$209 with health-service strengthening). If the possible effects on future pregnancies are included, the cost per LYS falls to \$93–\$145 per LYS. Health-service strengthening was also done in the control area, possibly reducing the relative effectiveness of the intervention. Outcomes for younger women who married and conceived after enrolment, or for women migrating into the study area, were not included.

If the women's group intervention were applied on a larger scale, average costs are likely to fall. In a district of 400 000 population, we assume that a supervisor could support seven facilitators in plain districts, four in hill districts, and two in mountain districts and that administration costs would increase by 10%. The average annual district-level costs would amount to \$135 704–\$161 095 or \$0.30–\$0.40 per person in plain and mountain districts, respectively. Assuming a 50% reduction in neonatal mortality effects, this equates to \$125–\$149 per LYS. The district-wide cost of health-service strengthening was estimated at \$80 917 and was not expected to differ by topography.

A cost-effectiveness ratio less than double the annual national income per capita might be an acceptable threshold value for most governments deciding which interventions to fund.<sup>5</sup> This equates to \$482 in Nepal, and our estimate of cost per LYS (\$211) falls well below this.

Little evidence is available about the cost-effectiveness of other community-based interventions such as this to improve maternal and newborn health.<sup>6</sup> A study in India with village health workers supervised by physicians to manage and treat neonatal illness at home reported an average cost of \$151 per neonatal death averted (including stillbirths).<sup>7</sup> However, administration costs,

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	Women's group intervention (cost with health-service strengthening)
Yearly cost (US\$)	65 262 (77 765)
Total population in intervention area	86 704
Average annual cost per person	0.75 (0.90)
Number of married women of reproductive age in intervention area	14 884
Average annual cost per married woman of reproductive age	4.38 (5.22)
Number of livebirths in the intervention area	2899
Average annual cost per newborn infant	22.51 (26.82)
Total cost for the intervention duration	179 470 (213 853)
Difference in number of neonatal deaths (control–intervention) <sup>1</sup>	30.94
Cost per neonatal death averted	5801 (6012)
Lifeyears saved per death averted	27.54
Cost per life year saved	211 (251)
Total life years saved	852

Table 2: Key results on the cost and cost-effectiveness of the intervention

technical assistance, and start-up costs were excluded. Furthermore, costs were only estimated for the final years of the intervention, when they were probably lowest.

A participatory intervention with a women's group is well suited to a setting, such as rural Nepal, where supply-side interventions are probably not feasible on a large scale because of the vast resource requirements.<sup>1</sup> The intervention offers an affordable means of reducing neonatal mortality, and could benefit from expansion.

**Contributors**

All the authors contributed to the design of the study and criticised drafts of the paper. J Borghi designed the cost-effectiveness study and did the economic analysis with inputs from B Thapa. J Borghi wrote the first draft of the paper and was responsible for subsequent collation of inputs and redrafting. D Manandhar and A Costello were responsible for the conception and overall supervision of the trial. B Shrestha managed the project and S Tamang the field intervention. J Morrison was the technical adviser on the intervention and D Osrin on the surveillance system. A Wade was the trial statistician. J Borghi and A Costello will stand as guarantors for the paper.

**Conflict of interest statement**

We declare that we have no conflict of interest.

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Economic assessment of a women's group intervention to improve birth outcomes in rural Nepal

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Variable	Lower limit	Original estimate	Upper limit	Justification
Discount rate used in cost and outcome measurement	0%	3%	6%	Standard practice in economic evaluation <sup>1</sup>
Exchange rate (US\$—NRS)	71	75-55	78	Observed variation during study period
% contribution of administrative staff to the intervention	10%	38%	45%	Assumed
Life expectancy for start-up costs (years)	5	10	-	Assumed
Age weighting life years saved <sup>2</sup>	Age weighting	No age weighting	-	Consistent with standard practice in estimating disability adjusted life years (DALYs)
Life expectancy at birth (years)	-	58.3	81	Use of standard expected years of life lost instead of local life expectancy. Also consistent with the DALY methodology.
Number of neonatal deaths averted	5	31	56	The upper and lower limits of the 95% confidence interval.
Maternal life years saved	-	Not included	Included	Although the trial was not powered to detect a significant difference in maternal mortality, a reduction was observed (69 versus 341 per 100,000; adjusted odds ratio 0.22 [95% CI 0.05-0.90]). This equates to an average present value of 19 additional life years for each maternal death averted, or a total of 191 LYs in the intervention area.
Effects on future pregnancies	Future effects included with half the trial reduction in mortality	No future effects	Future effects included with constant mortality reduction	Based on the estimated number of deaths that could be averted in the same cohort of women during their remaining reproductive life (average 27 years), based on the current fertility rate of 4.1 under two scenarios: constant reduction in mortality rates at 0-0.10% and half this rate of mortality reduction. Based on estimates of the sustainability of behaviour change interventions in other settings <sup>3</sup>

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Webtable 1: Sensitivity analyses methods

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Activity	Unit	Average total cost per unit*	Total cost during intervention period
Start-up		-	24376 (14%)
One-off			
Picture card game			
Production of card sets†	Picture card set	16	316 (-1%)
Design and training		-	14073 (8%)
Mother and child health fund training per group‡	Women's group	114	12616 (7%)
Participatory evaluation per group	Women's group	109	12153 (7%)
Capacity building		-	319 (-1%)
Total one-off			39477 (22%)
Recurrent		Average annual cost per group	
Facilitation of women's groups		110	33612 (19%)
Supervision of women's groups		203	64830 (36%)
General administration		54	16575 (9%)
Total recurrent		367	115017 (64%)
Total			179470 (100%)

\*Figures are rounded to the nearest decimal place. †Total of 20 sets of cards used for women's groups; one for each facilitator and eight replacement packs covering loss or damage.  
‡A total of 111 women's groups were facilitated as part of the intervention.

Webtable 2: Costs of the women's group intervention in US dollars (2003)

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	Hospital workers	Primary health care workers*	community based workers†	Other health systems support‡	General administration	Health service audit	Total cost
Training	1940	566	6457	1949	-	-	15953
Equipment and supplies	656	2355	2926	-	-	-	5937
Other	-	-	-	5026	3789	3678	12493
Total	2596	7961	9384	6975	3789	-	34383
Number of participants	23	92	122	-	-	-	-
Training cost per participant	84	61	38	-	-	-	-

Health assistants, auxiliary health workers, community medical assistants, staff midwives and auxiliary nurse midwives, maternal and child health workers, and village health workers.  
†Traditional birth attendants and female community health volunteers. ‡Includes a women friendly workshop at the district hospital, a workshop for community leaders, providing support to antenatal clinics, and meetings held with the District Public Health Office to facilitate health staff training.

Webtable 3: Total cost of training and equipment provision for health service strengthening in the intervention area in US dollars (2003)

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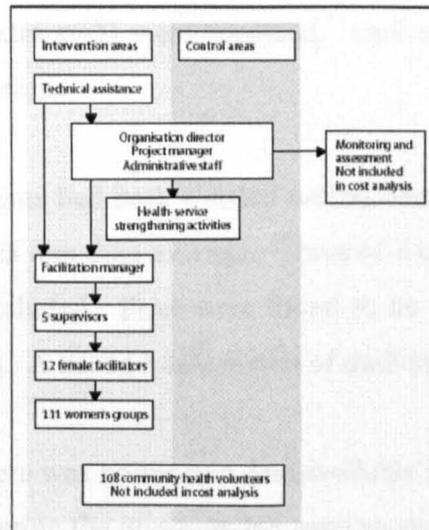
Cost	Cost per life year saved in women's group intervention (with health service strengthening)		Greatest percentage divergence from central estimate (US \$211/LYS)
	Lower	Upper	
Discount rate used in cost measurement	207 (247)	216 (257)	+2.4%
Exchange rate	206 (245)	220 (263)	+4.3%
% contribution of administrative staff to the intervention	190 (230)	225 (265)	-10.0%
Life expectancy for start-up costs		236 (280)	+11.8%
<b>Outcomes</b>			
Discount rate—outcome measurement	109 (119)	359 (428)	-70.1%
Ageweighting life years saved	83 (92)		-60.2%
Life expectancy at birth	191 (227)		-9.5%
Number of neonatal deaths averted	116 (138)	1206 (1437)	-471.6%
Maternal life years saved	175 (209)		-17.1%
Effects on future pregnancies—newborns	110 (132)	145 (173)	-47.9%
Effects on future pregnancies—mothers & newborns	93 (111)	121 (145)	-55.9%

\*Where relevant, we allowed for interactions between dependent parameters in these calculations (eg neonatal death rate and calculation of future newborn lives saved).

Webtable 4: Sensitivity of cost per life year saved to variation in key parameters\*

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## **Appendix 6      Dealing with Extreme Bids**

For those respondents who could give income data, monthly household income was estimated at an average of 3,281 RS, or Rs 39,371 (US \$521) per year. Five percent of Rs 39,371 equates to almost Rs 1970, or Rs 5,414 for the duration of the intervention. Only one respondent gave a WTP above Rs 5,414. All respondents who indicated a WTP above Rs 2000 (an extra n=3) were screened. One was found to be very poor and the other poorer than average.

Thirty respondents had both a stated willingness-to-pay greater than average and an asset score which was less than average. Three of these had offered to pay in kind or time and so were not excluded. Four were found to be outliers, the remainder were retained for further analysis. A list and description of outliers is presented below:

WA1BH3. There was no income data available for this respondent, however she had difficulty answering the question, her asset score was well below average (-2.70). The interviewer bid her up from Rs 50 per month to Rs 100. In total this amounted to Rs 3300 (one of the highest bids).

WA11D4: This respondent was willing to pay Rs 9,900, the highest bid of all. Her reported yearly income was Rs 60,000 so this represented 6% of income. This respondent was bid up from Rs 200 to Rs 300.

WA6B3: This respondent was also bid up from Rs 50 to Rs 100. Again there was no income data or asset score data but the asset data available was less than average.

WNAN2B4: This respondent did not have income data but their willingness-to-pay was greater than 5% of average mean income.

Table A 6.1 presents stated WTP results including the above outliers.

**Table A 6.1 Stated willingness-to-pay for the women's group intervention with outliers**

Variable	Women's group members	Non-members			Total
		Nearby	Faraway	Husbands	
% willing to pay positive amount**	81 (87%)	27 (84%)	26 (68%)	23 (70%)	157 (80%)
% WTP=0	5 (6%)	3 (10%)	1 (4%)	1 (4%)	10 (6%)
% WTP=non-response	7 (7%)	2 (6%)	11 (29%)	9 (27%)	29 (15%)
<b>Currency</b>					
% willing to pay money	78 (92%)	25 (89%)	31 (94%)	23 (92%)	157 (92%)
% willing to give grains**	-	2 (7%)	-	-	2 (1%)
% willing to give time	7 (8%)	1 (4%)	2 (6%)	2 (8%)	12 (7%)
<b>Frequency</b>					
Once per month	50 (68%)	15 (63%)	14 (56%)	11 (48%)	90 (62%)
Once per 3 months	9 (12%)	3 (12%)	-	3 (13%)	15 (10%)
Once per 6 months	3 (4%)	1 (4%)	-	-	4 (3%)
Once per year***	12 (16%)	5 (21%)	11 (44%)	9 (39%)	37 (25%)
<b>Initial bid \$ RS</b>					
Mean WTP	415	543	331	466	330
95% CI	250-579	159-926	196-467	178-755	165-660
Median WTP	165	215	165	248	570
25 <sup>th</sup> -75 <sup>th</sup>	165-435	138-495	138-435	165-550	316-547
<b>Final WTP RS</b>					
Mean WTP	570	604	399	721	570
95% CI	319-821	224-985	236-563	360-1,081	416-725
Median WTP	330	330	289	550	330
25 <sup>th</sup> -75 <sup>th</sup>	165-550	151-660	165-495	165-990	165-660
Mean log WTP	5.78	5.87	5.68	6.14	5.83

Note: \*\*\*<0.01, \*\*<0.05, \* < 0.10

\$ Total WTP values calculated over a 33 month period to match the trial period and later estimation of costs.

## Appendix 7 Analysing the Effects of the Elicitation Mechanism on WTP

Appendix 7 describes the impact of the bidding process on the elicitation of maximum willingness-to-pay values. Fifty six percent of respondents did not increase from their original WTP amount during the bidding process (i.e. they rejected the higher bid proposed by the interviewer). Of those who engaged with the bidding process, the mean increase for those opting for monthly payments was 12.70 Rs (median 5 Rs); for yearly payments the amount was: Rs 75.91 (median 40 Rs); for 3-monthly payment the amount was Rs 6.71 (median Rs 5)<sup>2</sup> (Table A7.1). Females were significantly less likely ( $p < 0.01$ ) to increase their initial amount than males (49% versus 73%) and by a significantly lower amount ( $p = 0.05$ ). Literacy was positively associated with the size of the bid increase as was wealth. The figures in Table A 7.1 represent the (initial and final/maximum) bids themselves before being summed over a 33 month period.

**Table A7.1 Mean and Median Initial versus Final Bids by Frequency of Payment**

	Monthly n=95		3-monthly n=15		6-monthly n=4		Yearly n=37	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Mean WTP	15	20	22	25	276	279	110	155
95% CI	10-20	13-27	8-35	12-38	-492-1045	-487-1045	42-178	68-242
Median WTP	10	10	15	20	50	55	50	60
25 <sup>th</sup> -75 <sup>th</sup> percentile	5-20	5-20	5-25	10-30	27.5-525	27.5-530	50-100	50-150

The difference between the initial median compared to the final bid was borderline significant for women's group members ( $p = 0.10$ ) and insignificant for the other stakeholder groups.

The addition of subsequent bidding questions increased the construct validity of results, the OLS regression offering a better fit of the data when the final compared to the initial bids were used.

<sup>2</sup> Only one observation for 6 monthly, so omitted.

## **Appendix 8      Analysis of Willingness-to-Pay per Group**

Table A 8.1 indicates that there is a large amount of both within and between group variation and mean WTP. For the same group, there was little difference in median WTP for Bhaise ward 4, between members and non-members. In Fakhel, ward 9, non-members were generally WTP more than members themselves. In Daman-8 the reverse was true. Bhimphedi-4 and Fakhel demonstrated the least variation amongst the women's group members.

**Table A 8.1 Mean and median WTP per group – members and non-members**

Ward	Members			Non-members Nearby			Non-members Faraway		
	n	Mean (95% CI)	Median 25 <sup>th</sup> - 75 <sup>th</sup>	n	Mean (95% CI)	Median (25 <sup>th</sup> - 75 <sup>th</sup> )	n	Mean (95% CI)	Median (25 <sup>th</sup> - 75 <sup>th</sup> )
Bhaise-2	5	284 -214- 781	165 99-165						
Bhaise-3	7	279 72-486	330 28-495						
Bhaise-4	8	355 29-680	303 17-523	6	234 59-409	303 55-330	9	276 115-438	303 138-330
Bhimphedi- 3	6	685 18- 1,351	413 165- 1,304						
Bhimphedi- 4	8	196 97-295	165 96-330						
Daman-4	12	551 277-825	435 275-605	11	546 234-859	495 151- 660	5	275 191-359	275 275-330
Daman-8	5	693 -23- 1,409	330 330-825	5	242 -284- 768	55 0-165	5	729 -316- 1,774	138 138- 1,650
Fakhel-9	9	253 121-385	165 165-330	7	572 97-1047	330 264- 660	8	410 196-624	362 165-619
Nibuwatar- 5	7	288 121-454	198 165-330						
Nibuwatar- 7	7	281 4-559	165 110-495						
Nibuwatar- 8	9	480 155-805	220 198-869						
All	93								

N: Number of respondents giving WTP=0 or WTP>0;

NR: number of non-respondents who could not give a WTP value.

In bold more than one woman giving the same value – happens with both members and non-members.

## **Appendix 9      Bivariate Analysis of Reasons for Missing and Zero Bids**

Appendix 9 considers the associations between respondent characteristics and being willing-to-pay a positive amount, a zero amount or not giving a value. Within the sample of females, non-responders were significantly more likely to have spent more on health care in the past year and to be a non-member of the group living faraway, than those willing to pay a positive amount. They were also less likely to be a member of another women's group. Although not significant, non-responders were also generally older than those paying a positive amount, they also knew less about the groups and were less likely to have ever attended a meeting. Surprisingly they were significantly more likely to be of higher wealth status. As to be expected, those with a zero WTP were significantly more likely to be from a lower wealth group than those willing to pay a positive amount (Table A 9.1). They were also less likely to be a member of another group.

**Table A 9.1 Nature of zero or non responses for WTP - Females**

Variables	Mean (Sdev)		
	WTP=0	Non-response	WTP>0
% who are literate	0.00 (0.00)*	0.25 (0.44)	0.25 (0.44)
Mean age	-	35.15 (8.07)	29.69 (7.71)
% of Indo-Arayan ethnicity	0.22 (0.44)	0.42 (0.50)**	0.22 (0.41)
% of Tibeto-Burman ethnicity	0.56 (0.53)	0.33 (0.48)	0.41 (0.49)
% of Newari ethnicity	0.00 (0.00)*	0.12 (0.34)	0.24 (0.43)
% of Professional caste	0.22 (0.44)	0.13 (0.35)	0.14 (0.35)
Mean score on household asset index	-1.72 (1.95)**	0.88 (2.37)**	-0.07 (1.84)
Mean household spending on medical care in NRs	5,409 (6,338)	8,599 (6,544)***	4,891 (7,942)
% used safe delivery kit in past pregnancy @	0.00 (0.00)	0.09 (0.30)	0.13 (0.34)
Proportion of meetings attended	0.27 (0.30)	0.21 (0.27)	0.29 (0.29)
Mean index of knowledge &	0.50 (0.58)	0.86 (1.46)	1.04 (1.52)
% who suffered complications during pregnancy	0.38 (0.52)	0.38 (0.50)	0.25 (0.43)
% using permanent contraception	0.25 (0.46)	0.05 (0.21)	0.20 (0.40)
% women's group member	0.56 (0.53)	0.42 (0.50)*	0.60 (0.49)
% non-members living nearby	0.33 (0.50)	0.12 (0.34)	0.20 (0.40)
% non-members living faraway	0.11 (0.33)	0.46 (0.51)***	0.20 (0.40)
% with membership of other community groups	0.44 (0.53)**	0.54 (0.51)**	0.76 (0.43)
Mean household size	6 (2.35)	5.48 (2.42)	5.93 (2.51)
Interviewer=1	0.78 (0.44)	0.63 (0.49)	0.64 (0.48)

Significance of difference in means in relation to those willing to pay a positive amount: \* $<0.10$ , \*\* $<0.05$ , \*\*\* $<0.01$

Used t-test for asset index (normally distributed). Mann Whitney U for other continuous variables.

@ for women's group members only.

& for non-members only

Although the variables are not reported, the results show a similar pattern of association with the dependent variable. For example, wealth status and spending on medical care are significantly higher for those who are willing to pay a positive amount. Education also shows a significant association with the dependent variable. The median years of schooling for those who are willing to pay a positive amount is 6.5 years, compared to 5.5 years for those who are not willing to pay a positive amount.

**Table A 9.2 Nature of zero or non responses for WTP - Males**

Variables	Mean (Sdev)	
	Non-response	WTP>0
% who are literate	0.78 (0.44)	0.67 (0.48)
Mean years of formal education	6.33 (4.27)	3.92 (3.52)
Mean age	38.44 (11.97)	36.38 (8.43)
% of Indo-Arayan ethnicity	0.44 (0.53)	0.38 (0.49)
% of Tibeto-Burman ethnicity	0.22 (0.44)	0.17 (0.38)
% of Newari ethnicity	0.22 (0.34)	0.25 (0.44)
% of Professional caste	0.11 (0.33)	0.21 (0.41)
Mean score on household asset index	0.49 (2.27)	-0.20 (1.97)
Mean household spending on medical care in NRs	6,220 (4,757)	5,534 (7,957)
% used safe delivery kit in past pregnancy <sup>@</sup>	0.22 (0.44)	0.14 (0.35)
Proportion of meetings attended	0.24 (0.28)	0.18 (0.26)
Mean index of knowledge <sup>&amp;</sup>	1.44 (1.74)	0.63 (0.92)
% who suffered complications during pregnancy	0.22 (0.44)	0.27 (0.46)
% using permanent contraception	0.11 (0.33)	0.26 (0.45)
Husband	0.31 (0.47)	0.17 (0.38)
% with membership of other community groups	0.56 (0.53)	0.55 (0.51)
Mean household size	5.89 (1.61)	5.32 (2.63)
Interviewer=1	0.56 (0.53)	0.54 (0.51)

Significance of difference in means in relation to those willing to pay a positive amount: \*<0.10, \*\*<0.05, \*\*\*<0.01

Used t-test for asset index (normally distributed). Mann Whitney U for other continuous variables.

@ for women's group members only.

& for non-members only

Although the variables are not significant (probably due to small numbers) a similar pattern of association can be observed between non-response and age in males, as well as wealth status and spending on medical care in the previous year (Table A 9.2). Level of education also shows an association, with male non-responders having more (mean and median) years of schooling than responders which is contrary to expectations.

So, overall, non-respondents were less familiar with the groups, had less experience of groups generally, and had lower knowledge levels about the programme. They also tended to be wealthier (females) and more highly educated (males). Those with zero values were poorer and had more children.

## **Appendix 10    Tobit regression results**

The log transformation of continuous independent variables did not improve the model fit or increase normality nor did the exclusion of those saying they would contribute time (Table A 10.1). We also ran the Tobit model on the square root of willingness-to-pay but the model still failed the normality test for the full model but passed at 0.1 level in the reduced model (Table A 10.2). This time the Ramsey Reset test indicated that the model was not incorrectly specified in either (full or reduced) versions. The signs and significance levels for the coefficients were as observed for the OLS regression presented in Chapter 7.

**Table A 10.1 Tobit regression of Log(wtp+1) against independent variables**

Independent Variables	Full Form		Reduced Form	
	Coef.	Std. Err.	Coeff	Std Error
AGE	-0.10	0.02***	-0.09	0.02***
AGE*CONTRACE	0.16	0.06***	0.05	0.05
LITERATE	-0.42	0.36	-0.52	0.37
ASSET	0.17	0.09*	0.26	0.08***
INTERVIEW	-0.04	0.30		
COMPLIC	0.18	0.38		
CONTRACE	-4.29	2.13**	-0.50	1.84
KIT	0.78	0.50	0.73	0.47
ROLEGP	-0.25	0.44	-0.72	0.37*
ROLEFORM	-0.18	0.68		
ANCVISI	-0.17	0.10*	-0.20	0.09**
MEETMONT	-0.95	0.71		
GROUP	1.19	0.47***	1.09	0.36***
NEWARI	0.44	0.45		
PROF	0.38	0.45		
INDO	0.02	0.46		
RISKHIGH	-0.61	0.30**		
HTOTAL	-0.04	0.06		
LOGMED	0.05	0.14		
_cons	7.83	1.25***	7.79	0.76***
Number of observations	97		104	
Number of censored variables	5		6	
Chi-sq statistic	42.73***		41.67***	
Ramsey RESET test	32.29***		10.30***	
Log likelihood	-173.00		-180.66	
Normality-conditional means test	53.92***		71.25***	

**Table A 10.2 Tobit regression on square root of willingness-to-pay**

Independent Variables					
	Full Form		Reduced Form		
	Coef.	Std. Err.	Coeff	Std Error	
AGE	-0.55		0.16***	-0.51	0.13***
AGE*CONTRACE	1.02		0.40**		
LITERATE	-4.01		2.34*	-3.98	2.38*
ASSET	0.47		0.57	0.88	0.50*
INTERVIEW	2.55		1.92	1.98	1.87
COMPLIC	0.99		2.49		
CONTRACE	-25.97		13.74*	8.58	2.47***
KIT	7.26		3.23**	6.21	2.90**
ROLEGP	-0.15		2.69		
ROLEFORM	-4.69		4.15		
ANCVISI	-1.10		0.58*	-1.38	0.54**
MEETMONT	-3.51		4.27		
GROUP	4.83		2.83*	3.94	2.25*
NEWARI	1.35		2.83		
PROF	1.44		2.81		
INDO	-0.59		2.78		
RISKHIGH	-3.67		1.95*		
HTOTAL	-0.12		0.39		
LOGMED	-0.06		0.89		
_cons	31.90		8.15***	30.03	4.77***
Number of observations	100			104	
Number of censored variables	5			6	
Chi-sq	34.76**			32.01***	
Ramsey RESET	0.63			0.90	
Normality-conditional means test statistic	11.81***			6.24**	

## Appendix 11 Random Effects Model

The Breusch and Pagan Lagrangian suggested that the random effects were not significantly different from zero ( $\sigma_u=0$ ;  $p=0.80$  full model;  $p=0.71$  reduced model). We also ran the random effects model on current women's group members only, to see if the effects were stronger in this group as one might expect. Again random effects were not significant ( $p=0.15$ ) (Table A.11.1).

**Table A 11.1 Random Effects model for Women's Group Members**

Independent Variables		
	Coef.	Std. Err.
<b>Fixed part</b>		
AGE	-0.05	0.02***
AGE*CONTRACE	-0.00	0.05
LITERATE	-0.46	0.22**
ASSET	-0.00	0.06
INTERVIEW	0.20	0.21
CONTRACE	0.68	1.68
KIT	0.79	0.26***
ANCVISI	-0.16	0.06***
_cons	7.12	0.57***
<b>Random part</b>		
Var (uoj)	0.77	
Var (eoj)	0.73	
Number of Observations	58	
Wald Chi2 stat	29.97***	
Ramsey RESET	1.26	
Breusch and Pagan Lagrangian multiplier test	2.03	

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